

## Chapter I

### INTRODUCTION

#### Background of the Study

There is no doubt that mathematics is a key science for the future, through both its fundamental development and its enabling role for science, engineering and technology. This is illustrated by dramatic advances in communications, bioinformatics, the understanding of uncertainty and dealing with large data sets. The former Director of the Division of Mathematical Sciences at the USA National Science Foundation, Prof. Philippe Tondeur has observed that "The 21st century is going to witness greater opportunities for mathematical sciences". Mathematical thought and concepts will become the primary navigational tools in the data driven world. As a result of the technological advancement in today's societies, mathematical knowledge has become essential for the success of individuals and for the progress and security of nations.

The factors that influence mathematics achievement has been interest of the policy makers, education practitioners, researchers and society because of the far reaching consequences of underperform in the subject for the decades. There are several research have been done on the field of the mathematics achievement of student in different country of the world. To implement the result of the research are not easy to our developing country. People think that mathematics achievements of the student are personal and private. But the success of students' achievement in mathematics has consequences not only for the students' personal and professional life but also for national development.

Academic achievement is one of the key indicators for measuring the outcomes of education. So that mathematics achievement is also taken as backbone of the whole education system. Mathematics achievement is pillar of the further study. Mathematics has led the development of various subjects, vocations and technology. Nowadays mathematics is used as languages. So, mathematics has been accepted as an important component of formal education from ancient period to the present day.

Students' mathematics achievement is often associated with the future economic power of a country. TIMSS advanced 2015 international results in mathematics shows that the developed country (Russia, Lebanon, US, Portugal, France, Italy, China-Hong Kong) mathematics achievement score was high. For many years, educators and researchers have debated which school variables influence student achievement (Darling-Hammond, 2000). The detrimental factors of pupils' mathematics achievement affect different variables such as teacher qualification, experience, student attitude on math, parents educational and economic condition, social culture, physical facilities, administrative management, schools environment etc. In this research researcher include only three independent variables teacher related factors, student related factors and environmental factors.

In the instructional process, achievement of each student is different. So what is the reason there? We can guess there are several responsible factors; they are direct and indirect factors that had been affecting achievement of students at secondary level. The direct factors are student and teacher related factors and indirect factors are environmental factors. Student related factors are mainly personal interest, prior knowledge, peer group, error in problem solving and teacher related factors are mainly

qualification, behavior and experience etc. And environmental factors are physical facilities of school, number of student at school, role of administration, parents awareness, social condition and culture etc.

Family related factors include variables such as parental education occupation and economic condition of family and school related factors comprise variables such as class size, mathematics teachers; qualification and teaching experience of mathematics teachers. The social related factors comprise variables were literacy rate of society, social system, cultural customs and train of society The error of problem solving were reading error, comprehension error, process skill error and encoding error and the time related variables were drill review and maintenance (Lamichhane, 2015).

Mathematics achievement is the back bone of the community development. It is directly and indirectly determined, reason behind there exist several detrimental factors. So, teachers, parents and school administration must be conscious to promote the students mathematics achievement as well as meaningful teaching.

### **Statement of the Problem**

It has been seen that achievements of the mathematics in schools are different. Some of them schools have high achievement whereas some of them have low. So, what are the reasons behind such deviations in the achievement of the students? It is the main contemporary phenomena in the field of mathematics education. In Nepal, Mathematics is one of the core compulsory subject from basic to secondary levels of school education. Despite the wide applicability and importance of mathematics, students consistently perform poorly in the subject, which makes our country lose economic advantage over

other countries. Hence, Mathematics achievement (MA) has been a great concern for researchers, policymakers, educators, teachers, parents and students themselves.

The new curriculum of mathematics in secondary level has been implemented in the history of Nepal since 2055 B.S. The mathematics is being taught as compulsory subject for 100 full marks whereas optional mathematics as also 100 full marks. The data of the SLC shows that student's achievement in mathematics is relatively low and unsatisfactory. So, there are several detrimental factors that affect on achievement of the student. Mc Guire (2000) mentions many variables in low achievement of students, but this study focuses on the context of three indentified factors: First is student self related factors which include study habits, time management, attitude and interests towards mathematics. Second is teacher factor, which is compose of mastery of the subject matter, instructional techniques and strategies, communication skills and personality. Third is environmental factor it includes physical facilities of school, vision of school administration, parents' values and attitudes, classroom management and haleness of peer group.

### **Objectives of the Study**

Every research has some fixed purpose. This study aims to explore the possible detrimental factors of the mathematics achievement and analyze them. This study has two objectives which are given in the following bullets.

- To find out detrimental factors of mathematics achievement of grade X students
- To analyze the major factors that affect in achievement of mathematics of grade X students.

## Research Questions

The study has intended to answer the following research questions;

- what are the major detrimental factors of achievement in mathematics?
- which factor is more significant in hindering mathematics achievement?

## Significance of the Study

Mathematics is one of the most important core subjects in school level curriculum. A national goal of the secondary education has been determined to develop the knowledge and skill of mathematics and to solve daily life problem in our society. But most of the students are fear from mathematics and feel that it is more complicated. The data of the different district education office showed that the results of mathematics at secondary level was low achievement than others subjects. Also maximum numbers of students fail in mathematics. Therefore, this study is concerned with to identify the factors that makes mathematics subject is more vague and affects the results of the students. The following are the major significance of the study

- This study would helpful to find out the possible detrimental factors of mathematics achievement.
- This study would helpful to minimize the failure rate of the students in mathematics.
- This study would help for school administration, parents and related teachers.
- This would help the curriculum planners, policy maker and textbook writer.

### **Delimitation of the Study**

The study has the following limitations.

- This study is limited to Kathmandu District.
- The study was limited to role of student, mathematics teacher, school, parents and administration.
- Only 4 public schools are selected in the study.
- This study focus on the interaction between mathematics teacher, student, parents and role of the school administration.
- This study would conduct in grade X.

### **Definition of Operational Terms**

Every study constitutes some of the key words depending upon the problem, objectives, methods, variables etc. The researcher, in this study used the following terms and their operational definitions as;

**Detrimental:** The term detrimental is affecting factor in mathematics achievement, which gives students' mathematics achievement result low and high.

**Achievement:** The term achievement is defined as score obtained by mathematics student in the MAT test taken by researcher.

**Factors:** The term factor is defined as students' personal factors, teacher related factors and environmental factors in this research. The factors related to students are interest, time allocation, and problem solving attitude. The factors related to teacher are

qualification, experience and behaviors. The factors related to environment are physical facilities of school, parents' awareness and school's administrative vision.

**Student:** In this study, students refer the pupil reading at grade X during academic year 2075.

**Mathematics Achievement Test (MAT):** In this study MAT deals about mathematics achievement test which would conduct by researcher to find out the student achievement in mathematics.

**Secondary level:** Secondary level refers to class nine and ten.

## Chapter II

### REVIEW OF THE RELATED LITERATURE

A literature review is an essential part of studies. It is the process of locating, obtaining, reading and evaluating the research literature in the area of the research. A review of related literature is the source of further study of research task. It helps to give the better idea at surveying in the research hypothesis. The related studies provide the research in making problem more realistic, valid, precise, researchable and meaningful.

This chapter describes the review of the literature relating to various aspects linked to detrimental factors of mathematics achievement of students at secondary level. For this, the researcher visited some libraries and even browsed the internet to get through the books, journals, articles, thesis and dissertation in order to know what other said about detrimental factors of students' achievement in secondary level mathematics. In this review of literature, the following primary databases were used during the literature search: ProQuest Research Library, ProQuest Digital Dissertations, dissertation.com, Open Access Theses and Dissertations, Education Resources Information Center (ERIC), bookzz.org. Additionally, sources were obtained through search engines (such as Google Scholar), suggestions from the thesis supervisor, the researcher's preexisting collection of literature and through references found within collected sources.

#### **Empirical Literature**

The third international mathematics and science study (TIMSS) investigated on middle school grades and found that majority of the participating countries performed



above the international average. In most countries, gender differences were lower in mathematics. In almost every country, the majority of students agreed that they did well in mathematics. Similarly, the major findings of TIMSS (2003) stressed that the countries where TIMSS was under work were seen to have increased mathematics achievement of grade eight students over the eight years period from 1995 to 2003 (Mullis et al., 2003).

Stone (1908) was the first person who conducted a comprehensive study in the area of mathematics achievement. He surveyed the arithmetic achievement of three thousand student of sixth grade from twenty six school systems and found some evidence that help in homework and discussion about school work help in student's from twenty six school systems and found some evidence that help in homework and discussion about school work help in student's achievement. Beswell and Judd (1925) reported a little relationship between achievement and the time spent on instruction. According to Hogan (1975), children generally want to participate in conferences because they want to show their work to their parents and wanted to receive positive reinforcement form the teachers in their parent's presence. Those children who do not want to participate in a conference usually fear from their parents reactions or fear from their parents will focus entirely on negative issues. Stevenson and Baker (1987), found a positive relationship between parents involvement and the student's school achievement in a sample of 179 grade school children. They also observed that parents of high educational attainment whose children were in lower grades show higher involvement than their counterparts. A longitudinal study conducted by Fehrmann, Kith and Reimers (1989) determine the effects of parental involvement on student's achievement. Analysis showed that parent's involvement resulted in student's achieving higher grades and

spending less time watching television and more time on homework. These relations were found similar for different ability groups. Reynolds (1992) collected data from parents, teacher, and students regarding perceptions of parental involvement. He also gathered data on reading and mathematics test performance from low-income, minority students and found parents' involvement and the achievement how low to moderate positive correlation.

Shrestha (1999) has conducted a research to assess achievement of grade five students in mathematics in terms of teacher's qualification. He studied three groups of student samples comprised of those taught by the trained teachers with S.L.C., Intermediate and Bachelor's degree. The result reveals that the third group of student samples taught by the trained teachers with Bachelors' Degree secured the highest score(37.46) in mathematics than other groups of sample students.

Joshi (1997) has conducted a study to examine the factors that influence secondary level students' mathematics achievement. The result reveals that teachers' certification had significant and directly affect in mathematics achievement. However, no study has been conducted to see whether teacher having degree in mathematics achievement. In this regard this paper intends to provide a clear picture on effect of teachers' qualification.

Research center for education innovations and development (CERID,1985) conducted a study among the grade five students and identified that majority of students' secured less than 45% marks in mathematics. BPEP (1997) conducted the study "The effect of new curriculum on the achievement of grade four students". This study revealed that the mathematics achievement was just 28%. Similarly, Basic and Primary Education

Project (BPEP, 1998) investigated the effect of new curriculum on the achievement of grade five students and concluded that the mathematics achievement was just 26.58%.

CERID (1999) a study entitled assessment of learning achievement of lower secondary children (Grade six and eight) was conducted. In this study, altogether twenty-two sub-factors under the student's personal characteristics, school related variable and family/house background were selected in order to find out the factors contributing to the grade six and eight students' achievement in mathematics. In this research seven factors were found these are; mother's occupation, student's gender, age, language spoken at home, worked at home, absent days in the school, grade repetition and father's occupation were found as major factors. The data analysis tools mean, SD, regression equation and t-test were used and the data collected through the students' achievement test interview and survey forms for head teacher, teacher staff and school related variables.

A study entitled the effect of new curriculum on the achievement of grade five students was carried out by BPEP in the year 1998. In this study, the household characteristics, student's characteristics, school characteristics and teacher's characteristics were included. The achievement of students in the various components of mathematics was studied. This study report revealed that the student's achievement scores in mathematics were very poor i.e. below 30% not even the required pass marks. Similar type of study among the grade four students was conducted by BPEP in the year 1997, which concluded that the achievement score in mathematics among the grade four students was 23.42% which was very poor and least among the other subjects.

EDSC/BPEP (1999) carried out a study national assessment of grade five students. Here, it studied factors affecting student's achievement such as school related

factors, student related factors and teacher related factors. Furthermore, the study acknowledged gender as significant factor. There, the national level achievement score of grade five students in mathematic was 27.25% which was significantly poor.

Mohamed Z.G. Al-Agili and Mustafa Bin Mamat, (2012) did a research entitle the factors influence students' achievement in mathematics. A case for Libyan's students found that affecting factors were teaching practices (which was recorded highly on loading), teacher' attribution, classroom climate, students' attitude towards mathematics and students' anxiety. The results showed that the teacher' attribution and students' attitude towards mathematics were the highest and lowest factors influencing the students' achievement, respectively. Moreover, the relationship among Teaching Practices and teacher attribution was high (0.68). Generally, good correlations were found among these factors in one hand and student's achievement in mathematics in the other hand.

Joshi (2011) concluded a research on factors affecting mathematics achievement in infective school in the remote area of *Doti* district from the field survey and distractively analyzed. Ten students (5 boys and 5 girls) were selected randomly. The major findings were as the physical facility of school was just satisfactory but not enough to facilitate effective and creative teaching learning activity. The school lacks library. Though the teacher was a academically qualified still following traditional teaching methods. There was no provision of extra classes for low performer in math. Teacher and parent have communication gap.

Chaman, Mini Joseph (2014) did a study factors influencing mathematics achievement of secondary school students in India. Found that parental involvement was

significantly and positively associated with attitude towards mathematics and but had no significant association with mathematics anxiety. Mathematics anxiety and attitude towards mathematics were significantly and positively related. The relationship between parental involvement and mathematics achievement was non-significant. Student attitude towards mathematics, and mathematics anxiety were also not significantly related to mathematics achievement. Gender was found not to have any influence on the variables. Interview data revealed that all of the parents had high expectations for their children's mathematics achievement that they had communicated through consistent reinforcement.

Ghimire (1997) studied on study on factors affecting teaching / learning mathematics at secondary level with the purpose to study the factor, affecting learning of schools in terms of school environment, family background, and motivational material. Taking the sample on ninety students and used the tools to analyze the data t-test. And conclusion is the environment of school in both rural and urban area affects quality but the boys are more affected than girls. Home environment affected girls more than boys. Urban areas students were more affected by the use of innovative instructional materials and girls paid more attention to use of instruction.

A research was conducted by educational development service center (EDSC), (1999) in national assessment of grade five students, with a view to collect baseline information about the performance of grade fived students in Nepali language, mathematics and social studies. The overall mean performance of students at national level in mathematics, Nepali and social studies were found to be 27.25, 51.46 and 41.79 respectively. This data shows that the performance of the mathematics is low so it need to emphasis on teaching mathematics.

National assessment of student achievement (NASA) conducted a research on achievement of grade nine students of Nepali, Social Studies and Mathematics in 2011. And found that achievement of Nepali, Social and Mathematics were 49%, 49% and 43%.

Nath (2007) did a study on a topic a study of causes of failure in optional mathematics in SLC examination. Main objective of this study is to what is the cause of the failure in mathematics at SLC and found that text book are more theoretical, lack of teaching materials and teaching without familiar with students' previous knowledge.

Sapkota (2005) studied on a comparative study of the mathematics achievement on SLC result of Kathmandu and *Kabhare* district of Nepal. The major findings of the study in several variables are presented as follows; there is significant difference between the achievement in mathematics students of Kathmandu and *Kabhare* 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.

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 the effectiveness of unit test as a teaching tool for enhancing achievement in mathematics at the seventh grade level of a secondary 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, competition items. He found that the achievement of two groups differed significantly.

CERID (1980) conducted a research entitled achievement study of primary school children and found that a great difference between the achievement of boys and girls. In their conducted a study (1982) on national achievement status of children who completed primary school, entitled "Achievement Study of Primary School Children" concluded that performance of boys in mathematics was better than girls.

Chaudhary (2000) conducted a study in a comparative study of achievement of secondary level students related to parents educational status including 150 students studying in grade five of public schools in *Saptari* district. The finding of this study showed that the mathematical achievement of educated parents' children were higher than literate and illiterate parents' children. Similarly the mathematical achievement of literate parents' children were higher than illiterate parents' children. In other words, mathematical achievement of students of grade v is effected by parents' educational status.

Hong and Ho (2005) examined the longitudinal effects of parental involvement on the academic achievement of students from different ethnic groups utilizing second-order latent growth modeling. Their results indicated that the direct effects of parental involvement were significantly different for students belonging to different ethnic groups and that students' locus of control and educational aspirations mediated the indirect effects of parental involvement.

Upadhyay (2001) write his dissertation on effect of constructivism on mathematics achievements of grade V students in Nepal from Panjab University Chandigarh, India with the research questions. Does constructivist approach produces

better results than conventional approach in students' achievement in terms of immediate learning, retention and net gain? Does constructivism encourage the habit of self-learning and self-correcting? Can constructivism in mathematics be applied in Nepalese school situation? What could be the problem that might arise while applying constructivism?

The research was conducted the experiment with the three key words action, verbal and scaffolding. The aim of the research was to adopt and advocate constructivism in mathematics teaching in Nepalese classroom. The researcher developed the teaching episodes and reliability was established.

After review the empirical literature concluded that many detrimental factors were around the field of students' mathematics achievement. It is found that detrimental factors of mathematics achievement are different on the perspective of country, society, community and environment the affecting factors are different. The researcher choose the only three detrimental factors among them which were student related factors, teacher related factors and environmental factors. These factors mention in the conceptual framework.

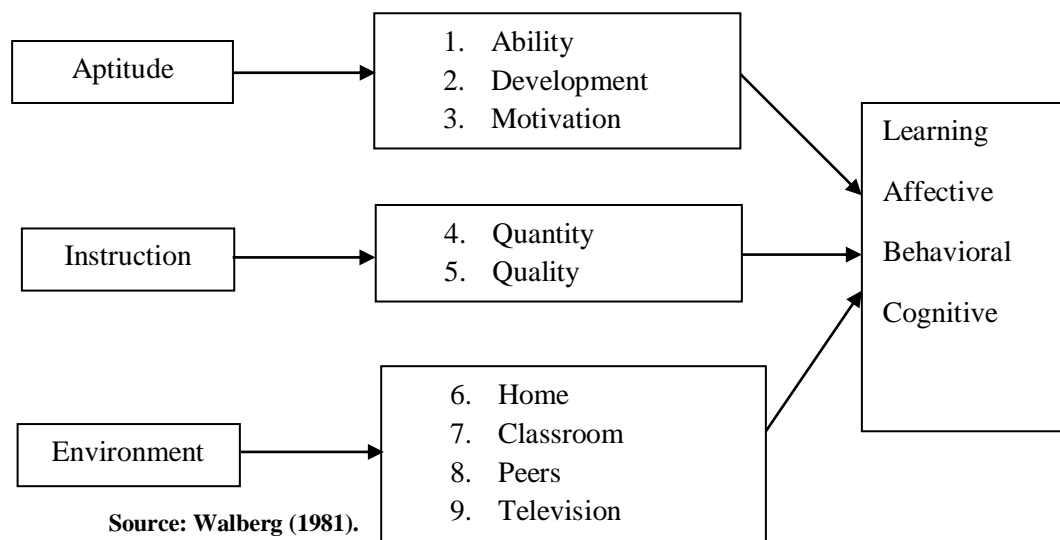
### **Theoretical Review**

There are many learning theories which can be used for the analysis and interpretation of data such as classical conditioning, social constructivism, operant conditioning and trial and error theory and others. This study guided by the theoretical foundation of Walberg's (1981) "Theory of educational productivity".

### **Walberg Model (1981)**



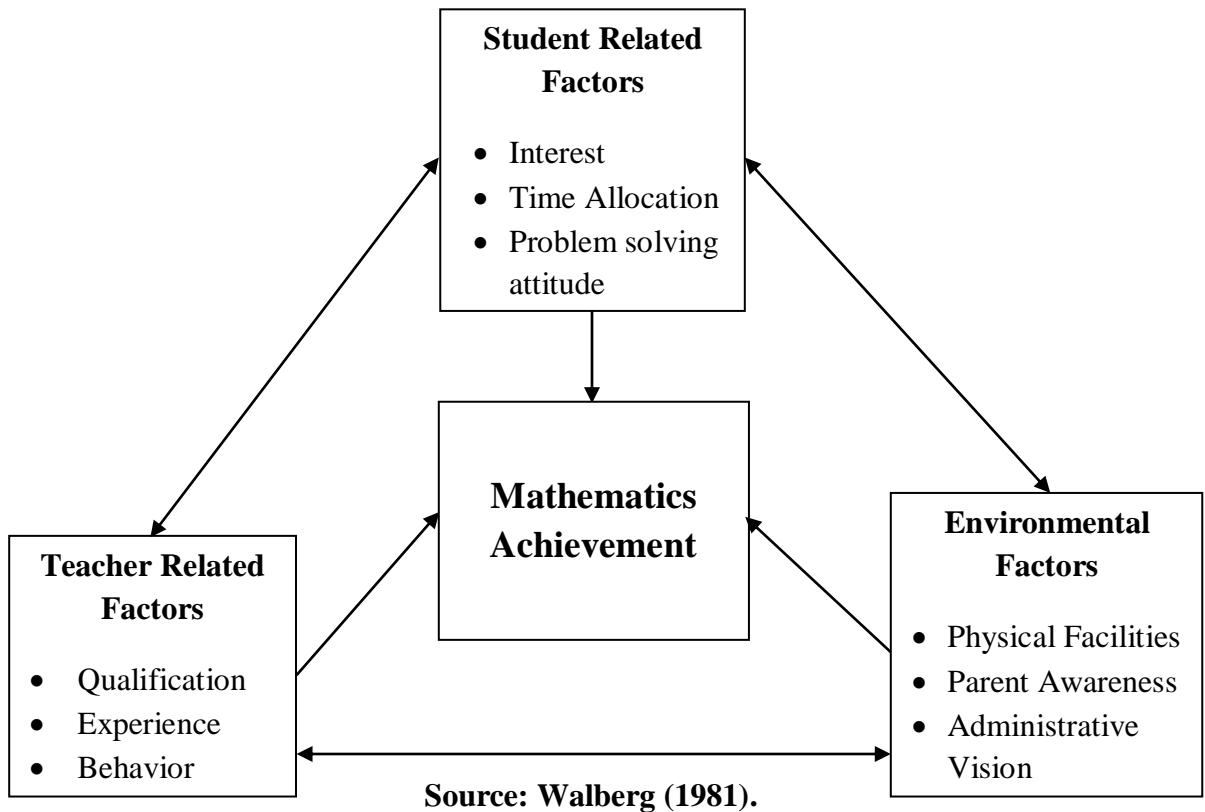
Walberg (1981), proposed "Theory of Educational productivity". This model has defined learning as a function personal variables, instructional treatment and environment. Walberg describes a theory of educational productivity requiring optimization model, which mentions nine factors to influence achievement of cognitive and effective outcomes. The nine productive factors of the students' related variables are given in this figure.



According to this model, learning is primarily affected mainly by students' factors: ability of student, skill development, motivation towards mathematics. Similarly, teachers' factors: quantity and quality of teacher in instruction. And environmental factors: home environment, classroom management, peers behavior and impact of television. So that mathematics achievement is increased and decreased in terms of these factors.

### Conceptual Framework

A conceptual framework is a representation, either graphically or in narrative form of the main concepts or variable and their presumed relationship with each other. Mainly, detrimental factors of mathematics achievement are student related factors, teacher related factors and environmental factors. After study of related literatures it was found that detrimental factors of mathematics achievement are school related school environment, home environment, social system, personal behavior, time variable and error in problem solving. The conceptual framework of this research is given in the figure below.



### Chapter III

#### METHODS AND PROCEDURES

Research methodology is a plan procedure which determines how to complete the research systematically. This chapter deals about the theoretical methodology. The design of the study was mixed in nature and aimed to find out the detrimental factors of mathematics achievement of student at class ten. Quantitative and qualitative both methodology were used and survey design supported by descriptive approach. This chapter explains the details of the procedure used in this study in the following sections.

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

A combination of quantitative and qualitative mixed research methods was used to collect data for the study. The tools survey used for collecting the quantitative data and interview for qualitative. Thus, it follows mixed method in nature. To explain the term survey design it is a form to planned collection of data for the purpose of analyzing the relationship between mathematical achievement and students' personal, teacher related and environmental factors of the government school of Kathmandu District.

##### **Research Area**

Researcher selected Kathmandu district for this study. It is located from 27°27'E to 27°49'E longitude and 85°10'N to 85°32'N latitude. Kathmandu is the capital of Nepal; it is a located in Kathmandu Valley, Province No. 3 of Nepal. It is one of the 77 districts of Nepal, covers an area of 395 km<sup>2</sup> (153 sq mi), and is the most densely populated district of Nepal with 1,081,845 inhabitants in 2001 and 1,744,240 in 2011. The district's

headquarter is Kathmandu Metropolitan City, it is also a famous tourist spot as there are many religious temples, attracting places. The district is surrounded by:

Here are different types of cast and ethnic groups have been leaving. Such as *Newar, Bramhan, Kshetri, Magar, Gurung, Dalit, Tamang, Tharu* and other different casts. Kathmandu district is the pioneer district in education in many aspects in Nepal. Durbar High School (the first school of Nepal), Trichandra College (the first college of Nepal), Padma Kanya College (the first women's college) are all located in Kathmandu city. Tribhuwan University, the first and biggest university of Nepal, is located in Kirtipur municipality of Kathmandu district. Besides these, thousands of educational institutions are located in the district which enrolls students from Nepal and foreign country. Figure of research area Kathmandu had been kept in appendix-E.

### **Population of the Study**

The population of the study consisted of all regular students of class X in academic year 2075 of Kathmandu district.

### **Sample of the Study**

There are 996 secondary schools in Kathmandu district. Among them 186 are community government secondary school and 810 are institutional secondary school. In this study researcher select only four government school using convenience sampling method from the Kathmandu district involving 60 students from each school. Thus, there were 240 students in total sample. In addition, two math teachers, two head teachers and six students had taken from sample school and participating in interview.

### **Tools of the Study**

To collect the data for this study the researcher use the following tools;

- Mathematics Achievement Test (MAT)
- Likert Scale Questionnaire
- Interview schedule

### **Mathematics Achievement Test (MAT)**

MAT was the main tool for the data collection of this study. The validity of MAT was determined by expert judgment and reality of the test would determined by taking item analysis in a small group. Initially, 50 questions were made for the item analysis test. Then, those questions were tested in a small group of 15 students of Mangal Secondary school, Kirtipur. Then, among 50 MAT questions, only 40 questions were selected after item analysis. The set of mathematics achievement test questions and item analysis kept on the appendix-A and appendix-B respectively.

### **Likert scale Questionnaire**

In the way of collecting primary data, the tool questionnaire was used to collecting the data. In this study researcher developed the tools by himself, discuss with expert and thesis guide to make it reliable and valid. In the form of Likert scale questionnaires was developed by the researcher with the involvement of experts and supervisor of this thesis. There were 25 observational points, student related factors containing 5 bullets, teacher related factors and environmental factors as well as containing 5/5 bullets. For measuring opinion of the student, Likert scale questions were used. The options including in the Likert scale were Strongly Agree, Agree, Neutral,

Disagree, Strongly Disagree and marking by 5,4,3,2 and 1 respectively. The model of Likert scale questionnaire is kept in the [Appendix- C].

### **Interview**

Interview is one of the most popular tools take the data from internal thought, interest, concept and thinking of a person. It is a tool to find out experience, internal thought of person according to their acting, looking and facial expression.

The interview schedule was developed in semi-structured form with the suggestion of the supervisor of this research. Interview had taken from student, head teacher and math teacher of the selected schools. Reason behind this interview was to analyze the major detrimental factors that affect in achievement of mathematics of grade X students'. The basic interview guideline questions were kept in appendix-D.

### **Data Collection Procedure**

With the help of the head teacher and math teacher researcher collected the data from selected school. To collect the quantitative data researcher used the survey design. It can be divided into two categories MAT and questionnaire. Researcher was make 40 question to measure the student's mathematics achievement. MAT would administrate to the student to find out achievement level of students' in mathematics. In the questionnaire there were 15 question included. It was based on five Likert scale. It is also distributed to find out opinion of student detrimental factors affecting mathematics achievement. To collect the qualitative data interview was taken from student, head teacher and math teacher.

### **Data Analysis Procedure**

Data analysis is heart of the research. After collecting the data, analysis is most important for research. At the first researcher analyzed the data by calculating the mean score of obtaining data from the questionnaire. After that researcher had used to analysis the data by using liner regressions equation with four variables as;  $Y = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3$ . Where,  $Y$ = Achievement of the student,  $X_1$  = Student related factors,  $X_2$  = Teacher related factors and  $X_3$  = Environmental factors which can be compute by using SPSS and analyzed in the thematic form. To analysis the qualitative data researcher used to collected information from interview with considered persons. Question and response of the participant has been written and the various themes were generated according to the advice of the supervisor and experience of the researcher.

## Chapter-IV

### ANALYSIS AND INTERPRETION OF DATA

Data analysis deals with the statistical analysis and interpretation of obtained data from different tools. In this study researcher used take quantitative data from the MAT and questionnaire. Qualitative data had taken from open ended interview. The collected data were classified, tabulated and analyzed according to the objectives of the study and were analyzed and interpreted discussed on following section respectively.

#### Students Related Factors

Students are the main component of learning. All activities of the school's are centered with student. In this study researcher has been taken student related factor is important detrimental factors of student's mathematics achievement. Five observational points, opinion of the student given in the table no.1 and analysis of them has done below.

**Table No. 1: Statement Related Student**

S.N.	Observational Points	SA	A	N	D	SD	Mean
1	I am curious to learn mathematics	35	93	71	24	13	3.42
2	I like to practice extra math problem	21	33	46	67	73	2.425
3	I read math two hours per day	68	76	47	35	14	3.62
4	I read math on holidays	38	75	87	24	16	3.39
5	I feel enjoy to practice math problem	37	84	69	27	23	3.35



As we know that in the school the students' self - support play very important role for learning mathematics. The 240 respondents were asked about the students' self - support and the respondents gave their views accordingly. From this data mentioned in the above in S.N. 1 is related to they are curious to learn mathematics in which 35 are strongly agree, 93 are agree, 71 are neutral, 24 are disagree and 13 response are strongly disagree. The average rating scale of they are curious to learn mathematics is 3.42 which is better, which indicate students' are satisfied with they are curious to learn mathematics. Similarly S.N. 2 is related to they are practice extra math problem in which 21 are strongly agree, 33 are agree, 46 are neutral, 67 are disagree and 73 response are strongly disagree. The average rating scale of they are practice extra math problem is 2.43 which is not as accepted, which indicate students' are not practice extra math problem.

Likewise, S.N. 3 is related to they read math two hours per day in which 68 are strongly agree, 76 are agree, 47 are satisfactory, 35 are disagree and 14 responses are strongly disagree. The average rating scale of they read math two hours per day is 3.62 which is better, which indicate students' are satisfied with they read math two hours per day. Similarly S.N. 4 is related to they are read math on holidays in which 38 are strongly agree, 75 are agree, 87 are neutral, 24 are disagree and 16 are response are strongly disagree. The average rating scale of they are read math on holidays is 3.39 which is better, which indicate students' are satisfied they are read math on holidays. Similarly S.N. 5 is related to they feel enjoy to practice math in which 37 are strongly agree, 84 are agree, 69 are neutral, 27 are disagree and 23 responses are strongly disagree. The average rating scale of they feel easy to practice math is 3.35 which is better, which indicate students' are satisfied with they feel enjoy to practice math.

From above table and analysis it was seen that among five bullets, four bullets are favorable and one bullet is unfavorable. The highest mean among the bullets are S.N.1. showed that maximum students are curious to learn mathematics problem. But the mean of S.N.2 was unfavorable, so student rarely practice extra mathematics problem. Maximum students were enjoying to practice mathematics problem on holiday. The average value of mean of the table no.1 is 3.24 indicted that overall performance of the student was favorable. Student self practice is most important for his academic achievement. A student get high or low achievement according to their hard work on the study and other are secondary part. To obtain high score in mathematics student most focus to practice mathematics problem.

### **Interview with student**

#### **Physical facilities of school**

Physical facilities of school plays vital role in achievement of mathematics. It create easy environment for mathematics learning. So, on the taking interview with participant student on the question; describe the physical facilities of your school. The respondent answered that - *In our class there are four sections. The class size is appropriate, decoration of class, desk bench, light effect, white board and fan are well managed. Toilet, playground and cafeteria are sufficiently available. Similarly library, smart board and ICT lab are highly managed. In this question the next schools' participant said that smart board, ICT lab, play ground, cafeteria and tap are not available.*

#### **Teaching Learning Activities**

Teaching learning activities at school determined the achievement of student. It is depend on the teacher that what kinds of the activity are appropriate for the mathematics learning? The researcher asked the question with participant; explain the teaching activities of your math teacher at class. Then respondent said – *At first our teacher warm up and review previous class. Objectives are present according to the topic. Then start objective oriented discussion. Teacher used teaching materials demand as the content. Teacher ask the question some student what do you know about this topic? Then give the definition, example and non example of the topic and then facing the problem. At the end of the class teacher ask some questions and give homework.*

### **Extra activities in school**

To explore the internal ability of the pupils extra activities is needed at school. It gives the opportunity to perform the creative action of student. Researcher asked question; what kinds of extra activity related to mathematics has been conducted in your school? Then, participant answered - *Sometimes school organized the mathematics exhibition where we present our creation and concept. School also organized a tour for only students and math teacher. Next schools' participant Said that extra mathematics activity not conducted in our school.*

From above opinion of the participant it was found that some schools were well managed and some were not. Teaching learning activities of the teacher was better in each school and extracurricular activity like mathematics exhibition not conducting at each school but some of them were organized. Good physical facilities, learner centered teaching learning activities, extra creative program enhance the mathematics achievement.

### Teacher related factors

Teachers are the main pillar of the school. They must support to the students for mathematics learning. Without their support no students can learn anything from them. Here, especially teacher support means help to students for their study, solve the problems what they need. And the teachers should care their activities inside the school and outside of it.

**Table No. 2 Statement Related to Teacher**

S.N.	Observational Points	SA	A	N	D	SD	Mean
1	Teaching quality of your teacher is good	40	105	85	7	3	3.72
2	Teacher complete the course on time	70	95	66	5	4	3.92
3	Your teacher taught according to the curriculum	31	102	98	6	3	3.63
4	Teacher help in the students' learning	25	43	61	65	46	2.54
5	Your teacher evaluate regularly	23	57	79	49	32	2.95

The above table shows the learning factors with related to teacher's support. As we know that in the school the teachers play very vital role for learning mathematics. The 240 respondents were asked about the teacher's support and the respondents gave their views accordingly. From this data mentioned in the above in S.N. 1 is related to teaching quality of your teacher in which 40 are strongly agree, 105 are agree, 85 are satisfactory, 7 are disagree and 3 responses are strongly disagree. The average rating scale of teaching quality of your teacher is 3.72 which is better, which indicate students' are satisfied with their teacher qualification.

Similarly S.N. 2 is related to teacher complete the course on time in which 70 are strongly agree, 95 are agree, 66 are neutral, 5 are disagree and 4 response are strongly disagree. The average rating scale of teacher complete the course on time is 3.92 which is better, which indicate students' are satisfied with their teacher complete the course on time. Similarly, S.N. 3 is related to teacher thought according to the curriculum in which 31 are strongly agree, 102 are agree, 98 are satisfactory, 6 are disagree and 3 responses are strongly disagree. The average rating scale of teacher thought according to the curriculum 3.63 which is better, which indicate students' are satisfied with their teacher thought according to the curriculum.

Similarly S.N. 4 is related to teacher helps students after the class also in which 25 are strongly agree, 43 are good, 61 are agree, 65 are neutral and 46 responses are strongly disagree. The average rating scale of teacher helps students after the class also is 2.54 which is not better, which indicate students' are not satisfied with teacher helps students after the class also. S.N. 5 is related to their teacher evaluate regularly in which are 23 strongly agree, 67 are agree, 89 are neutral, 39 are disagree and 22 response are strongly disagree. The average rating scale of their teacher evaluate regularly is 3.12 which is better, which indicate students' are satisfied with their teacher evaluate regularly

Among 5 points of the above table no.2 mean of the three bullets were satisfactory and other two were unsatisfactory. Among five points the mean score of the points S.N.2. was highest. Found that math teacher accurate complete the course in time. The quality of the math teacher was better and found that teacher taught according to the curriculum framework. Similarly, two bullets have low mean score respectively S.N.4 and S.N.5. Among the five points the lowest mean score was point of the S.N.4. Show

that teacher didn't help to the student at learning. Means math teacher teach according to the traditional method. Similarly, bullets of the S.N.5 had mean score low so the students are not satisfactory it can be conclude that math teacher didn't evaluate the regularly they only teach. From the above table No.2, the average value of average was 3.352. The variable teacher related factors show that, positive because of the math teacher were qualified, they completely finished math course in time and taught the math subject outline of the curriculum.

### **Interview with math teacher**

#### **Classroom Performance**

Teacher is the idol person for student. Performance of the teacher must be sound and effective on the period of teaching mathematics. The transformation of knowledge depends on the performance of the teacher. Researcher asked the question with participant; explain your classroom performance while teaching mathematics.

Respondent answered - *I used to inductive and deductive both methods according to the nature of the topic. Sometimes I used to problem solving and meaningful verbal learning method. I used to teaching materials as possible demand of the content. Firstly I warm up review the previous class. Then I inter in the new topic and give the concept of topic, define the topic, give the example and non examples. Then explain about the problem and solve it. Ask have you any question? Then, at the end of the class ask some question for some student to evaluate then give homework.*

#### **Treatment of student's problem**

In the mathematics learning different mathematics problem are arise. What kinds of treatment techniques used for solve the problem a teacher it is the responsible thing. On the question; how to treat students' problem of mathematics? Respondent replied – *I used to George Polyas' method. First I check the pre request knowledge of the student about the problem. Then motivate to student for understand and identifying the problem. Then discuss how to solve and give guideline or idea to student. If student cannot I solve it.*

### **Counseling and guidance**

No guidance of teacher, student cannot learn anything. So, counseling and guidance of the teacher need to student at every learning step. Researcher asked question with math teacher; what kind of advice and counseling give to your students about mathematics subject? Then, math teacher said - *At first, student need to ----Understand mathematics is funny subject.*

*-Give the more time for practice.*

*-Mathematics is practical subject take as a social science, linked with your behavior and use in your daily life.*

Teaching is an art. A well trained teacher only can use different instructional technique in the classroom to address for all cognitive level of students. The performance of the teacher should be sound and encourageable. The traditional behavior of teacher in class is not good, so teacher should be play the role of catalyst and helpful.

As we know that for learning mathematics teachers support plays vital role to the students. Without teachers' support no students can learn any subjects properly. Well

performance of the teacher, treatment of student problem, positive counseling and guidance of teacher to student accelerate the mathematics achievement of student. The behavior of the teacher should be effective, co-operative and helpful.

### **Environmental Factors**

Environmental factors of the student mainly refer to home and school environment. To enhance the mathematics achievement school, home environment as well as school administration plays the vital role. School administration should manage the extra classes and should provide teaching materials to the teachers for learning mathematics. On the other hand school administration should support the students' and create mathematics learning environment. Some environmental point's opinion of the student and analysis had done below.

**Table No.3 Statement Related to Environment**

<b>S.N.</b>	<b>Observational Points</b>	<b>SA</b>	<b>A</b>	<b>N</b>	<b>S</b>	<b>SD</b>	<b>Mean</b>
1	Extracurricular activity conducted at school	18	52	65	57	48	2.72
2	Home environment is good to read	39	69	105	19	8	3.46
3	Teachers are sufficient at school	84	36	66	42	12	3.57
4	Your parents visit school regularly	13	38	79	65	45	2.62
5	Math lab and library is well managed	24	72	43	32	69	2.79

As we know that in the school environment as well as school administration plays the vital role in promoting the students' mathematics achievement. The 240 respondents were asked about the environmental and the respondents gave their views accordingly. Similarly S.N. 1 is related to extracurricular activity at school related to math in which 18



are strongly agree, 52 are agree, 65 are neutral, 57 are disagree and 48 responses are strongly disagree. The average rating scale of extracurricular activity at school related to math is 2.72 which was not accepted, which indicate extracurricular activity wasn't sufficiently conducted at school related to mathematics.

Similarly S.N. 2 is related to good home environment in which 39 are strongly agree, 69 are agree, 105 are neutral, 19 are disagree and 8 responses are strongly disagree. The average rating scale of good home environment is 3.46 which are better, which indicate students' are satisfied good home environment. Similarly S.N. 3 is related to teacher sufficiency at school in which 84 are strongly agree, 36 are agree, 66 are neutral, 42 are disagree and 12 responses are strongly disagree. The average rating scale of teacher sufficiency at school is 3.57 which are better, which indicate students' are satisfied with teacher sufficiency at school.

Similarly S.N. 4 is related to regular school visit by parents in which 13 are strongly agree, 38 are agree, 79 are neutral, 65 are disagree and 45 response are strongly disagree. The average rating scale of regular school visit by parents is 2.62 which is not satisfactory, which indicate students' are not satisfied with regular school visit by parents. Similarly S.N. 5 is related to mathematics lab and library in which 24 are strongly agree, 72 are agree, 43 are neutral, 32 are disagree and 69 responses are strongly disagree. The average rating scale of mathematics lab and library is 2.79 which is not accepted, which indicate most of school had no mathematics lab and library.

From the above table no.3 there were five observational points which was detrimental factors of mathematics achievement of student. Among the five points two points are satisfactory and three points are unsatisfactory. The highest mean score of the

points was S.N.3. It showed that the teacher were sufficient at school for teaching the mathematics subject. Similarly, home environment of the student was favorable to read for student. Among five points the lowest mean score was S.N.4. showed the parents weren't visited at school regularly. Only some of the parents were visited at school environment and interact with school administration. The facility math lab and library were not well managed at school. Some of the school had managed but not all. Similarly, the extracurricular activities hadn't conducted at school. School administrations focus only the mathematics content knowledge but not care about the creativity of the student.

In the table no.4, the average value of the average was 3.032 which was favorable to the statement of the environmental factors. It shows that the physical facility and teacher was sufficient at school. Home environment was better and the interest of the parents with school administration was favorable. As we know that school plays vital role to the students for learning mathematics. School should be well equipped and should provide opportunity and facilities to the students for learning mathematics. Students, they are not getting favorable environment due to socio-economic pattern of society. School administration should mange extra classes but the some students are not attended in the class and they are unable to learn the mathematics as expected by their teachers and parents.

### **Interview from head teacher**

#### **Strategy of school**

At a academic section every school used different teaching strategy. Role of the head teacher is most important for making instructional plan in a academic year.

Researcher asked with head teacher; what kinds of strategy did you implement for improvement student's mathematical achievement? Then, head teacher responded - *First of all I managed the sufficient and excellent mathematics teacher for each section. Second the physical facilities and teaching materials are sufficiently well managed in my school. Third sometimes extra mathematics program are organize. I managed the combination between teacher staff and student.*

### **Parent awareness**

Achievement of the student depends upon the awareness of parent to their children. The role of the parents is important for mathematics achievement. Curiousness of the parents is helpful to create better environment for learning. Researcher asked with head teacher; how many times parent are visited in school for information about their child? *Then, he answered - Parents have been coming randomly in our school. They interact with me about their children's achievement. We invite for parents at the Anniversary day of the school. They are happy and support me to leading the school administration. In this question next head teacher said that- Parents are rarely came at our school. They didn't take care about their children's' study. Only some of the guardians were came sometimes.*

### **Role of administration**

School administration is leadership of whole educational activities. Role of the school administration is to check and balance the relation between teacher and student. Researcher questioned with head teacher; please tell me about the effort of school management/school administration to enhance the mathematics learning?

*Head teacher answered - The primary focus is sufficient managing the excellent teacher in school. Then Continuous assessment system and use of advance technology, sufficient instructional materials at teaching mathematics. Well management of physical facilities also library. Sometimes mathematics seminar, competition and tour need to organize.*

School environment includes mainly two important aspects. First one is physical environment second one is psychological environment. First one refers to the classroom size, instructional materials, decoration of class, desk benches and effective light of room. Second psychological includes the triangular relation between student, teacher and administration. From above interview it was found that sufficient and excellent mathematics teacher, use of teaching materials, mathematics exhibition increased the mathematics achievement of the student. Active participation of parents and school management committee and continuous assessment system in school also helpful for the student's mathematics achievement.

### **Detrimental Factors for Mathematics Achievement**

In this dissertation, we shall limit out discussion on factors affecting achievement in mathematics learning. As we know there are so many factors which affect the students' learning mathematics. Here, prime factors were mentioned how determine the students' mathematics achievement? The researcher calculated and analyzed the obtaining data by using the regression analysis where dependent variable obtain marks (Y) and other independent variables were Student related factors ( $X_1$ ), Teacher related factors ( $X_2$ ), and Environmental factors ( $X_3$ ). The regression equation is  $Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 \dots\dots$  (i)

**Table No.4 Summary Table of Regression Analysis**

Variable	Regression Coefficient
constant ( $a_0$ )	-3.07
Student Related Factors ( $X_1$ )	1.04
Teacher Related Factors ( $X_2$ )	0.39
Environmental Factors ( $X_3$ )	0.28

From above table has been shown that the value of the regression coefficient three variables student related factors, teacher related factors and environmental factors.

Putting the value of variables in regression equation (i) as follows;

$$Y = -3.07 + 1.04X_1 + 0.39X_2 + 0.28X_3 \quad \dots\dots\dots (ii)$$

### **Student Related Factors**

Clearly, equation (ii) show the coefficient of the student related factors ( $x_1$ ) was highest among others variables. Found that main detrimental factor of mathematics achievement was student related factor. Student self is the main component in mathematics learning. Walberg's theory of educational productivity explains motivation of the student primarily affected to the achievement of the student. The positive attitude of the student towards mathematics makes ready to learn him/her. Interest to practice mathematics problem, extra mathematics textbook and sufficient time to read mathematics, increased the productivity of student mathematics achievement. Feel enjoy to practice math problem on holidays as well as increased the productivity of mathematics achievement. The achievement of the students' depend on his/her interest and laborious to learn mathematics.

### **Teacher Related Factors**

Similarly, table no.4 showed that regression coefficient of teacher related factor( $x_2$ ) was positive because teaching quality of the teacher and teacher complete course at time accurately. Likewise, curriculum oriented instruction and cooperative behaviors of the teacher with student found better. According to the theory of educational productivity good quality and quantity of instruction enhance the achievement of the student. Sufficient teacher at school, student oriented teaching method and use of the instructional materials, regular evaluation and overall good performance of teacher increased the student mathematics achievement.

### **Environmental Factors**

Environmental factors are same as other responsible for student's mathematics achievement. Above table showed that the regression coefficient of the environmental factors also positive. It is back bone of the student mathematics achievement. Sufficient teacher at school, extra creative activity, well managed math lab, library and other physical facilities create better environment for student to read. Environmental factors also refer to the role of school administration, home environment and interaction with teacher and parents. The theory of educational productivity explains environment factors are the reading environment at home and classroom, characteristics of peers groups and role of media. Peace and encouragement environment in house and school, cooperative behavior of friends play positive role for mathematics learning. Well managed the combination between psychologically and physically it crates the balance environment to read for student.

## Chapter-V

### SUMMARY, FINDING, CONCLUSION AND RECOMMENDATION

This chapter synthesizes the research starting from the topic to analysis of all the data collected from primary and secondary sources as the findings of the study, draws conclusion and recommends for the further researches related to the same field.

#### Summary

This dissertation had focused on to find out the detrimental factors of the mathematics achievement of grade X of Kathmandu district. This study was only two objectives. First was to find out the detrimental factors for mathematics achievement of class X students and second was to analyze them.

To achieve the purpose researcher had selected the four public school of the Kathmandu district. The population of the study consisted of all students at grade ten in the academic year 2075 of Kathmandu district. According to the District Education Officer Nanda Lal Paudel here are total 996 secondary school. Among them 186 are government school and 810 are institutional secondary school. The four sample schools were Gyanodaya secondary school, Biswaniketan Secondary School, Balkumari Secondary School and Jnasewa Secondary School. For sample 240 student were selected from sample school. The research design was quantitative and qualitative mixed method in nature. The tool was used to survey and interview. For collecting the quantitative data researcher developed the Mathematics Achievement Test (MAT) and survey

questionnaire form on basis Likert five scale; Strongly Agree, Agree, Neutral, Strongly Disagree and marking 5, 4, 3, 2, 1 respectively. There were 15 questions included in which 5 question were related to student, 5 questions were related to teacher and 5 question were educational environment. After collecting the data the mean had calculated the each of the statement and whole tables'. To measure the detrimental factors of student mathematics achievement researcher used equation of the regression analysis. To collect the qualitative data researcher had made interview guideline and took interview with two head teacher, two mathematics teacher and six student of sample school. Then it was analyzed and summarized in the thematic form.

### **Findings and Discussion**

Overall section of this study researcher had found the following facts.

- The prime detrimental factors of mathematics achievement were student related factors, teacher related factors and environmental factors.
- The value of regression coefficient of student related factors ( $X_1$ ) was 1.04, teacher related factors ( $X_2$ ) was 0.39 and environmental factors ( $X_3$ ) was 0.28 found. The highest detrimental factor for student mathematics achievement was student related factors and lowest was environmental factors found.
- Students' achievement was affected by student self support, teacher support and environment support. So a combine correlation in all inspected is required.

### **Conclusion**

Education is a complex process and many factors directly or indirectly affect achievement of the student. As a result, it is difficult to properly define the major factors



influencing students' mathematics achievement. The study investigated how the variables student related factors, teacher related factors, and environmental influenced mathematics achievement of secondary school students' in Kathmandu district.

This study found curiousness of the student towards mathematics, sufficiency of the extra math textbook to read, habit of practice extra math problem, reading math two hour per day and to feel enjoy practice math problem on holiday accelerate the achievement of the student. According to the Walberg's' theory of educational productivity negative attitude of student is harmful for achievement but positive attitude increase the productivity of the student's achievement.

Teachers are potter and students are the soil. Qualified teacher can make the student different sizes. Curriculum oriented instructional activities of teacher, experience of teacher, complete course in time increase the productivity of mathematics achievement. Co-operative behavior of teacher with students and continuous assessment system of teacher play responsible role for better result of student. By the theory of educational productivity the quality and quantity of instruction affect learning. Sufficient quantities of qualified teacher contribute to high mathematics achievement.

Environment is important component for mathematics learning. It includes mainly school and home environment. Sufficient teacher at school, well managed math lab and library, extracurricular activity conducting at school create the well environment for student to read. Reading environment at home and interaction between parents with school administration enhance mathematics achievement of the students. Theory of educational productivity deals the environment are home and classroom, peer support and social media. Sufficient physical facilities, effort of the parents', peer support, social and

economical background of parents, teaching method, design of curriculum etc. potentially influenced mathematics achievement.

### **Recommendations**

Thus after analyzing the conclusions and implication of this study the researcher would like to suggest some recommendations for the improvement of the student's achievement in mathematics are pointed out as follows.

- This study should be conducted at all levels of school and in other subjects as well.
- It is found that the mathematics achievements of students are more affected by interest of learner, home environment, interaction between students and teachers, facilities and environment of school. It is suggested that to improve the above variables in teaching learning process and encourage the students in learning mathematics to get better achievement in mathematics.
- The school should manage the physical facilities to improve the quality of education for the community.

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**APPENDIX-A****Mathematics Achievement Test for students.**

Student's Name:

Date:

Class:

Time:

School's Name:

Address:

**Tick (✓) the best answer from the following alternatives.**

1. If, the cost of 8 pens is Rs. 96 how many more pens can be bought for Rs. 180?

- (a) 10      (b) 12      (c) 15      (d) 18

2. If 8 men complete a piece of work in 36 days in how many days would 12 men complete the same work?

- (a) 24      (b) 25      (c) 27      (d) 30

3. If, 1 American dollar (\$) = Rs. 72 and 1 pound (£)=Rs. 120 convert \$60 in pound.

- (a) 32      (b) 34      (c) 35      (d) 36

4. What percent of 150 is equal to 5% of 450?

- (a) 10      (b) 15      (c) 20      (d) 25

5. What is the formula for simple interest?

- (a)
- $P = \frac{I \times 100}{TR}$
- (b)
- $R = \frac{I \times 100}{PT}$
- (c)
- $T = \frac{I \times 100}{PR}$
- (d)
- $I = \frac{PTR}{100}$

6. Length and breadth of a rectangle is 6 m and 8 m find the perimeter of that rectangle.

- (a) 25m      (b) 28m      (c) 30m      (d) 35m

7. What is the formula for area of circle?

- (a)
- $\frac{1}{3} \pi r^2 h$
- (b)
- $\pi r^2$
- (c)
- $2\pi r$
- (d)
- $\pi r^2 h$

8. Factorize:  $\frac{4x^2}{a^2} - \frac{49y^2}{b^2}$

(a)  $(\frac{2x}{a} - \frac{7y}{b})(\frac{2x}{a} + \frac{7y}{b})$       (b)  $(\frac{2x}{a^2} + \frac{7y}{b^2})(\frac{2x}{a^2} - \frac{7y}{b^2})$

(c)  $(\frac{2x^2}{a} + \frac{7y^2}{b})(\frac{2x^2}{a} - \frac{7y^2}{b})$       (d)  $(\frac{7y^2}{b^2} + \frac{2x^2}{a^2})(\frac{7y^2}{b^2} - \frac{2x^2}{a^2})$

9. Factorize:  $x^2+5x+6$

(a)  $(x+3)(x-2)$       (b)  $(x+2)(x-3)$       (c)  $(x+3)(x+2)$       (d) none

10. Find the H.C.F. of  $x^2 - 25$  and  $x^2 + 2x - 15$

(a)  $(x-5)$       (b)  $x+5$       (c)  $x^2-5$       (d)  $(x+5)(x-5)$

11. Which of the following are incorrect?

(a)  $(a^m)^n = a^{mn}$       (b)  $\frac{a^m}{a^n} = a^{m-n}$       (c)  $a^0=1$       (d)  $a.a.a = 3a$

12.  $(a+b)^2 - (a-b)^2 =$

(a)  $4ab$       (b)  $a^2+b^2$       (c)  $a^2-b^2$       (d)  $(a^2+b^2)$

13. If the value of x and y are 2 and 3 respectively, then value of  $4x-3y$  is;

(a) -1      (b) 3      (c) 6      (d) 1

14. In a triangle PQR if  $\angle Q=90^\circ$ ,  $\angle P=\theta$  then value of  $\operatorname{cosec} \theta$  is

(a)  $\frac{PR}{QR}$       (b)  $\frac{AR}{PR}$       (c)  $\frac{PQ}{QR}$       (d)  $\frac{QR}{PQ}$

15. The biggest side in the right angle triangle is;

- (a) All equal    (b) Adjacent side    (c) Hypotenuse    (d) base

16. Solve:  $\sqrt{x+7}=5$ ; what is the value of x?

- (a) 18                      (b) 19                      (c) 20                      (d) 21

17. The median value of 5,6,7,8,9,10,11 is;

- (a) 4<sup>th</sup> term              (b)  $\frac{1}{2}$ (4<sup>th</sup> and 5<sup>th</sup> term)              (c) 3<sup>rd</sup> term              (d) 5<sup>th</sup> term

18. The mid value in the set of arranged order.....

- (a) Mean    (b) Median    (c) Mode              (d) Range

19. If the diameter of a circle is 12cm what is the area of circle? ( $\pi = 3.14$ )

- (a)  $100\text{cm}^2$               (b)  $110.50\text{cm}^2$     (c)  $113.04\text{cm}^2$     (d)  $115\text{cm}^2$

20. A gain 10% more profit than 'B' then what percent of loss occurs to 'B' than 'A'

- (a) 10% loss              (b) Neither profit    (c)  $\frac{91}{11}\%$  loss              (d) Cannot say nor loss

21. A milk man has 5 liter milk in 10 liter cane. He mixed 1 liter water to each liter of milk then the ratio of milk and water is

- (a) 75:25              (b) 1:1              (c)  $\frac{1}{3}:\frac{2}{3}$               (d) 25:75

22. If one stick  $\frac{1}{6}$  part is colored by blue,  $\frac{1}{5}$  part by yellow and 19 meter colored by red, then what is the total length of stick?

- (a) 30 meter              (b) 20 meter              (c) 15 meter              (d) 25 meter



23. Which of the following is obtuse angle?

- (a)  $60^{\circ}$     (b)  $150^{\circ}$     (c)  $180^{\circ}$     (d)  $360^{\circ}$

24. A card is drawn from at randomly from a well-scuffed pack of 52 cards. What is the probability that the card drawn be a black queen?

- (a)  $\frac{4}{52}$     (b)  $\frac{13}{52}$     (c)  $\frac{1}{26}$     (d) none of the above

25. Solve ;-  $3x+5 \leq 8x-20$ , then the value of x is;

- (a)  $x = 5$     (b)  $x \leq 5$     (c)  $x \geq 5$     (d) none

26. If  $a:b = 2:5$  find the value of ;  $5a+6b:5a-b$

- (a) 3:1    (b) 1:3    (c) 1:5    (d) 5:1

27. In classroom,  $\frac{3}{4}$  parts of the total number of students are boys. Find the percent of boys and girls.

- (a) 80% boys and 20% girls    (b) 30% boys and 70% girls  
(c) 80% boys and 20% girls    (d) 75% boys and 25% girls

28. In a group of 200 students they like at least one of the game, 120 of them like cricket and 105 like football, how many students like only cricket?

- (a) 80    (b) 95    (c) 100    (d) 120

29. Indirect variation refers to:

- (a) Number of pens increase, the cost also increase
- (b) Number of pens decrease, the cost also decrease
- (c) Number of workers increase their working days decrease
- (d) None of the above

30. What are digits used in binary system?

- (a) 1 and 0      (b) 1 and 2      (c) 0 and 1      (d) 1 and 3

31. If the rate of cost of sugar was increased from Rs.80 per kilogram to Rs. 96 per kilogram, how percent price was increase?

- (a) 12   (b) 15                      (c) 16      (d) 20

32. In a school there are total 700 student, 280 student are boys how many percent are girls students?

- (a) 60      (b) 55      (c) 53      (d) 50

33. 18% of 500 is;

- (a) 80   (b) 85                      (c) 90      (d) 92

34. Rajesh bought a television 12,500 without 13% VAT, what is the actual price of television with 13% VAT?

- (a) 12,800                      (b) 13,500      (c) 13,900      (d) 14,125

35. What is the ratio of 50cm and 2 meter?

- (a) 1:2                      (b)2:3      (c) 1:3      (d) 1:4

36. Which of the following class interval represents the mode?

Marks	0-10	10-20	20-30	30-40
No. of student	5	10	13	8

- (a) 0-10                      (b) 10-20      (c) 20-30      (d) 30-40

37. What is the value of y to fill the given table in equation?

Where,  $y = \frac{3x+2}{2}$

x	-4
y	

- (a) 4   (b) -5                      (c) -7      (d) 8

38. Find the area of triangle of having sides PR=4 cm, RQ=5cm and PQ=3cm

- (a) 4 sq.cm                      (b) 5sq.cm      (c) 6sq.cm      (d) 7sq.cm

39. The radius of the circular base of a solid cylindrical pipe is 3.5 and it's 20cm long find it's volume is;

- (a) 665cm<sup>3</sup>                      (b) 770cm<sup>3</sup>      (c) 780cm<sup>3</sup>                      (d) 790cm<sup>3</sup>

40. Ramchandra is twice older than Rohan. Six years ago Ramchandra was 3 times older than Rohan then what is the present age of Ramchandra?

- (a) 12 year                      (b) 18 years      (c) 22 years      (d) 24 years



**APPENDIX-C**

**Questionnaire**

Name of the Researcher:

Date:

Name of the School :

Gender:

Class:

**Statements Related to Student**

S.N.	Observational Points	SA	A	N	D	SD	Mean
1	I am curious to learn mathematics						
2	I like to practice extra math problem						
3	I read math two hours per day						
4	I read math on holidays						
5	I feel enjoy to practice math problem						

**Statements Related to Teacher**

S.N.	Observational Points	SA	A	N	D	SD	Mean
1	Teaching quality of your teacher is good						
2	Teacher complete the course on time						
3	Your teacher taught according to the curriculum						
4	Teacher help in the students' learning						
5	Your teacher evaluate regularly						

**Statements Related to Environment**

<b>S.N.</b>	<b>Observational Points</b>	<b>SA</b>	<b>A</b>	<b>N</b>	<b>S</b>	<b>SD</b>	<b>Mean</b>
1	Extracurricular activity conducted at school						
2	Home environment is good to read						
3	Teachers are sufficient at school						
4	Your parents visit school regularly						
5	Math lab and library is well managed						

**APPENDIX-D**

**Guidelines for interview with mathematics teacher, head teacher and students**

Name:

Gender:

Name of the School:

class:

Experience:

Qualification:

**Teacher Support**

1. Explain your classroom performance while teaching mathematics.

.....

2. How to treat students' problem of mathematics?

.....

3. What kind of advice and counseling give your students about mathematics subject?

.....

**Head teacher support**

4. What kinds of strategy did you implement for improvement student's mathematical achievement?

.....

5. How many times parent are visited in school for information about their child?

.....

6. Please tell me about the effort of school management/school administration to enhance the mathematics learning?

.....

**Student Support**

7. Describe the physical facilities of your school.

.....

8. What kinds of extra activity related to mathematics has been conducted in your school?

.....

9. Explain the teaching activities of your math teacher at class.

.....

**Thank you for your co-operation!**



### APPENDIX-E

Map of Kathmandu district



काठमाण्डौ जिल्ला  
(गाउँपालिका / नगरपालिका)

