

Chapter I

INTRODUCTION

Background of the Study

In an increasing technological society, mathematics is becoming an increasingly important discipline within our occupational and educational structure. That means, mathematics is becoming one of the major basis for everywhere. In addition, mathematics is a critical filter in the job market with students who drop the subject severally limiting their educational and vocational options.

The study of mathematics is also important to nation building for many reasons; one of them being the training of professionals capable of managing the country's finances and economy. Another reason is the development of science and technology by equipping students with uniquely powerful ways to describe, analyze and change the world and help development in youth and in adults an attitude of discovery, problem solving and inductive-deductive reasoning.

Given the importance of the mathematics, understanding negative mathematic attitudes may take it possible to effect changes (Lange, 1992). Thus, mathematics that can be changed possibility of the success in every discipline. Though, there are many factors that causes to mathematics learning uneasy and working memory disrupts. Among them, mathematics anxiety is one of the dreaded causes that interfere to manipulate and perform with solving mathematical problems and mathematical creations.

Mathematics anxiety was first detected in the late 1950s, and till there are doing different researches for their causes, effects and ways to minimization it. It is very real and occurs among thousands of pupils. It is generally known as 'math phobia'. In early definition of mathematics anxiety suggests that, it is feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of

mathematical problems in a wide variety of ordinary life and academic situation (Reichardson & Suinn, 1972; cited from Lang, 1992). Mathematics anxiety emerges when students exhibit illogical emotional reactions or when they are expected or required to solve mathematics problems. Many researchers had tried to define mathematics anxiety. Among them an early researchers Dreger and Aiken 1957, defined mathematics anxiety as syndrome of affective reactions exhibited towards mathematics, whereas Ashcraft and Faust 1994, defined it as the tension, helplessness and mental disorganization that individuals experiences when they are required to perform an operations with numbers and figures or when they solve mathematics problems (cited; Chamen, 2014). In another way, Bhatta,H.R., (2016) defined mathematics anxiety as both an affective and a cognitive feature in the nature of individuals who experience learning problems. Therefore, we see that mathematics anxiety is a person's negative affective reaction to situations involving numbers, math and mathematics calculations.

Since it is a frequently encountered condition in every stage of education, it is an important to understand and define and to avoid or reduce mathematics anxiety. Furthermore, higher -math-anxious people are essentially doing two things at once when they do math, (i.e. attending to their worries and doing math), their math performance suffers (Beilock & Maloney, 2015). In similar way Hembree (1990) claims that math anxiety also causes students to avoid math, math classs, and math – related careers and this avoidance undoubtedly impacts math achievement.

In the last decade, the research began to move to the field of neurology, specially focused on cognition. Ashcraft and Krause found in 2001 that, “mathematics anxiety disrupts the ongoing task relevant activities of working memory, slowing down performance and degrading its accuracy” (Ashcraft & Krause, 2007). If students have feelings of tension and anxiety that interfere with the manipulation of numbers and the solving and the solving of mathematical problems, the teacher needs to

understand that the student has mathematics anxiety. The main cause of mathematics anxiety is losing one's confidence (Tobias, 1978). It is a kind of disease. In the other words, math anxiety refers to such unhealthy mood responses which occurs when some students come upon mathematics problems and manifest themselves as being panicky and losing one's head, depressed and helpless, nervous and fearful (Wang, Luo, & Luo, 2009). Math anxiety is a phenomenon that is often considered when examining students' problem in mathematics. There may different causes that can help to develop math anxiety to the students. Major causes may be teacher anxiety, societal factors, educational or environmental factors, innate human characteristics, failure in math and may influence of early mathematical experiences.

In Nepalese context, it is commonly accepted that mathematics is difficult and vague subject. They have negative conceptions of mathematics i.e. tension and anxiety which formed negative image towards it. In general, many students themselves as well as their parents also believe that, mathematics as one of the most difficult and hard subject to cross in secondary level. In researcher's teaching experience, researcher has met several students who were frequently failed in mathematics. In order to reduce to mathematics anxiety, as a mathematics teacher, researcher became curious about this serious problem in mathematics. On the side of parents, researcher frequently heard several blames toward mathematics teachers but, somewhere they seriously talked about their children's weaknesses to solve mathematics problem is the result of teaching and school environment. But also some parents accepted their children's weaknesses as main reasons of their anxiety.

Statement of the Problem

There are many researchers such as, Effandi and Norazah, (2008) math anxiety was rooted during elementary and secondary years; Lou et al., (2009) focused specially on cognitive aspect; Venkatesh and Karimi (2010); Devine et al.; (2013) there is no gender differences in math anxiety; accepted that female students have

high math anxiety compared to their male counter parts, even they got higher score in mathematics. In context of Nepal, K. C., (2011); and Kunwar; (2014), completed master's degree thesis about mathematics anxiety among secondary school students and its relationship to achievement in mathematics and they compared math anxiety level between male and female students. Their result shows that, the type of management of school has strong correlation with anxiety, and private managed school has lower level of anxiety in comparison to other types of schools.

Furthermore, research noticed school's management should be perfect for minimizing students' math anxiety. Researcher found public students have more math anxious than that of private school students. Furthermore, researchers found result that, students' anxiety score increases according to their level of achievement decreases and vice-versa. That's why, researcher got very much curiosity about the study of math anxiety and its causes among secondary level students.

In general, mathematics takes the central role in education, not for only one country, but worldwide its' importance is increasing day by day. Nowadays, mathematics is accepted as foundation of every innovation and development. But in the case of Nepal, many students have difficulties in studying mathematics. According to (Acharya B. , 2013), low achievement in mathematics is the major problem of good achievement and performance in mathematics. Behind this problem, there may be different causes that students facing. That problem may be classroom or course related, may be attitude related and may be related to the methods. Among them, math anxiety is one of the major problems which are prevalent among the school population. According to Russel (2002), typically math phobic's have had math presented in such a fashion that it lid to limited. Unfortunately, math anxiety is often due to poor teaching and experiences in math which typically leads many of the students to math anxiety.

With growing uses of ICT around the world, there may or may not be reduced or increased the math's anxiety of students that as before. This curiosity encouraged researcher to carry out the causes of math anxiety and find out the ways of minimizing math anxiety among secondary level students. In the context of Nepal, very few researchers have carried out the way of minimization in this area. So, the study had been aimed to answer the following research questions:

- What are the major factors which causes math anxiety in secondary level students?
- How can we reduce mathematics anxiety in secondary level students?
- How can math anxiety help to overcome on mathematics problems?

Significance of the Study

This study is concerned with the anxieties of mathematics in the students of secondary school level. This study has tried to find out main causes which play vital role to create environment of anxieties into ones learning mathematics. This 21st century generation is also known as IT generation. We can utilize different IT & ICTs in mathematics learning. Though, why mathematics anxiety is still not reduced? In the side of students, teachers and parents, this study has tried to find out the minimizing ways of the issues. Moreover this study is significant for following:

- This study would be helpful for educators, policy makers and related persons to make further curriculum policies.
- This study would be helpful for students to identify the factors that influencing to contribute mathematics anxiety and its effect on math achievement.
- This study would be helpful for students to minimizing math anxiety.
- This study would be helpful for teacher who has a role of significant impact on the success of students in the class.

Objective of the Study

The objectives of this study are:

- To find out the causes of mathematics anxiety in secondary school students.
- To suggest some remedial measures of mathematics anxieties.

Delimitations of the Study

The previous relationship between the researcher and the student participants may impact the findings of the study. However, the students who had participated the researcher is totally unknown to them. Only these participants could answer the research question formed by this researcher. Additionally, the small number of participants limited the amount of data available for analysis. Being mathematics educational research, in this study; researcher is looking different views of nature of mathematics through the eyes of mathematics teaching pedagogy. The mathematical implication in classroom and students' real life situation was key focus of the study. This study contained the issues related to mathematics anxiety. This study was mainly limited to secondary level students. It only focused on the analysis of factors which cause mathematics anxiety to the secondary level students in Nepal. It was totally based on qualitative research. The study has following delimitations further:

- The study was limited in a public school in Nuwakot District.
- The case students were selected purposively by examining MARS-R.
- The information was collected from students, teachers and parents with related case students only.

Definition of the Key Terms

Anxiety: Feeling distress or uneasiness of mind caused by fear of danger or misfortune.

Mathematical anxiety: Feeling of tension to learn mathematics and get good achievement, fear of math, not willing study mathematics.

Teaching materials: All positive or negative aspects that are used for better learning mathematics fall under this area.

Teaching strategies: All causes related to teaching innovations or strategies fall under these areas.

Causes: Symptoms occurred in mathematics anxiety.

Remedial Measure: Remedial ways or ideas of mathematics anxiety.

Case study: A case study is defined as a research method which investigates the central problems or status of person or group in the past and present. And each designed to increase understanding as it exists in real life setting.

Chapter II

REVIEW OF RELATED LITERATURE

This chapter deals with the review of related literature relating to various aspects linked mathematics anxiety. The literature review helps to avoid the duplication of the work and to synthesis the previous work. It means previous related studies cannot be ignored because they provide the foundation to the present study. To address the above issues, researcher had reviewed the following related Theoretical and Empirical literatures. This chapter organized as follows:

Ontology

Research ontology concerns with the nature and relations of being the cases. In general research ontology deals with the theory about the nature of being or kinds of things that have existence. So, believe of existence of the mathematics anxiety in secondary level is an ontology of the research.

Epistemology

Research epistemology is the study of the theory of the nature and grounds of knowledge with reference to its limit and validity. Researchers' believe, as mathematics anxiety has ground and validity with reference to its limits is accepted as research epistemology. Many research findings indicated that mathematics anxiety starts from lower grades, because of careless.

Axiology

Research axiology refers to the study of the nature, types and criteria of values, value of judgments, especially in ethics. In the research, researcher has considered and kept values of an ethical judgment all over parts of cases and relative aspects. Researcher has got enough attention toward ethics and its value of judgment of cases and participants. This is an axiology of the research.

Theoretical Consideration

Lang (1992) says there is a noticeable lack of clear theoretical basis for mathematics anxiety, in either the research or the treatment literature. However there are number of researchers might be applicable these being general anxiety theories and theories taken from the test anxiety. For the purpose of the study researcher considered the different motivation theories or statement related with mathematics anxiety. Often many researches showed that there is different aspect that interferes mathematics learning and achievement. Parental involvement, school and home environment etc. plays very significant role to reduce mathematics anxiety. Therefore, researcher has considered the following different aspect that might be interfere student's mathematics anxiety relatively.

Theories of Anxiety

In earlier research and anxiety theories viewed anxiety as an entity or single system. One of such a theory is drive theory. To concern about anxiety on learning and performance, Spielberger (1960) extend 'Drive' theory by taking into account both the difficulty of the task and ability of the subject. According to Heinrich and Spielberger (1982), drive theory assumes that aversive stimuli arouse a hypothetical emotional response that contributes to drive level. Drive theory sum up that people who are high trait anxiety are likely to see more situations as threatening than people who are low in trait anxiety (Lange, 1992). Thus, mathematics anxiety is concern with drive theory. Mathematics anxiety arose from students' negative or positive feelings or experiences towards mathematics which are depend upon their hypothetical emotional response.

Attitudes towards Mathematics

According to Aiken (1970), an attitude is an individuals' learned predisposition to respond in a positive way to an object, concept, situation or another individuals (Chaman, 2014). Generally attitude towards mathematics refers to individuals' beliefs and feelings about mathematics. It is also defined as a negative or a positive

emotional disposition toward mathematics. In general many research findings had showed that a strong relationship has been assumed between students positive attitudes towards mathematics and achievement in the subjects. To get well performance and good achievement in the subjects, there is vital role of attitudes towards the subjects. Almost teachers and educators believe that students learn and achieve better if they have interest in mathematics and a linking for the subject (Chaman, 2014). What it shows is that, students' mathematics anxiety is build up from their attitudes towards mathematics. It is mostly depend upon their views towards mathematics. Thus, students' attitude towards mathematics has been considered as important in their learning, participation and achievement in mathematics.

Parental Involvement

From an early age children engage in learning and parents are their first teachers. Parental involvement in their children's performance and attention towards their behavior play significant role to overcome mathematics anxiety. According to Fishel and Raimirez (2005) in Chaman (2014), parental involvement is referred as the participation of the parents in the education of children to enhance their social and academic achievement. Parental involvement include helping with homework, or supervising homework, volunteering or attending school events, encouragement of academic success, hiving high expectations for achievement and parent child communication (MacNeal, 1999). For the purpose of the study parental involvement has been defined as parental participation in school relative activities. According to Jeyner (2005), more recent concept of parental involvement encompass activities and engagement between children and their parents at home as well as in school, such as helping them with homework supervision and discussion about school activities (Chaman, 2014).

Social and Affective Aspect of Learning

Vygotsky considered social interaction as the most important component of an intellectual and personal development. Vygotsky (1978) views social interaction serves as a bridge between a learners' existing knowledge and skill and the demands of task (Wei, 2010). The field of psychology has traditionally identified three distinct components of the human mind, affect (feelings), cognition (knowing) and conception (willing) (Forgas, 2001). When humans are in a positive mood, they view the world as more friendly and make positive judgments. As Piaget concludes, affective states that have no cognitive elements are never seen, nor are behaviors found that are wholly cognitive (Wei, 2010). Therefore, it is natural that mathematics learning is achieved through both a learners affect and cognition. Thus, mathematics anxiety is almost related to social phenomenon that concern with Vygotskys' Social Constructivism.

Reflection on the Reviews

For the purpose of the study, how mathematics anxiety increases or what the factors that gets interfere ones' mathematics performance and achievement is an important aspect. Mathematics anxiety is related with drive theory which response to express emotional response. In similar way, attitude towards mathematics is very close to mathematics anxiety. Who have negative attitude towards mathematics is more anxious than who have positive attitude. That's why we can draw the conclusion that, the main causes of hindrance of mathematics is attitudes. Furthermore, parents' involvement can extend students better performance and achievement. That shows parental involvement might reduces the mathematics anxiety. At home as school, if there is an environment of social interaction, then students' feelings of dreaded mathematics can be reduced. In the sense, Vygotskys' Social Constructivism is also related with mathematics anxiety causes and it's reduces.

According to LaBahn (1995) on their article ' Education and Parental Involvement in Secondary Schools ', parental involvement, in almost any form, produces measurable gains in student's achievement and it concern with reducing

math anxiety. There are two key elements that works together to make up the concept of parental involvement. One of these is a level of commitment to parental support. This includes such things as encouraging the student, being sympathetic, reassuring, and understanding. The other element needed is a level of parental activity and participation, such as doing something that is observable.

Empirical Review

Yang (2014) wrote ‘To many people “MATH” is a scary four letter word; they don’t like it or feel that they are good at it’. He defines it as ‘People who feel tension, apprehension and fear of situations involving math are said to have math anxiety’ (p. 28) (Mutawah, 2015).

Research regarding mathematics anxiety and learning disabilities has begun in the 1950s and is ongoing till now. At the first time Gough (1954), a school teacher reported that many of the students, predominately the females, were exhibiting emotional difficulties with math and were failing to learn the mathematics. She termed this emotional reaction as "Mathemaphobia" (Maloney, 2011). Shortly after, Dreger and Aiken (1957) published a report on "Numerical Anxiety" among college students. This paper attempted to standardized assessments into the study of mathematics anxiety.

Extensive research on mathematics anxiety has tried to determine why so many people demonstrate a fear or even antipathy towards mathematics. Much has been written regarding the causes of mathematics anxiety such as assigning the same work to everyone, teaching the textbook problem by problem insisting only one way to complete a problem. Number of research indicated students' ignoring behavior as the main cause of mathematics anxiety such as ignoring daily assignments, thinking for another opportunities and community myths (e.g. mathematics is dreaded subject or mathematics only for gifted or males etc.).

Still, it is not fully understood how a mathematics anxiety affects an individuals' ability to learn mathematics in all of the different areas, because of the limited research base. To date, the majority of research has focused mostly on the skills associated with mathematics calculations including numbers, counting, arithmetic combinations or basic facts and problem solving. Among several (foreign and local) research has conducted to find causes, effects and preventative measure of mathematics anxiety, here are mentioned thematic review of some related researches.

Mathematics Anxiety and Numerical Anxiety

Research on mathematics anxiety has begun in the 1950s and is ongoing till now. According to several results of the research we can draw conclusion that, mathematics anxiety can explained as the fear of doing mathematics and students' minds go blank of fearing this subjects. It is generally known as 'math phobia'. In early definition of mathematics anxiety suggests that, it is feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situation (Rechardson & Suinn, 1972).

According to Hembree's (1990) study on the topic "The nature, effects, and relief of mathematics anxiety", levels of mathematics anxiety grow stronger with the constraint of the time in answering mathematics quizzes, tests and examinations. It shows mathematics anxiety is ones' experience or feelings when s/he is doing mathematics tasks. Devine (2012; 2013) defined mathematics anxiety as stable of discomfort associated with performing mathematical tasks and this problem was caused by low level of understanding the skill in mathematics. As the results, mathematics phobia emerged due to their poor mastery of basic mathematical concepts.

Luo et al. (2009) described in their study that mathematics anxiety as a cognitive passive mood which was produced while solving mathematics. Thus

according to researchers' different views discussed above, mathematics anxiety is a feeling or experience that is seen while solving or doing mathematical tasks.

Numerical anxiety is defined as anxiety present during mathematics learning process.

A study carried by Nolting (2002) entitled "Winning of math: Your guide to learning mathematics through successful study skills" explained that numerical anxiety is emotional response of person when solving mathematical problems. So mathematics anxiety is related to everyday situations that require working with numbers and perform- arithmetic calculations. Numerical anxiety occurred when manipulating of numbers in an ordinary situation.

Mathematics Anxiety and Gender

Devine et al. (2013) did research entitled "Gender differences in mathematics anxiety and the relation to mathematics performance while controlling for test anxiety" and they measured 433 (165 males and 268 females) seventh- to tenth-graders' mathematics performance and their levels of mathematics anxiety. Data collected showed that there was no gender difference in mathematics anxiety and their mathematics performance. However female students' anxiety level was higher compared to male students. Both gender showed a positive correlation between mathematics anxiety and test anxiety, but mathematics anxiety was negatively correlated with performance.

Venkatesh and Karimi (2010) claimed in their research entitled "Mathematics Performance and Overall academic Performance in high school students", that there was a need to address gender differences in the levels of mathematics anxiety and overall academic performance. In the study of a sample of 425 students from 12 high schools in South India, the results supported that there was no gender difference in mathematics anxiety and academic performance. However, this study also showed female students' mathematics anxiety was higher compared to male students. In similar manner, Lou et al. (2009) found that female students had higher mathematics

anxiety level especially in the cognitive aspect but also scored higher in mathematics. And analysis shows that mathematics anxiety level increased according to their grades increased.

Kunwar (2013) conducted research on “anxiety of secondary level students and its causes”. In the case study with 2 female and 3 male students, for this researchers used purposive sampling method. In research it can be seen that there is no significant different between male and female students in case of mathematics anxiety. K.C. (2011) completed his masters' thesis entitled " Mathematics anxiety among secondary school students and It's relationship to achievement in Mathematics" and compared math anxiety level between male and female students, according to their school management and the achievement in mathematics. Researcher noted important information that female students' has more math anxiety than their male counter parts. The type of management of schools have strong correlation with anxiety, private managed school has lower level of anxiety in comparison to other types of schools

According to researchers' important findings, in general, mathematics anxiety does not discriminate gender differences. That is everyone might have mathematics anxieties. They might have passive negative feelings towards mathematics problem solving and manipulation of number and counting. But, one of the serious and an important finding they got is similar, that is female students had more mathematics anxiety than their male counter parts.

Mathematics Anxiety and Mathematics Achievement

Many students experienced mathematics anxiety in their school lives. Venkatesh and Karimi (2010) conducted research entitled "Mathematics anxiety, Performance and academic hardiness in higher school students", and they perceived that mathematics anxiety was a good predictor of mathematics performance and overall academic performance. Conversely, several studies have identified that negative influences of mathematics anxiety in students' mathematics performance.

Hembree (1990) felt that students who did not master mathematical operations might not be able to do well in mathematics. Venkatesh and Karimi (2009) indicated that mathematics anxiety influenced mathematics and academic performance. That means ones' passive mood affects the mathematics mastery or mathematics interests negatively. The study showed there were significant relationships between mathematics anxiety, mathematics performance and academic hardiness. Students with hardy attitudes would be more motivated in mathematics learning. Students' learning attitude is an important indicator than the cognitive status of interested in a subject (Mallow, 2010).

Luo (2009) surveyed 311 middle school students who attached to a university in China ranged from seventh grade to twelfth grade. Their finding showed that Seventh graders had lowest anxiety level compared to ninth graders and mathematics anxiety influenced students' mathematics performance. In addition, Shaikh's (2013) study on the topic "Mathematics anxiety factors and their influence on performance in mathematics in selected international school in Bangkok", indicated there were several reasons why students experienced difficulties in learning mathematics. Some students perceived mathematics as a difficult subject. Besides, he also identified six levels of mathematics performance and four types of mathematics anxiety.

How to get students past math anxiety was a concern to Scarpello (2007) who thinks that math anxiety can begin as early as the fourth grade and peaks in middle and high school. He wrote an article saying that math anxiety can be caused by past classroom experiences, parental influences, and remembering poor past math performance. He wrote ahead that, research shows that students who have high levels of math anxiety have lower levels of math achievement and may be less likely to pursue math courses or math related careers.

Since mathematics achievement has strongly bonding with the performance on it, and mathematics anxiety affects directly into ones' performance then obviously mathematics anxiety effects on achievement.

Causes and Reducing Mathematics Anxiety

Effandi and Norazah (2008) published report entitled “The effect of mathematics anxiety on matriculation students as related to motivation and achievement” taking sample of 88 students (73 females and 15 males), who were at the end of their second semester of study. On their results, they noted that majority of Malaysian students had moderate level of mathematics anxiety and believed that mathematics anxiety was rooted during elementary and secondary years. Factors such as truancy, poor self-image, poor coping skills, teacher attitude and learning through drill without understanding could lead to mathematics anxiety. Besides, passive mathematics learning among secondary school students might cause mathematics anxiety in later years.

Dulal (2009) conducted research on the topic “Causes of Anxiety in Mathematics Learning”. Researchers' main focus was to find out the factors that played major role to create math anxieties and suggest the remedial measures in order to minimize the anxious feelings of students. His study found out the major causes that help to increase math anxiety on ones' feeling are: not to understand the structure of mathematics, lack of effective instructional materials, absence of creative thinking etc. In addition, researcher suggested that there are no expert teachers this is why students' math anxiety is produced. This result shows that math anxiety is growing up on the basis of weaknesses of teaching strategies and carelessness of math contents. Moreover researcher pointed out the role of family, school staff, peer, math contents, curriculum design are also responsible to produce students' math anxiety. Kunwar (2013) discussed that Students in Parbat District had mathematics anxiety because of themselves. Teachers covered the second and school administration covered third

place to create mathematics anxiety. In addition research noted that teachers' carelessness about home assignment, upgrading system being failed in any two subject, teaching without preparation, not regularity of students attendance, and method of evaluation are major causes of mathematics anxiety.

Shields (2006) worked entitled "Causes of mathematics anxiety: the students' perspective", with 91 college students to produce quantitative and qualitative data on societal influences, parental influences, and teacher influences on mathematics anxiety. Students said anxiety was due to lack of mathematics understanding (78%), and they blamed themselves because they felt responsible. Shields suggests that students need to take control of their learning and attitudes, that attitudes determined their behavior, and that anxiety is a learned response that can be unlearned. Study participants identified five techniques to reduce anxiety: tension/relaxation techniques, visualization, deep breathing, thought-stopping techniques, and overcoming negative self-talk.

Scarpello (2007) highlights, that parent should encourage and support students to take challenging class in school. Parents should discuss their student's career choices and investigate school grades that complement the choice. The parent's attention to how their student is progressing in grades such as mathematics and science, helps the student to see a value in them. Parents that show an interest can help build student's interest in a subject. Teachers also play a large role in noticing mathematics anxiety and encouraging students to succeed. Teachers must implement effective teaching practices to help ease anxiety in the subject area.

Reflection on the Reviews

Research findings shows mathematics anxiety is negatively related to mathematics achievement. The situations related to mathematics anxiety are numerous, and may be as individual as the student. However, research suggests that reduction or coping mechanisms for mathematics anxiety must be known and

explored from the point of view of the mathematics anxious student. Research explores that, parents, teachers, peers and schools' environment plays significant role to reduce ones' mathematics anxiety. The literature shows that mathematics anxiety can affect mathematics achievement. Therefore, reduction in mathematics anxiety will support increases in achievement. If teachers can help students cope, anxiety may also be reduced. Thus researcher has come up with some suggestion and recommendation to decrease such math anxieties. As preventive measures, continuous communication among students, teachers and parents, teaching with students centered method with planning, continuous assessment and equally behave from teacher should be treated by teacher are main suggestion.

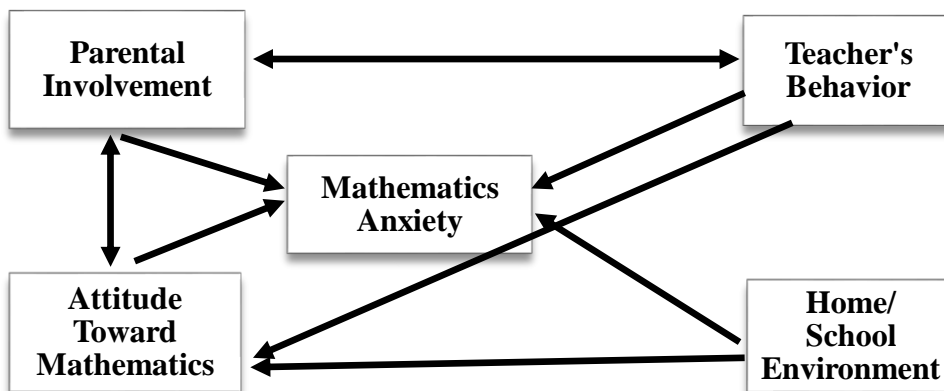
Theoretical / Conceptual Framework

The theoretical/conceptual framework established the relations between factors that influence on mathematics anxiety. This study demands the factors which exactly fulfill the objectives. A conceptual model was built based on research findings discussed in the earlier sections. The model has included the four factors that influenced on mathematics anxiety: (a) attitude towards mathematics, (b) home/school learning environment (c) parental involvement and (d) teacher's behavior (including teaching strategies). These variables influenced mathematics achievement among secondary school students as shown in Figure 2.1. The study has also investigated the factors or causes of mathematics anxiety among secondary level students.

Given conceptual framework says that mathematics anxiety is negative output of different aspects. In the given conceptual framework, it is clear that student's attitude towards mathematics is mostly influence by all the aspects parental involvement, teacher's behavior and home environment. The parental involvement determines teacher's behavior towards their children and each-other. Those factors

mentioned in the framework are seriously connected with increasing student's mathematics anxiety.

Figure: 2.1, Causes Influencing Math anxiety



Source: Chaman (2014)

Chapter III

METHODS AND PROCEDURES

The chapter is to discuss the method adopted throughout the study to accomplish the research objectives. This chapter further attempts to explain the nature and sources of data and data collection techniques. Moreover, this chapter's purpose is to provide information about various qualitative data collection tools and techniques which is used for the analysis of the presented data. The chapter organized as follows:

Research Design

Research design constitutes the blue print for collection, coding of the theme and analysis of the data. This study is qualitative in nature on the basis of case study design about anxiety on mathematics learning in secondary level students. Case of the studies was those students who have high mathematics anxiety. Thus, this study was completed on the basis of qualitative as well as descriptive in nature. Since math anxiety is concerned with students' attitudes and their achievements, study is focused on deep inquiry among respondents.

Rationale of Selection of Study Area

Since the qualitative study seeks for analytic or theoretical generalization, this study was conducted in the community based school in Nuwakot District. Nuwakot District is one of the high hill regional District. Almost 2/3rd part of population occurs by Tamang indigenous ethnicity. Nuwakot is one of the fourteen badly destructed Districts by mega earthquake 2072. Several private and public infrastructures like: hospitals, health posts, public properties and schools were badly damaged all over the District. So, general daily activities were influenced. We all know that educational sector also badly influenced by this disaster. In this situation, it is important to observe analytically and recommendation for re-construction of various damaged sectors. Thus, Shree Bhawani Higher Secondary School, Kakani of Nuwakot District

was selected study area to evaluate student's performance and growing anxiety of community based secondary school level students under re-habitation phase after earthquake. This study focused on identifying the major causes and remedial ways of anxiety in mathematics learning.

Selection of Case Respondents

This study is qualitative in nature based on case study design about mathematics anxiety in secondary level students. So, the case respondents of the study were selected those students of secondary level, who have high level of mathematics anxiety. In case study design there is no fixed rule about size of the cases. Qualitative inquiry typically focuses in depth relatively small sample, even single case. Therefore, cases of the study were selected as purposefully by examining MARS-R, which gives minimum score 24 and maximum score 120; in the grades IX and X among total students of 224. Different anxiety scores were obtained by examining MARS-R. Among them low anxiety rating score (below 56) obtained by 69 students, moderate anxiety rating score (57 to 88) obtained by 120 students and high anxiety rating score (above 89) obtained by 35 students. For the purpose of study, highest scorer top five students were selected as case students assuming they have high anxiety in mathematics. In addition teachers and parents also selected as respondents.

Table 3.1: Respondents demography

Grade	Boys	Girls
IX	-	2
X	2	1

Data Collection Tools and Techniques

One of the most important aspects of the study is data collection tools and techniques. Because of all results and conclusions depends on the collected data. In the research, applied data collection tools and techniques should be applicable,

experimented and behavioral. So that collected data should be valid and reliable for the purpose of the study. Therefore researcher used the relevant tools and techniques as Revised Mathematics Rating Scale (MARS-R), classroom observation guideline, in-depth interview schedule and focus group discussion.

MARS-R

The first formal scale of measuring math anxiety was developed by Richardson and Suin in 1972 and is titled 'The Mathematics Anxiety Rating Scale' (MARS). It contains 98 items of brief descriptions of mathematical situations that may arouse math anxiety while thought of by taking the scale. Later, in 1982 researchers Plake and Parker analyzed the 98-item MARS, and made a Mathematics Anxiety Rating Scale- Revised (MARS-R). It contains 24-items in two subscales. First subscale contains 16-items directions related to learning mathematics anxiety and second subscale contains 8-items directions related to mathematics valuation anxiety. Those directions are for students to rate each item involving a mathematical situation in terms of how anxious feel during those events. In MARS-R, students responds individually to the scale by measuring their level of anxiety, where 1 is assigned "not at all" anxious and 5 reflecting "very much" anxious. High scores on this scale reflect high levels of math anxiety and low scores reflect low anxiety suffered by the individual. MARS-R shows a pattern of relationships with measures of state similar to that for the full scale MARS. Therefore MARS-R which gives lowest score 24 and highest score 120; is reliable test of math anxiety. During the research, MARS-R was examining at first (once) in the grades IX and X among 224 students, and case students were selected two students from grade IX and three students from grade X, who got top of high score among students.

Classroom Observation Guideline

The classroom observation is a comprehensive data collection and management system that reports real time data from classroom walkthroughs, teacher observations, instructional rounds and evaluations. To collect data from classroom observation, researcher used classroom observation guidelines. Classroom observation guideline contains various important points to be observed in classroom while teaching and learning activities is running. The researcher had used 13 points classroom observation guidelines in natural setting of classroom to noted important factors promoting math anxiety. Classroom observation guideline was constructed including different factors that might be promoting math anxiety such as; physical structure of classroom, student's behavior in classroom and learning activities, opportunities provided to students, teacher's behavior, using instructional materials, giving home assignment etc. This guideline was conducted four times in research period.

In Depth Interview Schedule

In-depth interviewing is a qualitative research technique that involves conducting interactive individual interviews with a small number of respondents to explore their perspective on a particular idea, program or situation. The process for conducting in-depth interviews follows the general process as: plan, develop instruments, collect data, analyze data and disseminate findings. The researcher developed an interview schedule for parents, students and teacher including various questions to be explored during the interview. At first researcher has developed an interview protocol; the rules that guide the implementation of the interviews. It contained 19 main questions for parents and 20 main questions for students. It was used to capture rich descriptive data about student and parent's behavior, attitudes and perceptions towards mathematics, math problem solving, doing homework, sharing experience, helping each other etc. The researcher used interview formats in semi-structure form and open interview format.

Focus Group Discussion

A focus group discussion (FGD) is a good way to gather together people from similar backgrounds or experiences to discuss a specific topic of interest. In this research specific issue was causes of math anxiety and their remedial ways. The group of participants is guided by a moderator (or researcher) who introduces topics for discussion and helps the group to participate in a lively and natural discussion amongst themselves. The strength of FGD relies on allowing the participants to agree or disagree with each other so that it provides an insight into how a group thinks about an issue, about the range of opinion and ideas, and the inconsistencies and variation that exists in a particular community in terms of beliefs and their experiences and practices. During research period FGD sessions was prepared carefully through identifying the main objective(s) of the study, developing key questions related to issues and planning how to record the session. The next step was to identify and invite suitable discussion participants; the ideal number is between case students. At the end researcher summarized the session to reflect the opinions evenly and fairly.

Data Collection Procedure

Data collection procedure is the process of gathering and measuring information on targeted variables in an established systematic fashion, which then enables one to answer relevant questions and evaluate outcomes (Wikipedia). It is a component of research in all field of study. The goal for data collection procedure is to capture quality evidence that allows analysis to lead to the formulation of convincing and credible answers to the questions that have been posted. At first, the permission to conduct this study was obtained from the school administration principal where the study took place. To collect qualitative information and descriptive data, researcher conducted above mentioned data collection tools and techniques, such as; class observations guideline, in-depth interview schedule and focus group discussion. In order to be more confident in the study's findings, data were collected from multiple sources. Classroom reality observations, interviews with

students and parents, and focus group discussions were the main data-gathering method while interviews with mathematics teachers from the school were conducted to get an authentic impression of the behavior and participation of the case students.

At first researcher used classroom observation guideline for observe physical structure of classroom, student's behavior, teaching and learning activities, teaching strategies, use of instructional materials and so on. After that semi-structural interview schedule was conducted on students, teachers and parents. Semi-structural interview schedule contains set of questions to capture student, teacher and parent's opinions, attitudes, beliefs and suggestions to minimize mathematics anxiety. However researcher used talking to administration about case student's achievement, activities and participation in school activities. It was helpful to draw information about case students. At last focus group discussion was conducted among cases students. Focus group discussion was helpful to capture case student's opinions, feelings, attitudes and further aims towards mathematics learning. Furthermore the unpublished documents or records of school related with case students were also studied. Attendance, register, extra activities records and students result in mathematics was considered as the supporting documents. In addition, different related journals and articles were studied about the factors producing anxiety and remedial ways in mathematics anxiety. Since the study is case study in nature. So, researcher tried to establish close and friendly relationship with case students. According to school documents, parents' information and case students' responses researcher picked up several notes every day by writing, by recording and as possible by talking video recording. Until the accurate and necessary data is not collected, these procedures were regularly constructed as per necessary.

Data Analysis and Interpretation Procedure

Data analysis and interpretation procedure is the process of bringing order, structure and meaning to the mass of collected data. It is the activity of making sense of, interpreting and theorizing data that signifies a search for general statements among category of data. In qualitative research data analysis can be describe as the process of making sense from research participant's views and opinions of respondent's. In other way, it can be describe as a search for general statement about relationship among category of data.

This study is pure qualitative in nature. So, collected qualitative data were analyzed by the perspective from the different related theories, ontology, epistemology and methodology. The thematic network analysis was considered to analyze different themes related to the study, such as: student attitude towards mathematics (e.g., student beliefs, student behavior, aims, and myths etc.), parental involvement (e.g., participation at school events, maintaining learning environment at home, parents education background, helping learning activities etc.), and school management (e.g., school physical structure, classroom management, instructional materials, teacher behavior etc.). After that data was categorized and coded according to category of responses. Natural setting teaching and learning activities observations, case student's responses and already established theories (conclusion of related researches), these three facts were compared to establish the triangulation and validity between the facts. Also framework analysis method was applied to examine findings with pre-determined framework which determined research aims, objectives and interests.

Ethical Consideration

Researcher believes that ethical code of conduct should be considered. In this case researcher started initially by the explanation of the purpose of the study. Researcher has used unbiased words against gender or age in writing this research. Researcher never tried to ask about participants' private information to make them feel

embarrassed and uneasy. Moreover, in presentation of the data, received from the field are explained as the same way that participants' understanding, ideas and perceptions. As per necessary, researcher has cited the literatures that referred study and references. And also being a qualitative research, there is no objective claim of realities. Just drew and compared the theme of information collecting in the natural setting.

Chapter IV

ANALYSIS AND INTERPRETATION OF THE RESULT

This chapter deals with analysis and interpretation of the collected information and important notes collected from the classroom observation guideline, semi-structural interview schedule (students, parents and teachers) and focus group discussion. Data analysis and interpretation is the process of bringing order, structure and meaning to the mass of collected data. It is the activity of making sense of, interpreting and theorizing data that signifies a search for general statements among category of data. In qualitative research data analysis can be describe as the process of making sense from research participant's views and opinions. In other way, it can be describe as a search for general statement about relationship among category of data.

As mentioned in previous chapter, researcher has used thematic network analysis as a data analysis and interpretation method. Furthermore, findings of previous researches, article reviews and findings of this study (or research); these three facts were analytically discussed for making triangulation between the facts. Thematic network analysis and triangulation approach between facts were main consideration of the data analysis. So, collected qualitative data were analyzed and interpreted on the category of following main themes of the study:

Student Attitude towards Mathematics

In general some authorities regard attitude towards mathematics as just a like or dislike for mathematics, while other extend the meaning to embrace beliefs, ability, and usefulness of mathematics. According to Zan and Martino (2007), attitude towards mathematics is just a positive and negative emotional disposition towards mathematics. Attitude towards mathematics can be consider from multidimensional perspective and defined as an individual's attitude towards mathematics by the emotion that he associates with mathematics, his beliefs about mathematics and how he behaves towards mathematics. Attitude towards mathematics includes the tendency

to be fearful of and anxious about mathematics. Attitude towards mathematics has cognitive, affective and behavioral components. Attitudes can be seen as a more or less positive. A positive attitude towards mathematics reflects a positive emotional disposition in relation to the subject, and in a similar way, a negative attitude towards mathematics relates to a negative emotional disposition.

There are various factor groups that play a vital role in influencing student's attitudes: factors associated with students themselves (e.g., mathematical achievement, anxiety, self-efficacy and self-concept, motivation, and experiences at school), factors associated school, teacher and teaching (e.g., teaching materials, classroom management, teacher knowledge, attitudes towards math, guidance, beliefs), and finally factors from home environment (e.g., educational background, expectations). These three groups of factors were taken to analysis case student's attitude towards mathematics.

Rabin Lama, 17 student of grade X of roll number 49 was from middle class economical background. His behavior showed hesitation and fear of maths. In previous grade he failed in mathematics. While class observation, researcher found that Rabin has problem in remembering and applying math formulae and problem solving. He said, "*the teacher doesn't use materials and clarification of problem solving for slow learners.*" It effects in understanding mathematical concepts and definitions. Lack of parent's support because of uneducated and lack of good guidance, he is no clear about further aims to regularity in study. He just has thought to go golf country to earn money. So, all of those reasons, negative attitude is developing under his mind. Susmita Tamang, 15 said, "*math subject is hard and vague subject.*" She has negative attitude towards mathematics because, she has no interested in mathematics. Home environment is not suitable for reading and practicing math's tasks because of damaged their house by earthquake. Her parent informed that, she has bad habit of watching TV serial program and influenced by

laziness and careless habit instead mathematics is practical subject. So, without practice and problem solving, mathematics goes to be complicated for everyone. According to the math teacher she has poor in pre knowledge and basic concept of mathematics. That means necessary and basic formulae ideas and definitions should know every student. Gyalmo Ghale, 16 also student from grade X. He has also negative disposition towards mathematics. He behaves mathematics as bad and hard subject because he couldn't apply suitable formula on correct steps while solving a mathematical problem. He can't solve verbal problems and long processing questions. Fear and loss of self-confidence is his main problem. This type of behavior towards mathematics supports developing anxiety. Lang, M. C. (1992) sum up that, students who react negative to mathematics might also have negative reactions to other related endeavors such as computing. Rubi Lama, 17 from grade IX, roll number 75 got high math anxiety score. According to administration and observation of school documents, it is seen that her mathematics achievement is worst from grade seven. She says, *"I can't understand mathematical problems and I can't remember formulae as well. So I fear to solve mathematical problems."* This shows she has fear from math. Because she is afraid if she can't solve any problems. Parental support and home environment were disturbance to doing homework and learning activities because, her parents engage on their hotel business all the times. According to teacher she never asked any questions about subject matter, she is passive in class activities, and backbencher of the class. The teacher should also be responsible for developing negative or positive attitude towards mathematics. Lack of motivation, lack of new behavioral teaching strategy and lack of knowledge of content are main responsible factors related with teacher. During the research period it is found that Saru Tamang, 14 of grade IX has positive disposition but, she has high math anxiety. She says, *"I think mathematics is good subject. But, only excellent students cross it. It is not suitable subject for us, poor students."* She noted further that; noisy classroom environment,

lack of teacher's control, lack of instructional materials, lack of explanation of problems and solving, and teacher careless habit are main causes to developing hindrances. This shows there are various factors relating with home environment, school management, classroom management, behavior of teachers and students that causes to develop negative attitude towards mathematics.

In this case Chamen (2014) noted that attitude towards mathematics have direct influence on mathematics anxiety of students. Further, his research findings revealed that a significant positive correlation between attitude and towards mathematics and mathematics anxiety.

Parental Involvement

Parental involvement refers to the amount of participation a parent has, when it comes to schooling their child's life. In addition parental involvement include helping with homework or supervising homework, volunteering or attending school events, encouragement in academic success, having high expectation for achievement and parent child communication. Parental involvement in school, as measured by attendance at a general meeting, a meeting with a teacher, school events, servicing on a committee etc.. Cai, Moyar, and Wang (2014) study found that students with the most supportive parents demonstrated higher mathematics achievement and more positive attitudes towards mathematics than those students with least supportive parents. Parents might be involved their child's education as motivator, resource provider, monitor, content advisor or learning counselor. For the purpose of study parental involvement has been defined as parental participation in school relative activities and maintaining learning environment at home.

During the research, there was no parent meeting called at school. According to school administration attendance of parents of case respondents in the school meeting, was not significantly regular. Generally their fathers are working in foreign country because of hoping re-habitation of their houses destroyed by badly destructive

earthquake. So, sometimes their mother attends in school- parents meeting. But, they don't speak anything about child's learning, school management and teacher's activities. They just listen and go home. Parent's passive involvement refers student's passive activity. Student's passive activity is directly related to creating math anxiety. During interviewing it was cleared that parents just do for formality of presentation in the meeting, discussion and other event of school. This means, there is no good environment of interaction and problem sharing between parents and students. In this point, LaBahn (1995) says on their article that, parental involvement, in almost any form, produces measurable gains in student's achievement and it concern with reducing math anxiety. Generally in study site, parents are uneducated and surviving with struggle because, Kakani is rural area under developing municipality. They did not suggest child's bad activities and careless of doing homework at home. Lack of coordinating environment at home, lack of good suggestion of parents and ignorance of child's bad activity promotes laziness of reading and doing mathematical tasks.

Parents of Rabin Lama are farmer. They don't have any other resources of income. They are just literate. So, they said that, they can't suggest their child for learning and doing homework properly. When researcher asked his parents, they said; *“we are unknown about Rabin's achievement and progress in school.”* They are feeling upset and not interested in participating school events. In similar way parents of Susmita Tamang are also farmer. They said that their family economical condition disturbed regularity of higher education. So, they can't check daughter's homework and assignment properly. Study area is rural area and dominating by indigenous Tamang ethnicity so they are not educated by their culture. It is proportionally related to the passive involvement in child's learning activities. Parents of another case student Rubi Lama, has their hotel business. So, they say; *“we accept that we are can't managing time for daughter. But we motivated her to go ahead. The subject teacher and principal also responsible for student's learning.”* But, they suggest their

child to do homework, assignment and daily practices, and also participated school events but they can't guidance for mathematical subject because of lack of mathematical knowledge. This situation is seen as almost encourage less from his parents. At same time Gulik (2012) pointed that without encouragement to be successful at mathematics and having expectations to fail by parents, young children likely to develop mathematics anxiety. Gyalmo Ghale said that their economic status of home environment is good. His father works in foreign golf country and mother is housewife. His mother often asked about her son's activities in school to the teacher. She suggests child to do homework and assignment regularly. Her mother said; *"I think he has good aim further and he knows an important of education. But why he fails mathematics? I don't know."* This shows, her mother expects high achievement and performance. But she is not involving properly in school events. Parents of Saru Tamang are also farmer. She said, *"my parents are farmer. They are just literate. So they can't help me in study."* They said that, they are providing everything that demanded by daughter. Though, her father participates at school events and meetings of school, and asks to the teachers about Saru's achievement, but she is poor in math..

It is seen that parents of case students are not high education holders they are just literate. They are simply the farmers. But we may not say that they are poor, weak and ignoring to understand importance of education. The study area is rural area, so there are no opportunities as city area. Therefore, parental involvement is meaningful for their children because, students need helps, coordination and affection from their parents. Lack of good guidance, lack of help, lack of well home environment and lack of learning materials are directly related to increasing anxiety. Moreover, Chamen (2914) suggests that parental involvement directly influence attitude towards mathematics and attitude towards mathematics is one of the major cause of producing mathematics anxiety. It seriously causes to negligence of reading and doing mathematical tasks. Therefore without comparing with the case of other excellent

students, researcher come up to conclusion that least parent's involvement in teaching learning activities and passive participation on school events strongly related with producing mathematics anxiety amongst the case students.

Home / School Environment

School management / environment refers physical (e.g., buildings, classrooms, desk benches, boards, teaching learning materials), educational (e.g., teaching learning activities, teacher's behavior, educational projects, output) and administrative (e.g., rule and regulation, reward and punishment, discipline and norms) management of the school. Good school management impresses positive impacts to the stakeholders. Similar way, teaching learning environment, good classroom management and well administrative culture promotes to achieve better educational output. This is proportionally related to buildup positive attitude towards mathematics. However, if school administration can convince as school is public property then all stakeholders should be ready to manage school environment. So, school management is most important factor for promoting or reducing student's anxiety towards learning mathematics.

The natural setting observation was conducted to collect current data of school physical management, administrative management, classroom management and teaching learning activities in order to search the facts, factors and facilities providing to students. Sometimes classroom management promotes students participation and build up confidence and an efficacy, which helps to reduce anxious feeling of students. Observation of classroom management and teaching learning activities was conducted regularly ten days. Nepal mega earthquake 2072 damaged three buildings completing, those were still re-constructing, and two building were made from bamboo for temporary classes. Outside environment of school was noisy and helter-skelter because of re-construction of building and classrooms.

Specially, researcher observed classroom management and teaching learning environment of class IX and X with the aim of picking fresh information and adapt teacher-students activities from the classroom while running the classes. To collect current information of class activities researcher used classroom observation guidelines. Physical structure of classroom of grade X is almost 300 square ft in area carrying 85 students. Desk and benches were not so comfortable for students because number of students was high and classroom was not enough. Also teaching learning activities were disturbing by vehicles and other sounds. In similar manner grade IX is also same size in area that of grade X. There were 85 students in grade IX. There were no windows to close to prohibit disturbance of outdoor sounds. Because of high attendance of students class were clamor by student's side talking and out of control. During classroom observation it is noted that classroom management was not comfortable for students because of large size of attendance. Desks and benches were also not comfortable. This type of uncomfortable management creates laziness and uneasy to reading, writing and doing mathematical problems in to the class. So, these are seen as causes of increasing math anxiety inside of classroom management. Another important factor of class observation was teaching and learning activities during the class period. First class observation was conducted in grade X. There were 75 students presented in the class. The chapter was Probability.

In this class observation it is seen that, teacher as a just speaker and students as listener. It means teacher is could not playing the active role in classroom. Effective teaching techniques and strategies were not provided to activate the students to participate in learning activities. At the end of the class students were still in confusion. They were could not understanding the actual concept of probability and, they are not giving interest from where and how teacher presented tables and examples. Due to the lack of comprehensive teaching, students did not get opportunities to discuss and expression their experience and understanding. In this

sense Gulik (2012) says that teachers and peers are great forces of influence and can be causes for mathematics anxiety. Thus teacher should cooperate and play role for good learning opportunities. But, students were busy in coping rather in thinking discussion about concept and how formula was developed. There way, teacher was seen passive and careless about students understanding.

After classroom observation, researcher asked about the class with case students Rabin Lama, 15 of grade X. according to his answer, it is clear that he is back bencher of the class, although he tries to focus into the teaching learning activities. But, he said; *"I am poor in mathematics. I can't give attention towards the class because of noisy class and carelessness of the teacher."* Lack of discipline and freedom of students in class makes students lazy and careless about subject matter. As a result there is creating un-seen anxiousness towards mathematics. It destroys intelligence, and it effects on child's whole way of looking at, thinking about mathematics and dealing about life.

Researcher's next classroom observation was held in section A of grade IX. It was also compulsory mathematics class of same teacher. Classroom was physically large in size, without closed window and door. There were 61 students presented among 80 students. In the class running time, students were entered and entered until 10 minutes of class started. This seems disturbance to learning. In this class observation, one thing is cleared that the teacher was active in his side. But still students were aspect some close students favor remedial activities. For example, the teacher wrote formula on the board but he did not explained again. Presented figure was not clear. In this context, case students were in confusion. They were busy in copying the solution written on the board. It means there was no time given to thinking and understanding. No one student asked cross questions in the class period. Just class work presented but, teacher did not give any feedback after that. This is

what a seemed is, just given and left. It might be the cause of developing mathematics anxiety.

In this class, behavior of case student's showed that; students are also responsible for developing anxiety. If they don't focus to activities and do not get interest to participate in teaching learning activities, then obviously there is fear, afraid, worry and negative attitude build up in mathematics.

Optional mathematics class of grade X was researcher's third class observation. There were 12 students attended only. Physically, this class was appropriate for the students. Not large in size. There was good blowing wind and adjust of the lights. This class was running after break time, at 5th period. Researcher had noted the class activities as follows: When, the teacher told at start to them; "*the optional mathematics is one of the difficult and vast subject*"; exactly in the time researcher noted that students became anxious mentally. So, negative attitude toward mathematics of teacher also helps to pick an anxiety of mathematics. Here is the point that should be noted is the methodology of teaching, which causes anxiety of mathematics. A teacher might create anxiety by placing too much emphasizing on memorizing formula and applying rote memorized rule excluding understanding learning session in the class.

The teacher did not use any teaching learning materials. Teaching materials helps students to perceive clear vision and understanding of the mathematical concept. Lack of materials means there is no supportive materials for concept building. Similarly, student's participation was also minimal in the class. No one asked for their prior knowledge about the topic. Not reached to every single student to advise or help. Thus, researcher noted that, creating fear environment, providing no opportunity for participation, teaching without materials and do not behave students as closely etc. plays negative role to increase anxiety of mathematics.

The fourth observation class was IX, Optional Mathematics class. This room is same room where grade X optional class held. Physically classroom was quite small and good environment of teaching learning. There were 10 students only. Teacher said all students were attended. Out of 10, there were 2 girls. The teacher started class starting the chapter Function. Then, researcher observed class activities ahead. In this class new strategy and teaching materials does not used. Weakness students are facing the same problems like as the other classes. In this class the teacher wants to apply the coordination or participation method for teaching. But, teacher is could not coordinating between students, because of their laziness and without pre knowledge of subject matter. Teacher spends more time for scolding and other unnecessary talking. Here Gulik (2012) study mentions that the major behaviors teachers engages in which are causes of mathematics anxiety are; modeling gender bias, having insensitive attitudes, being angry towards students, expressing dislike for the subject and offering poor quality instructions. During research work and interviewing parents and students, they frequently talked that teacher do not used appropriate teaching strategies.

At the end of the class observation, it was cleared that pre knowledge is building block for up-coming knowledge. That means, priori knowledge is responsible for creating anxiety of mathematics. Simply we know that, mathematics is a structural and chain subject which is connected with previous formulae, concepts and so many factors. So, previous incomplete knowledge or wrong conception makes students anxious. Active and successive student's role increases confidence level and strong mental activeness. So, every class should aspect students' active participation in teaching and learning activities. In the class observation students are seen passive in role. Teacher used 'jug and mug' strategy. He did not call any students in front of the class. Just make them to develop habit of copy and paste. Thus, passive activities,

shyness and hesitation on participation are symbols of developing anxiety of mathematics.

Main causes of Math Anxiety from Teacher's View

The teacher's views and opinions were collected through semi-structural interview schedule. Main focus of interview schedule used to teacher was to find out the serious causes of student's weakness or anxious feelings. The main themes of teacher's view are presented as follows:

There is a most popular slogan; 'practice makes man a perfect'. Without practice, we can't get good achievement in mathematics. But, students do not practice the mathematical problems at home seriously. Most of weak students have various presentation problems such as; asking questions, understanding step by step of problem solving, discussion about lessons and confusions etc.. These are common symptoms of shyness and loss of self-motivation. Another main cause of student's anxiety is class upgrading system being failed in any two subjects. This system promotes students bad habit of negative thinking to be upgraded grade if they failed in mathematics. New introduced grading system in secondary education examination (SEE) also indirectly promoting student's to be laziness to reading and practicing mathematics. Because, they are impressed negatively as they didn't need high score in mathematics. So, all related stakeholders should be aware about delivery of wrong information. Furthermore, lack of effective instructional materials, audio-visual materials, do not identify effective teaching learning methods, lack of encouragement to students about positive good will of mathematics in classroom promoted the loss of student's self-confidence. It means school administration should be responsible for creating math anxiety among students.

Another serious cause of increasing math anxiety among secondary school level students is home environment. Classroom is only the place from where students learn concept and get few opportunities to solve mathematical problems. Students

spends much time at home than classroom. So, illiterate parents, noisy and uneasy home environment, lack of comfortable study room, lack of positive guidance, society environment and peer group behavior impacts students studying time and as a consequent the loss self-confidence.

Thus from teacher's views, the researcher came to the conclusion that there are various stakeholders are responsible for promoting students anxiety in mathematics. The school administration, home environment, teachers, peer group behavior and society can impacts student's behavior, thought and reaction.

Remedial Ways of Mathematics Anxiety

Mathematics anxiety is general and occurs thousands of students and teachers. So, it is necessary to understand and minimize using various methodologies. There are several researches carry out to get remedial ways of it. Same way, here are presented participant's views and suggestions of remedial ways of mathematics anxiety.

Teacher's View

School administration should responsible for manipulations effective instructional materials. There are no appropriate materials for every lesson. So, administration should provide effective teaching materials. Because, used of instructional materials helps students to understand mathematical concepts clearly and to remember for long time. Learning is depends upon understanding cognitive level of students. Slow minded students can't follow the fast minded students. Therefore, students should self-motivated, they should develop positive attitude toward mathematics, they should know importance of mathematics; because it is behavioral and useable subject. Students should involve project work in mathematical task, they should participate in classroom discussion, they should develop habit to ask clear illustration or elaboration of subject matter and teacher should responsible for answering their questions. Parent's habit, literacy level, job description and home environment also effects children study. So, parents should play role to reduce child's

anxious and negative feelings on mathematics. For this, they should provide peaceful, appropriate and learning favor environment. They should motivated students to be a good person, they should help to complete homework and assignment, parents should give suggest children to avoid bad peers and bad habits. Parents should take care about their child, they should establish communication with school and teachers, they should ask about their child's achievement. It helps students to be aware and they don't engage with bad habits. Consequently, student's anxious feeling and fear to mathematics decreases.

Parent's Views

As discuss in previous chapter parents of case respondents are educationally poor and they accepted that they aren't able to help child's homework, assignment and so on. But they suggest their children to go school. Often they admitted their children in mathematics tuition too. It means they want to give all responsibility of developing math anxiety is by the subject teacher and class activities, because almost all the time of children in a day was handover by parents to the school and teaching learning activities. Also they accepted that this generation of children having bad habit of engaging on TV, mobiles, games, entertainments, and so on. Therefore, parents suggest to the teachers to be responsible, to strategic teaching, to do diagnostic behavior in class, to give regular homework and so on.

Discussion

This study was qualitative in nature and case study design about mathematics anxiety among secondary level students. Main objectives of the study were to find out the causes of mathematics anxiety and to suggest the remedial measures on different views. According to teacher's and parent's views towards remedial ways of mathematics anxiety, it is clear that, they allegation each other for responsibility. But, both factors have equal responsible for developing anxiety on students. Parents are first *gurus* of students. So, they must provide peaceful and suitable environment at

home. They must give always good suggestion for being moral and helpful in school as well as in society. Another way, teachers are most ideal people for students.

Therefore, teacher must responsible for teaching well behavior, well discipline and building positive thought or attitude. Furthermore, on the basis different stakeholder's views and results or findings of study some remedial ways are discussed as following to reduce anxiety in mathematics learning:

- ◆ Teacher should focus on effective learning strategies in classroom such as; students centered teaching learning, collaborative learning, discovery learning, problem solving based learning and group discussion methods by using ITs & ICTs as possible.
- ◆ Promote conceptual and understanding learning. Because, mathematics is structured subject. It has chain from basic level. So, teachers should provide dualistic concept connected with student's pre-requisite knowledge to students by using different techniques, technologies, audio-visual aids, and gaming.
- ◆ Using of daily lesson planning and effective instructional materials should be helpful for both teachers and students to create interactive teaching learning environment.
- ◆ Students should be interested and self-motivated to learn and utilization of mathematics concept. For this, teachers should be presented himself as ideal person and motivational person. Performance of good behavior and good willing of mathematics may help students to be positive towards mathematics. It can help reduce math anxiety among students.
- ◆ Parents are first *gurus* for children. So, parents should play as manager for providing peaceful environment to study and help to complete their assignment, homework and practices at home. Regular communication with school administration and children is needed. Parents awareness about child's activities, presentation and achievement in school makes students beware too.

- ◆ Students are raw clay. They need true guidance, well discipline and good habit formation. So, related stakeholders should encourage them to develop habit of asking for questions, discussion about mathematics learning, asking for clear illustrations, demonstrations, talking about positive attitudes towards mathematics etc.. So, that they enjoy mathematics learning.
- ◆ Teachers and parents should work together to assure every student that; mathematics is backbone of every sector, mathematics is interesting fun, important, relevant and useable subject. So that, they can learn the mathematics skills that they need to success.

Chapter V

SUMMARY, RESULTS, CONCLUSION, AND IMPLICATION

This chapter deals the detail with summarizing of the research, major findings drawn from the analysis and interpretation of result of collected data, conclusions and recommendations for further study. The chapter closes with mention of the important implications of the study in further teaching and learning activities.

Summary of the Study

This study is framed as a case study design about mathematics anxiety on secondary level student's. School level is accepted as backbone of the further study. But, there are such blames to school administration and teachers that concerned with their ignorance and careless behavior for classroom management and teaching learning activities. That seriously impacts to the performance and achievement of the students in mathematics. In this context, this study was conducted regarding with the main objectives to find out main causes of mathematics anxiety in secondary level students and to suggest appropriate remedial measure. For this purpose, Shree Bhawani Secondary School was selected as study site which is located at rural area Kakani Rural Municipality ward no. 4 of Nuwakot District.

The major tools and techniques that are used for this study were MARS-R, classroom observation guidelines, semi-structured interview schedule for parents and students and focus group discussion among case students. MARS-R was examining once to select case respondents who got high scores, assuming they have high mathematics anxiety. Classroom observation guideline was used for pick up fresh and current data from classroom physical and instructional environment. Specially, researcher has focused to observe of factors that causes mathematics anxiety. In similar way, semi-structural interview schedule was conducted on parents and case students to draw their experiences, views, beliefs and attitudes towards mathematics learning. And focus group discussion was conducted among case students to share

their habit, feeling, and attitude in depth. Collected qualitative data were categorized according to main factors effecting mathematics learning. Then coding thematically that obtained facts and factors. After that thematic network analysis and triangulation approach were applied to analysis and interpretation. Then findings of this study were presented according to the theoretical and conceptual framework. Furthermore, result and discussion, conclusions, recommendation and implications are presented as follows:

Result and Discussion

The research shows that there are many factors; such a negative family environment, careless and negative impression from parent's behavior and past generation, no encourageable school environment, discriminative teacher's behaviors etc. plays significant role to bring anxiety in mathematics. But, it is found that the case students are more responsible to produce anxious feelings themselves because their bad habit of not doing homework, engaging TVs, social media and negligence to reading increasing day by day. Results / findings and discussion of the research from analysis and interpretation of the data are as follows:

- ~ Upgrading system being failed in at most two subjects is directly related to promote anxiousness of students further. It is more responsible to having anxious feeling for the past grades. It is directly proportional to loss of self-efficacy. Loss of self-efficacy implies producing mathematics anxiety.
- ~ The research shows that badly infrastructural detriment by earthquake is responsible to create negligence to study, doing class works and homework. So, case students lost their habit of doing class work and homework regularly. This means, student's worst home (physical) environment playing role of increasing laziness to doing study and homework. It creates an anxiety of mathematics.
- ~ According to parents of case students have bad habit of using social media, like; You Tube, Facebook, TV, video games etc. though mobile were banned in

school, they used at home rapidly. Hanging on these types of media swallowed their activeness and good utilization of reading time. It has inverse proportional to their mathematics achievement.

- ~ During the class observation, it is noted that there were lack of appropriate mathematical instructional materials and lack of opportunity to active participation in problem solving strategy. There is no used daily lesson planning of mathematics teaching. It is true that instructional materials and appropriate teaching learning strategies has directly linked with learning by understanding. Also mathematics is not rote learning. It should be better to do understanding learning.
- ~ In the time of class observation, researcher did not see well understanding of the teacher to students according to their cognitive domain. If teacher is not able to know different cognitive level of case students; he is not able to apply suitable approach to teaching and learning activities including all cognitive level of students. Consequently, it causes the anxiety among case students.
- ~ This is 21st century, well known as Information & Technology (IT) generation. Mathematics teaching and learning can be behavioral and presented in 3D by using Information, Communication & Technology (ICT). So that classroom should be managed as useable of IT and ICT in teaching learning activities. But, teacher used only traditional lecture and problem solving methods anyhow. Which makes students very passive and weak students were not able to follow the teacher. It is seriously connected with feeling frustration, fear and anxiety doing mathematical task.
- ~ Most of the case students said; the teacher did not check homework every day. If he checked out, though he did not give any suggestions or solutions for wrong answers clearly. Just cross with red marks. This type of teacher's behavior has been promoting students to negligence to do homework. Without

good feedback case students can't overcome on many structural problems of mathematics.

- ~ Mathematics is almost structural, practical and applicable subject from early school level. It is found that; students have bad habit of not practicing at home. They accepted that they didn't practice as enough. Parents also ignore to care their children because of uneducated.
- ~ Good discipline increases creative thinking and co-operative environment in classroom and outdoor situation too. But, it is found that student's ignorance and dominated behavior towards the teacher. Their behaviors were promoted to decrease self-confident and understanding learning. So, student's anxious feelings were increasing.
- ~ Students have no aims to continue mathematics for further study. Without passion and aim, there is no way to overcome fear and anxiety of mathematics. During the research, it is found that no one case student has good vision for further mathematics study. This is directly proportional to promote anxiety on subject.
- ~ It was found that the role of school administration was passive during the research work. Teaching and learning activities were feedback-less. According to students teacher don't use general feedback after examination, class work and as well as after completing the chapter. It helps to create careless habit to students. As consequences, students get feeling anxious to do better than before.
- ~ Absence of giving learning opportunities to case students, absence of creative thinking in administration, teachers and students, absence of taking seriousness to teaching and learning mathematics, absence of habit to share mathematical knowledge among peers can badly paralyze student's confidence of learning by understanding mathematics.

Conclusion

Mathematics anxiety is a real dreaded problem facing by thousands of secondary level students. Mathematics anxiety is well known as fear, frustration, negative feelings towards mathematics. So, it has well bond with earlier/previous learning impact and self-behavior.

As a conclusion, the reasons of mathematics anxiety were grade upgrading system being failed in two subject, lost of self-efficacy, lost of habit of doing homework being mental effected by earthquake, bad habit of hanging on social medias, lack of problem solving practices, the teacher's discriminated behavior, used of traditional teaching methods only, lack of conceptual teaching, lack of effective instructional materials, lack of feedback after assignment and examinations, passive role of school administration to conduct mathematical programs, uneducated parents, lack of past generation motivation etc . That is why students could not understanding mathematics as creative and world wise practical and important subject for further study area.

In similar way, there are so many practical and instructional strategies and remedial ways suggested during research to reducing math anxiety. In conclusion it is found that students should be motivated themselves, they must attempt their homework and they should do enough practices at school and as well as at home too. Parents should understand home as a child's first school so that manage home environment peaceful. Parent's help may be another best way and motivation to solve different types of problems, cooperation and caring of child behavior in school and outdoor. Other hand, the mathematics teacher should be responsible for reducing math anxiety. Teachers should use child centered teaching strategies, lessons should be presented in variety of ways, diagnostic teaching methods should apply in classroom and teachers should pay enough attention for focus group. For instance, new concept can be taught by acting, playing, using audio visual aids, making co-operative groups

among students and using popular apps, games & technology. Moreover frequently discuss about math's positive aspects, asking questions-answers in the class, organizing brainstorming competitions about goodwill of mathematics, peer sharing and caring discussions, assess students to be positive about mathematics and having positive self-belief helps in reducing math anxiety helps students to overcome math anxiety.

Implications

The research is clearly applicable to understand causes of mathematics anxiety in secondary level students and its remedial measures. Mathematics anxiety is common and real fear and it occurs among thousands of students. It is generally known as math-phobia. It is feelings of tension and anxiety that interfere with the manipulation of numbers and the solving mathematical problems. Thus, math anxiety can be reduced by using preventative measures. In this case, this research's findings and recommendation clearly helps to stakeholders to avoid causes and factors that creating mathematics anxiety in secondary level students. In the classroom, teachers should maintain balance for both weak and talented students. Weak students have more math anxiety rather than talented students. So, this research prefer for diagnostic teaching method, sharing and caring students by giving learning opportunities and making positive attitudes toward mathematics.

For students, they can study this research for understand their self-weaknesses and wrong activities. So, that they get opportunity for recover it and overcome from mathematics anxiety. They can get different ideas to build self-motivation, build up habit of doing mathematics practices. As a result they can reduce their bad feelings and fear of mathematics problems.

The researcher hopes that, this research contributes to the larger literature on mathematics anxiety among teachers, students and related sectors. May this research should encourages education programmers, educational trainers and educational

article writers to be more responsible. Furthermore, the research is based on real case study so that researcher aspect for critical analysis from exports. Similarly this study is applicable to textbook writers, curriculum planners, policy makers and self (researcher) to improve professional development.

Appendix-I

MARS -R

Please rate each item in terms of how anxious you feel during the event specified. Use the following scale and record your answer in the space to the left of the item.

- 1 = Low anxiety**
- 2 = some anxiety**
- 3 = Moderate anxiety**
- 4 = Quite a bit of anxiety**
- 5 = High anxiety**

Learning Mathematics Anxiety

- _____ 1. Watching a teacher work an algebraic equation on the blackboard.
- _____ 2. Buying a math textbook.
- _____ 3. Reading and interpreting graphs and charts.
- _____ 4. Signing up for a course in statistics.
- _____ 5. Listening to another students explain a math formula.
- _____ 6. Walking into a math class.
- _____ 7. Looking through the math textbook.
- _____ 8. Starting a new chapter in a math book.
- _____ 9. Walking on campus and thinking about a math course.
- _____ 10. Picking up a math textbook to begin working on a homework
- _____ 11. Reading the word statistics.
- _____ 12. Working on an abstract mathematical problem.
- _____ 13. Reading a formula in chemistry.
- _____ 14. Listening to a lecture in a math class.
- _____ 15. Having to use the tables in the back of a math book.
- _____ 16. Being told how to interpret probability statements.

Mathematics Evaluation Anxiety

- _____ 1. Being given a homework assignment of many difficult problem which is due the next class meeting.
- _____ 2. Teaching about an upcoming math test one day before.
- _____ 3. Solving square root problem.
- _____ 4. Talking an examination (quiz) in math course.
- _____ 5. Getting ready to study for a math test.
- _____ 6. Being given a "pop" quiz in a math class.
- _____ 7. Waiting to get a math test returned in which you expected to do well.
- _____ 8. Talking an examination (final) in a math course.

Appendix-II

Number of students responding MARS-R according to the rating record they felt at the statements.

1 = Low anxiety (L)

2 = some anxiety (S)

3 = Moderate anxiety (M)

4 = Quite a bit of anxiety (Q)

5 = High anxiety (H)

Sn	Statements	Number of students				
		L	S	M	Q	H
Learning Mathematics Anxiety						
1	Watching a teacher work an algebraic equation on the blackboard.	46	43	20	48	67
2	Buying a math textbook.	35	43	56	40	50
3	Reading and interpreting graphs and charts.	45	41	32	39	67
4	Signing up for a course in statistics.	32	39	43	50	60
5	Listening to another students explain a math formula.	56	34	29	29	76
6	Walking into a math class.	33	43	54	39	55
7	Looking through the math textbook.	41	45	50	43	45
8	Starting a new chapter in a math book.	54	32	54	41	43
9	Walking on campus and thinking about a math course.	32	45	49	34	64
10	Picking up a math text book to begin work in workbook.	46	32	45	36	65
11	Reading the word statistics.	45	42	54	34	49
12	Working on an abstract mathematical problem.	34	39	39	45	67
13	Reading a formula in chemistry.	45	36	75	24	44
14	Listening to a lecture in a math class.	34	54	35	34	67
15	Having to use the tables in the back of a math book.	28	43	56	32	65
16	Being told how to interpret probability statements.	22	33	61	43	65
Mathematics Evaluation Anxiety						
1	Being given a homework assignment of many difficult problem which is due the next class meeting.	28	43	33	55	65
2	Teaching about an upcoming math test one day before.	29	43	39	65	48
3	Solving square root problem.	24	49	56	33	62
4	Talking an examination (quiz) in math course.	54	26	46	32	66
5	Getting ready to study for a math test.	21	52	32	54	65
6	Being given a "pop" quiz in a math class.	31	44	34	56	59
7	Waiting to get a math test returned in which you expected to do well.	29	64	34	43	54
8	Talking an examination (final) in a math course.	39	43	65	33	44

Appendix-III

Classroom observation guidelines

1. Classroom physical structure
2. Students behavior in classroom
3. Interaction between teacher and students, and home assignment and classwork.
4. Participation of students on mathematics task
5. Participating in classroom discussion and extra activities
6. Regularity and participating of students on mathematical concepts
7. Teachers' behavior in classroom with students
8. Teaching strategies and opportunity of response
9. Materials and teaching planning of teacher
10. Teachers' behavior in classroom with case students
11. Guidance of teacher during classwork
12. Home assignment and classwork condition.
13. Coordination of teacher with students to problem solving.

Appendix-IV

Indicative interview schedule

For students

1. What is your name?
2. How old are you?
3. Who helps you with your study?
4. Do you think mathematics is important in your future work? In what ways? Why? Why not?
5. How do you rate yourself as a mathematics student?
6. How do you feel about it? Why?
7. What is your worst subject in school?
8. How do you feel when taking a mathematics test?
9. Which mathematics course are you studying now?
10. In what ways, if any, are your parents involved in your mathematics learning?
11. How often do your parents check your homework?
12. Who help you with your maths work?
13. Do your parents monitor the time you spend watching TV? Why? / How?
14. What is your parent's opinion about your achievement in mathematics?
15. Do your parents monitor the time you spend on mathematics? Why?/ How?
16. What do you want to do when you finish secondary school? Why?
17. What is your view about working hard in studies, particularly in mathematics?
18. What do you think is your parents' expectation about your achievement in school?
19. What do you think your parents would like you to do when you finish secondary school? Why?
20. In what ways do your parents help you in making decisions about your maths?

Appendix-V

Indicative interview schedule

For parents

1. What is your name?
2. How many children you have?
3. What do you do for living?
4. How much are you involved with your child's schooling?
5. How do you help your child with his/her studies?
6. How often do you check his/ her homework?
7. How much are you involved with your child' mathematics learning?
8. How do you help your child with the maths homework?
9. Do you check the assessment results of your child in mathematics? Why?
10. What is your opinion about your child's achievement in mathematics?
11. How often do you monitor the time your child spends on mathematics?
12. How do you monitor the time your child spends on activities other than studies like watching TV, playing games?
13. How often do you consult your child's teacher about his/her mathematics performance?
14. What is your view about working hard in studies, particularly in mathematics?
15. What is your opinion about your child's achievement in mathematics?
16. Which was your worst subject in school?
17. How do you help your child to make decisions about his/her studies?
18. What is your expectation about your child's achievement in school?
19. How do you encourage your child in his/her studies?

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