

LETTER OF CERTIFICATE

This is the certify that Ms. Manisha Rijal a student of academic year 2071/72 with Campus Roll Number 480/2071, Thesis Number 1382, Exam Roll Number 28710303/2071, and T.U Registration Number 9-2-284-325-2010, has completed her thesis under the rules and regulations of Tribhuvan University , Nepal. The thesis entitled "Factors for choosing Mathematics as a Major subject at Higher Secondary Level" has been prepared based on the results of her investigation conducted during the period 2020 Feb/Mar. I hereby, recommend and forward that her thesis be submitted for the evaluation as the partial requirement to award the degree of Master's in Education.

Mrs. Sarala Luitel
Supervisor

LETTER OF APPROVAL

A
Thesis
Submitted
By
Manisha Rijal
Entitled:

"Factors For choosing Mathematics As a Major Subject At Higher Secondary Level
" has been approved in partial fulfillment of the requirement for the degree of Masters of
Education.

Committee for the viva-voce

Signature

1. Prof. Dr. Bed Raj Acharya

(Chairman)

.....

2.

(External)

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3. Mrs. Sarala Luitel

(Member)

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Date:

RECOMMENDATION FOR ACCEPTANCE

This is to certify that Ms. Manisha Rijal has completed her M.Ed thesis entitled **"Factors for Choosing Mathematics as a Major Subject at Higher Secondary Level"** under my supervision during the period prescribed by the rules and regulations of Tribhuvan University, Kritipur, Kathmandu Nepal. I recommend and forward her thesis to the Department of Mathematics Education to organize final viva-voice

6 March, 2020

.....

Mrs. Sarala Luitel

Supervisor

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Defense Date.....

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DEDICATION

Dedicated

To

My parents and all my family members whose blessings is with me forever.

DECLARATION

I hereby declare that this thesis is my original work. It contains no materials which has been accepted for the award of other degree in any institutions. For the best of my knowledge and belief, this thesis contains no materials previously published by any authors due to acknowledgement has been made.

6 March, 2020

Manisha Rijal

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Manisha Rijal

February 2020

ABSTRACT

This is a qualitative research entitled 'Factor for choosing mathematics as a major at higher secondary school.' for trying to find the motivational factors choosing mathematics as a major subject and ways of mathematical knowledge construction at Kathmandu district. For this study, researcher took a design as a case study because the case of this research was mathematics students. For this study 6 students (3 girls, 3 boys) from Koteswor Multiple Campus of Kathmandu were selected. The main way of collecting data is interviewing students. The data were obtained by taking in-depth interviews with sample students. Observation form and document analysis were also used for the collecting the data. The data obtained from the interview was analyzed by descriptive method.

The researcher had divided the analysis part by different themes such as Introduction of case college, Introduction of case students, Class observation of case students, Teachers and students views, Motivational factors to choosing mathematics as a major, Ways of mathematical knowledge construction. After analysis and interpretation of the obtained data the findings indicate that the motivational factors of choosing mathematics as a major are value in mathematics, mathematics teacher, economic factor, foundation for the other sector, the ways of construction the mathematical content are practice ,practice and more practice, work along with teacher, self-study, group discussion.

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**FACTORS FOR CHOOSING MATHEMATICS AS A MAJOR SUBJECT AT
HIGHER SECONDARY LEVEL**

**A
THESIS
BY**

MANISHA RIJAL

**IN THE PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE MASTER'S DEGREE OF EDUCATION**

SUBMITTED

TO

DEPARTMENT OF MATHEMATICS EDUCATION

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CHAPTER- I

INTRODUCTION

Background of the Study

The term mathematics has been derived from the ancient Greek word- Manthanein which means "to learn" this shows that mathematics is considered as a process of learning and interpreting the natural phenomena of each individual according to the new English dictionary "mathematics, in a strict sense, in the abstract science which investigates deductively the conclusions implicit in the elementary conception of the spatial and the numerical relation" further mathematics is said a man made science and it is a branch of knowledge including, thinking, computing, reasoning and applying orderly.

Mathematics provides a great preparation for a variety of jobs, and in the current job market many employers are desperate for applicants that have mathematics background and problem solving skills. Math majors are increasingly in demand and a mathematics major from UH can provide us with critical thinking skills and technical training that will give us higher-paid jobs.

Mathematics is so important for a student's life. Mathematics helps us to better problem solving skills. It helps us think analytically and better reasoning skills. But in the present situation in Nepal, there is a lack of mathematics students in higher secondary level and higher level. Most of the students are not interested in studying mathematics because mathematics is often considered to be one of the most challenging subjects in school. Students take mathematics is difficult because mathematics always builds upon previous concepts, concepts of mathematics are learned but not understood, lack of student's practice and patience. Many students

have trouble with math, but some students find it more difficult than others. In fact, many students complain that math is a boring subject. There are many reasons why students are not interested in studying mathematics compared to other subjects. Some reasons are it can't be committed to memory, some students find it is a boring subject, It is fear of humiliation.

Motivational factors for mathematics are those factors which develop the student's interest towards mathematics, which helps to increase the number of mathematics students in the field of study. Choosing mathematics as a major subject is challenging for those students, who are weak in mathematics and those students who are not interested in mathematics. But choosing mathematics as a major subject is the best way to study because there are so many advantages in mathematics compared to choosing other subjects. Some of the students choose mathematics as a major subject at a higher level. Some of the students choose mathematics because they love mathematics. Some of students choose mathematics for the field of study for being a mathematics teacher in the future, some of the students choose mathematics as a major to be smart and prestigious. Some of the students are interested in mathematics so they choose mathematics as a major. Some of the students are choosing mathematics because they are influenced by their relatives. There are many factors which motivates the students to choose mathematics as a major instead of the other subject such as they like mathematics, favorite subject, economic factor, mathematics teacher, value in mathematics, creative subject, interesting subject, foundation of other sectors, prestige, social value, large income.

There are several reports indicating that few tertiary students around the world are enrolled in science, technology, engineering and mathematics(STEM) related careers (European Commission,2004).In particular, the recruitment rate of women in

these areas is particularly low (see for example European Commission,2009).Meeting the demand for scientists and engineers is a widespread concern because of the important role that these careers play in the development of modern society; however, there is also a global interest in producing a diverse and gender balanced scientific workforce. This situation has generated a number of studies that try to identify what factors attract and retain students to STEM careers (see for example Brickhouse, Lowerly & Schultz, 2000; Herzig, 2004; Hill & Rogers, 2012; Medick, 2005).

In the context of Nepal women are found comparatively behind the men in all most all spheres of life due to patriarchal social structure, cultural traditions, religious practices, attitudes and deep rooted gender discrimination. The recruitment rate of girls students in STEM careers, particularly in mathematics, is very low. The latest figures on the study of mathematics at the tertiary level in Mexico show that :(1) women represent 38%of the people studying in a bachelor degree in mathematics;(2) women represent 24% of the people studying a master degree in mathematics; and (3) women also represent 24% of the people studying a Phd degree in mathematics (Barrera, 2012).

In spite of these problems to attract women to the study of mathematics, there are very few studies in Mexico (and in general in Latin America) focused on identifying the factors that may attract and retain girl students to study math-related careers in this region.

In this paper, researcher has reported an ongoing research project focused on identifying some of the factors that may motivate students to choose mathematics as a major. Specifically, researcher trying to answer the following research questions:

What factors motivate students to choose mathematics as a major subject?

The main contribution of our work is to help to understand what motivates students to choose mathematics as a field of study. This research could help to identify differences and similarities between the motivating factors to study mathematics among the students from different regions of the world. Researcher also believe that this research can produce pedagogical recommendations to promote the study of mathematics among young students in our country.

Research in the past indicates that there is low participation in mathematics at a higher level. Some of the research indicates that there are most of the students participating to study mathematics at a higher level. But in the present situation, some research indicates that there is low participation in mathematics at a higher level. So, researcher research and survey about the issues and find the factors which motivates the students to choose mathematics as a major subject for increasing mathematics students at a higher secondary level.

Statement of the Problem

Mathematics has started from the beginning of human civilization to the advanced level at the twenty-first century the need for mathematics is apparent for everyday life as well as for higher study in the field of science and technology mathematics is the central part of the school curriculum not only in Nepal but also in the entire world. Most of the students in schools are poor in mathematics so that low achievement in mathematics is common problems at school levels in developed and under developed countries as well. More than half of the total students failed in mathematics in previous years. In the present situation, there are few students who choose mathematics as a major. So it is one of the issues why students are not interested in mathematics? So researcher try to find out the motivational factors which help students to choose mathematics as a major subject.

The following are the main concerns of this study: the total study was focused on finding the answer to the following research questions.

- What are the motivational factors to the students for choosing mathematics as a major subject?
- What are the ways of knowledge construction in mathematical content?

Objectives of the Study

- To explore the motivational factors of girls and boys choosing mathematics as a major subject.
- To dig out the ways of knowledge construction in mathematical content.

Justification

Mathematics plays an important role in our everyday life for this reason the national educational system plan has emphasized in making mathematics teaching life oriented and practical. The goal of teaching mathematics is to provide students with essential tools for further study and everyday life. All physical, biological, social, management, science and technology are very much dependent on mathematics and the use of mathematics in everyday life is increasing. Therefore, almost every child throughout the world at the age group 5-16 years are expected to study mathematics at school education with the value of mathematics in every educational system not only a child but every person is expected to have learned and acquired mathematical knowledge for everyday use.

- The main contribution of this research is to help to understand what motivates students to choose mathematics as a field of study.
- Our research could help to identify differences and similarities between the motivating factors to study mathematics from different regions of the world.

- We also believed that our research can produce pedagogical recommendations to promote the study of mathematics among young students in our country.
- Every research is important in itself because it untold various unseen facts in any area of the study. As stated in the problems statement, the study will find out the factors which motivates the students to choose mathematics as a major.
- This study would provide the information about how the factors affect the student's participation in mathematics learning.
- This study will further inform the government as well as other concerned authority's policies makers and planners of education about how to make education plans, policies and their corresponding strategies to promote the academic qualities of the girls.
- This study will provide the information to the other researches also. This study would inform mathematics teacher gender issues about the teaching learning process that supported the improvement of the integrated education system.
- This study would help the school administration to create the school environment for students. .
- This study would be helpful for improving teaching methods and the learning process according to students' attitudes which may be valuable for teachers, curriculum, designers; other stakeholders related to education.

Delimitation of the Study

Each study is not rigorous, perfect and free of limitations, so this study has the following delimitations which are pointed as follows.

- This study was limited to Koteshwor Multiple Campus in Kathmandu district.
- +2 level (grade XII) mathematics students of Koteshwor Multiple Campus were samples of the study.

- This study was limited to in-depth interviews of sample students and subject teacher of sample campus.
- This study included in-depth interviews to find the factors affecting the students choosing mathematics as a major subject.

CHAPTER- II

REVIEW OF LITERATURE

The review related literature deals with theory or research studies a review of related literature provides the knowledge of what has been established, known or studied and what has been attempted to be obtained. It is more important to draw a meaningful conclusion particularly in comparative research where the result in the similar content can be compared with earlier research. It helps to conduct related literature is an essential aspect of a research project and this work is basically undertaken for the purpose of documenting the research finding drawn by the different research related to present study in this chapter different literature related to mathematics learning among the girls students have been reviewed.

When we began our review of the literature, we focus initially on mathematics Education research journals, trying to locate studies that could explain why few Women choose to study mathematics. In a second stage we extended our search to Science education journals, trying to locate articles focused on studying what factors attract and retain female students to STEM careers.

Empirical Literature

The literature review had a dual role in our research. On the one hand, it allowed us to locate some of the methods used in the literature to identify the factors that may motivate women to study STEM careers; we used this information to design our own research method. On the other hand, the literature review was useful to identify hypotheses or possible explanations on why some women are attracted to this type of careers.

Tiwari (2002), has reported that both farmer and non-farmer parents had positive attitudes towards the school mathematics. Farmer and non-farmer parents had

positive attitudes towards their male child and female child about the school mathematics however educated parents had positive towards daughters' education rather than non-educated parents.

Pandey (2007), conducted research on topics "Factor influencing mathematics achievement in case studies of ineffective secondary school of Kailali district." This case study was done in one of the secondary school of Kailali district only 20 students each from effective and ineffective schools were chosen as sample personal and environmental factors such as gender, age prior knowledge, affordance, motivation, study, at home parental support quality of teacher, class, size, student, teacher, interaction, physical and environmental condition and school leadership were in consideration. The major finding of this study was that students' achievement was mostly affected by both their personal and environmental factors that cause the girls to achieve low marks and boys high. Home environment, school environment, teacher quality, student self-motivation has made student achievement high in mathematics. Less knowledge on instructional strategy less teaching experience and Lack of teaching mathematics has led students' mathematics achievement forward to a low percentage. Another physical factor like the school surrounding the environment was seen as an influencing factor. Teachers laziness and school leadership have close links to student performance and achievement.

Ryan and Deci (2000) state "motivation concerns energy, direction, persistence, and equifinality –all aspects of activation and intention" (p. 69). For this study, motivation will have a more narrow definition Dörnyei (2001) explains motivation as "why people decide to do something, how hard they are going to pursue it, and how long they are willing to sustain the activity" (p.7). Motivation is internal to

an agent. On the other hand, engagement is the amount of effort spent doing a task over time. How hard someone pursues an activity and how long they are willing to sustain the activity are physically measurable quantities; however, motivation is not directly measurable. It is an attribute of cognition. For example, a cat can be motivated to eat, but the cat food is not motivated to be eaten. Instead, cat food is motivational for cats.

The term motivation is used at least two different ways in research. Pintrich (2003) used the term motivational science as science dedicated to the understanding of motivation, with science being “reasoned argument from evidence” (p. 668). Although there is a place for philosophical and theological theories of motivation, Pintrich defines motivational science as inquiry into motivation supported by empirical research. I am strongly aligned with Pintrich’s motivation science; however, the term “motivational” in this review will generally refer to a relationship between a structure and an agent. Notice, a structure could be lots of things. Students may become more engaged when they work together, they may become more engaged because of an affection towards a teacher, they may become more engaged when the teacher facilitates discussion, and they may become more engaged when they are able to search for materials on a smartphone. Students, teachers, teaching methods, and types of technology could all be correlated to student engagement, and therefore, these relationships can be motivational. A relationship, which is motivational for a student when interacting with a task, tends to increase the student’s engagement. Motivational relationships are observable and measurable. There is a great deal of research on motivation, with a fair amount focused on mathematics. As psychology shifted towards an acceptance of cognitive research, the science of motivation also moved to investigate the cognitive –not directly

measurable-- construct of motivation. Bandura (1997) focused on self-efficacy as a cognitive model with affective and selection components associated with motivation. Ryan and Deci (2000) focused on a social-cognitive model of motivation concerned with autonomy, competence, and self-regulation; and Elliot and Harackiewicz (1996) focused on a social cognitive model of motivation related to achievement goals. These three avenues towards understanding motivation may not be exclusive and probably interact; so following suggestions\ made by Pintrich (2003), this review approaches motivation as a composite having affective, cognitive, and social components.

According to McLeod (1992) factors such as attitudes and beliefs play an important role in mathematics achievement. The general relationship between attitude and achievement is based on the concept that the better the attitude a learner has towards a subject or task, the higher the achievement or performance level in mathematics.

Stuart (2000) argues that teacher, peer and family attitudes toward mathematics may either positively or negatively influence learners' confidence in mathematics. The findings are that learners who have positive attitudes towards their teachers have high achievement levels. Newman and Schwager (1993) found that at all grades a sense of personal relatedness with the teacher is important in determining a learner's frequency in seeking help from the teacher. According to McLeod (1992) factors such as attitudes and beliefs play an important role in mathematics achievement. The general relationship between attitude and achievement is based on the concept that the better the attitude a learner has towards a subject or task, the higher the achievement or performance level in mathematics.

Stuart (2000) argues that teacher, peer and family attitudes towards their teachers have high achievement levels. Newman and Schwager (1993) found that at all grades a sense of personal relatedness with the teacher is important in determining a learner's frequency in seeking help from the teacher. They

further state that this aspect of the classroom climate has been shown to be related to good academic outcome. In the same vein Dungan and Thurlow (1989) state that the attitudes toward mathematics may either positively or negatively influence learners' confidence in mathematics. The findings are that to which learners like their teacher, influence their liking of the subject.

Research on attitudes towards career choice and towards mathematics teachers is extensive. Eccles and Jacobs (1986) found that self-perceptions of mathematics ability influence mathematics achievement. Norman (1988) concluded from a wide review of literature that there is a positive correlation between career choice and mathematics achievement. Subsequently Trusty (2002) reported that learner attitudes impact on later career choices in mathematics. Mathematics attitudes during high school had a positive effect on choosing science careers. Trusty and Ng (2000) studied learners' self-perceptions of mathematics ability and found that positive self-perception mathematics ability has relatively strong effects on later career choices.

Regarding the methods used, we found that in some studies questionnaires are employed in conjunction with other instruments (for example in Holmegaard, Ulriksen & Madsen, 2012; Sjaastad, 2012), but most studies use open interviews to allow women to produce narratives about their experiences with mathematics (Mendick, 2005; Piatek-Jimenez, 2008; Solomon, 2012). Through these personal narratives researchers try to locate activities and experiences that have led women to study mathematics.

With regard to the hypotheses or possible explanations for why some women choose to study (or not so study) mathematics-related careers, they are very different in nature. To explain why some women choose not to study mathematics, some authors

claim that mathematics can be perceived as an unfeminine profession, resulting in a discrepancy between female identity and a mathematical identity (Piatek-Jimenez, 2008; Solomon, 2012). Another explanation for the low number of women in mathematics as a field of study is that there is discrimination against women in math-intensive fields and in the mathematics classroom —sometimes unconsciously— (Ceci, Williams & Barnett, 2009). There are authors who claim that the level of creativity required in some hard sciences, which is not socially favored among women, can be a reason why there is a low presence of women in these sciences (Hill & Rogers, 2012). There are at least two factors that have been identified as motivating and inspiring for women to study mathematics-related careers: (1) the confidence that individuals have in their own intellectual abilities (Eccles, 2007) and (2) the positive influence of significant persons, such as parents, teachers and friends (Sjaastad, 2012).

During our review of the literature, we also noted that some studies associate the process of choosing a career with the construction of an identity in young people. For example, Sjaastad (2012) uses as a theoretical tool the concept of self; he bases his discussion of the concept of self in the works of Higgins (1987) and Swann & Bosson (2010). The self refers to the attributes that a person believes to possess and the attributes the person would like to possess. One important thing here is that, the self is influenced and shaped by interpersonal relationships; as stated by Swann & Bosson (2010): “We know ourselves [...] by observing how we fit into the fabric of social relationships and how others react to us” (p. 589).

In turn, Holmegaard, Ulriksen & Madsen (2012) relate the choice of a career with the process of defining oneself:

The decision about which course of study to choose after finishing upper-secondary school is not limited to figuring out what could be interesting or promising; it is also about defining oneself, and making a decision about whom one wishes to become” (p. 4). Similar to the theoretical position of Sjaastad (2012), Holmegaard, Ulriksen & Madsen (2012) conceptualize the constitution of an identity as shaped by interactions with others and the cultural context where the person is immersed.

The concept of mathematical identity or identity as mathematics learner can also be found in the literature on mathematics education (Anderson, 2007; O’Hara, 2010). The construct of identity refers to “the way we define ourselves and how others define us” (Anderson, 2007, p. 8), and serves to explain what makes a person to feel like an able mathematics student and as a consequence get involved and engaged in mathematical activities. As we shall see, this construct could be Helpful to explain some of the results of our study.

Research Gap

From the above review, there has been much research on motivational factors for choosing mathematics as a major subject. From which the researcher has found that there are many factors such as attitudes towards mathematics, confidence level of learners towards mathematics, influence by the mathematics teacher, economic conditions, influenced by their relatives are motivational factors in learning mathematics. From the above research study, it is clear that mathematics achievement of students is low and there are so many factors which affect achievement of students in mathematics education. From this above research, researcher find that the factors which motivate the students for choosing mathematics as a major subject. The

motivational factors for choosing mathematics as a major subject are influenced by teachers and relatives, economic condition, foundations for other sectors and value in mathematics.

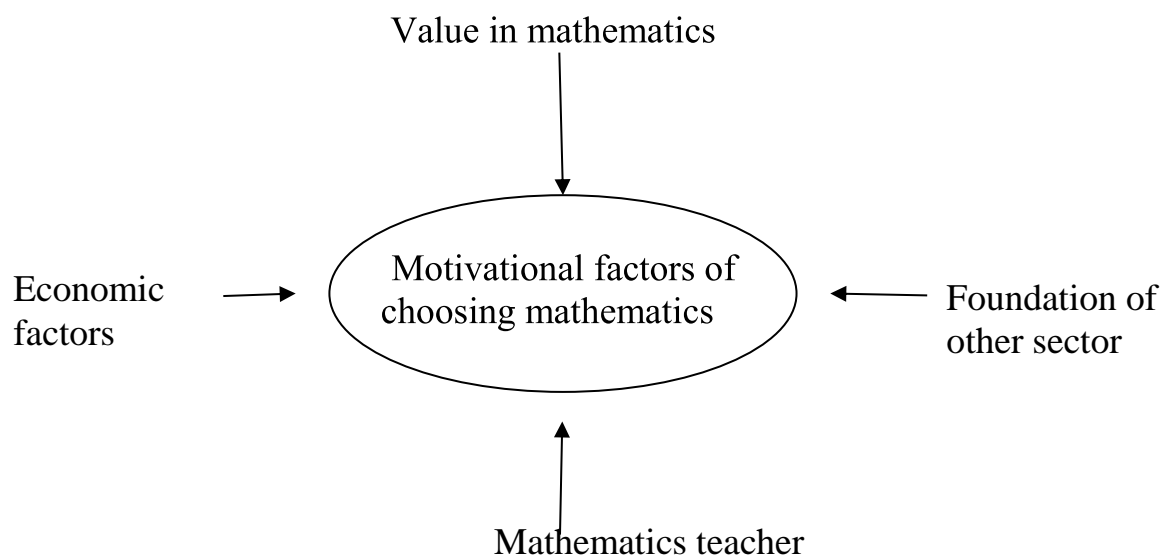
Theoretical Review

Vygotsky's constructivism: Vygotsky developed social theory and believed that children are active seekers of knowledge, but the donor views them as solitary agents. In this theory, rich social and cultural content profoundly affects the children's cognition, knowledge is being constructed in the social situation of negotiations rather-than being the reflection of the objective reality, which is termed as social constructivism. Social constructivism believes in the multiple construction of the world. In social constructivist theory each human being makes sense of the world in a unique way. Vygotsky argues that the child development cannot be understood by studying the individual that it needs to examine the external world. The children as they go about their daily activities we will see that they continuously talk loud to themselves as they play and explore the environment. He termed it as "private speech" Vygotsky believed that all higher cognitive processes develop out of social; interaction.

According to social constructivists, Vygotsky knowledge is constructed in two ways in social content. Firstly social interaction influences the nature of knowledge that is constructed and the process of individual use to construct that knowledge. The knowledge constructed by a child is not only through his own capacity but also from the content and interaction with more knowledgeable others. Vygotsky proposed that child knowledge could be predicted if we could understand the social context. Vygotsky pointed out instantly that children act against their impulses because they must subject themselves to the rules of the play scene.

Conceptual Framework of the Study

A conceptual framework is made to find out the motivational factors affecting the mathematics students choosing mathematics as a major in Kathmandu district. The conceptual framework of the study was given below by the help of mentioned literature review as Sharma (2016).



This conceptual framework shows that the researcher has collected the views of mathematics students and teachers on the impact of motivational factors in mathematics learning with constructivism theory. The conceptual framework of choosing mathematics as a major are as follows:

Value in mathematics

Mathematics has many educational values which determine the need of teaching the subject in schools. These values are Practical values (mathematics has great practical value. Everyone uses some mathematics in every form of life.

Mathematics is needed by all of us whether rich or poor, high or low), Cultural value

(mathematics has got a great cultural value which is steadily increasing day by day. mathematics has made a major contribution to our cultural advancement),
 Disciplinary value (mathematics trains or disciplines the mind also. It develops thinking and reasoning power. According to Locke," Mathematics is a way to settle in the mind a habit of reasoning. "Thus we see that mathematics has many educational values which show the increasing importance of the subject in schools and in social life.

Economic Factors

Economic factor also the most important factor for motivating the students to choose mathematics as a major. It is one of the subjects which secure a good job in the future which helps to keep good economic conditions for their life.

Mathematics Teacher

Mathematics teacher is one of the most important motivational factors for choosing mathematics as a major because some students choose mathematics due to influence by the mathematics teacher. There are several aspects that students highlight about their teacher. Some mentioned that they like the way they taught for example by presenting step by step and detailed explanations of the topics.

Foundation of other sector

Mathematics is only one subject which is necessary for study of other sectors such as population, management, engineer, doctor, etc. Without mathematics nobody studies these sectors. So it is also one of the motivational factors for studying mathematics. Mathematics is necessary for daily life for every person to keep a

record. Mathematics helps to do IELTS, GRE which helps to get a good scholarship for further study.

CHAPTER- III

METHOD AND PROCEDURES

This chapters explain the design of the study, sample of the study, tool for research, data collection procedures and data analysis and interpretation.

Research Design

This research would be based on case study. In this research, researchers took a case study because there were a smaller number of girl's students at grade XII in Kathmandu. The case of research was mathematics students.

Case study is a process of record to research into the development of a particular person, group or situation over a period of time (Oxford Dictionary). Case study emphasizes detailed contextual analysis of a limited number of events or conditions and their relationship. Researcher have used the case study research method for many years across a variety of disciplines. Social scientists, in particular, have made wide use of this qualitative research method to examine contemporary real life situations and provide the basis for the application of ideas and extension of methods (Yin, 1984).

This case study has tried to understand the complex relationship between the motivational factors of choosing mathematics as a major and ways of constructing mathematical content. Basically, the case study has pointed out the student's perception, interaction and response towards motivational factors and learning style of mathematics education.

Sample of the Study

For this research Koteswor Multiple Campus was chosen because there are enough girls students of mathematics which are needed for researcher for data collection. There are six sample students (3 boys, 3 girls) for this study. From Grade

XII of Koteswor Multiple Campus, 3 girls and 3 boys were taken for in-depth interview. Also the researcher took an interview with a mathematics teacher for the data collection.

Demography of focused students

S.N.	Name	Level	Gender
1	Respondent I	+2	Male
2	Respondent II	+2	Female
3	Respondent III	+2	Male
4	Respondent IV	+2	Female
5	Respondents V	+2	Female
6	Respondents VI	+2	Male

For this research, researcher selected respondent students according to their results of the first terminal examination of grade XII of mathematics. Researcher selected sample students by using a stratified sampling method of Probability Sampling among the whole students of grade XII. Where, Respondent I and Respondent II are talented students, Respondent III and Respondent IV are medium and Respondent V and Respondent VI are poor in mathematics.

Tools for Research

For the data collection the researcher used an interview schedule, observation.

Interview Schedule

Interview is the most effective method which is used to collect primary data. It is a media to explore thoughts, interests, concepts, and thinking of person's. The

purpose of interviewing is to find out what is and on the participant's mind and their views in relation to their action and activities.

The main respondents of this case study were students and mathematics teacher. Therefore the researcher developed the interview schedule in semi structure form on the basis of the objective.

It carried out six students (3 girls, 3 boys) of grade XII of +2 level from the case college to identify the motivational factor of girls and boys choosing mathematics as major and way of knowledge construction in mathematical content.

Class Observation Form

Observation is the active acquisition of information for a primary source. In science, observation can also involve the recording of data via the use of scientific instruments.

Observation is the action or process of closely observing or monitoring something or someone.

For the collection of data related to teaching strategies researcher took an observation form. The observation form was made on the basis of students' regularity, teacher's behaviour towards male and female student's performance, teacher and student interaction, teaching learning activities, student's participation etc.

Document Analysis

Document analysis is also a tool for collecting data. Document analysis helps to find out the Intellectual capacity of students. Through the document analysis research had tried to find out who is talented in mathematics and who is poor in mathematics knowledge.

For this study, the researcher analyzes the document of case students by analyzing the result of the first terminal examination of mathematics of grade XII.

Data Collection Procedures

I had collected concerned data and information with the help of a semi structured interview, class observation form. I record the activities of focus students and teachers in the classroom. The interviews were taken with the 6 students (3 male students and 3 female students) and mathematics teachers. Answers to the interview were noted in the diary. Focus points of the interview were motivational factors of choosing mathematics (mathematics teacher, value in mathematics, economic factors, foundation of other sectors etc.) and way of construction of mathematical knowledge (peer group discussion, assessment, self-study, practices etc.)

Data Analysis and Interpretation

In this part, the researcher took an in-depth interview of 6 students (3 boys and 3 girls) and maths teachers enrolled in the grade XII of Koteshwor multiple campus of Kathmandu district. The range of the age of case students was 17-18. The interview was taken 3 times for the purpose of the study. The interviews were video and audio recorded and their average length is 8 minutes.

The semi-structured interview guide contained a couple of open questions aimed at triggering students' narratives on the activities and experiences that motivated them to study mathematics. These open questions were: (1) Can you say what are the motivational factors are you choosing this mathematics? and (2) Why you to choose your major as a mathematics, did you always know you wanted to study this or was there any particular incident that made you choose his career? Thus, researcher expected that the above-mentioned questions could detonate narratives in which students were mentioned as factors influencing their choice. For this reason researcher prepared additional questions to deepen each of these factors, in case they appeared. For example: How much time do you study mathematics at home?

After, took a in-depth interview with students and teachers, the researcher analysis the collected data and information through a descriptive method.

CHAPTER- IV

ANALYSIS AND INTERPRETATION OF DATA

This chapter is mainly concerned with the analysis and interpretation of the data. The data collected from the informants were analyzed and interpreted to find out the motivational factors of choosing mathematics as a major subject and way of constructing the mathematical content. The researcher had observed the case students, behaviour, activities and interaction with teachers in this research. The motivational factors were evaluated by the researcher with the help of the in-depth interview. The required data was collected by using interview and observation tools. The case students and maths teachers were interviewed. Regular 3 mathematics classes were observed for the collection of required data on the basis of pre-observation form.

The data are interpreted and analyzed in the following heading.

- Students and teacher's view
- Motivational factors for choosing mathematics as a major subject..
- Ways of knowledge construction in mathematical content

Introduction of Case College

I took a Koteshwor Multiple Campus (KMC) for my research as a case college. Koteshwor Multiple Campus was established in 2047 B.S. It is located in the Koteshwor of Kathmandu district. KMC works on the institutional aim at becoming the center of academic excellence in the country. KMC not only believes in imparting quality education but also focuses on preparing competent citizens ready to face challenges of the future. Hence, KMC has been an ideal abode for hundreds of education enthusiasts from all over the country. It would be fact not hyperbolic to state that KMC is one of the very few leading public colleges in the nation imparting quality education through time tested, student oriented and globally required

strategies, including case studies, presentations, group discussion, seminars, workshops, field visits, guest lectures, survey and other to enable the students to face the national and global challenges in the seas of the opportunities.

KMC has been the prime choice of cream students from all over Nepal. The campus chief of KMC is Mr. Govinda Bahadur Karki, M. Phil There are many faculties such as Humanities, Management, Education in Koteshwor Multiple Campus. The total students of KMC are around 3400 in +2 and bachelors level. Besides academic achievements, KMC also carries numerous co-curricular and extra-curricular activities for the overall development of the students. Students will be encouraged to develop their personal leadership styles and will be provided with ample opportunity to interact with faculty and practitioners alike.

Introduction of Case Students

Respondent I

Respondent I is male student in grade XII Koteshwor Multiple Campus of Kathmandu district. He came from Okhaldhunga district to Kathmandu district to continue his studies. When I asked him informally about his family background he said that he was a son of a farmer, so his economic condition was not good .So, he felt it was difficult to manage the college fee. He did not give proper time to practice mathematics at his room. Although his records of college were good. According to the first terminal examination of grade XII, he obtained 33 marks in mathematics under the full marks 50.I concluded from his result that he is excellent in mathematics. When I observed the class, I found that he was so interested in mathematics and he actively participated in the class. His class performance was good. He said that mathematics is an easy and interesting subject. So, he chose optional mathematics as a major subject at school level. He said that mathematics was his favourite subject from

childhood. He likes mathematics but he is good for other subjects than mathematics. He says that mathematics is a practical subject. So, practice is most important to construct mathematical content.

Respondent II

Respondent II is a female student in grade XII sample College. Her records in college show that she is excellent in all subjects. She came from Ramechhap district to Kathmandu to study at a higher level. Her main aim in life was to be a good mathematics' teacher. According to the result of the first terminal examination of grade XII, she obtained 32 marks in mathematics under the full marks 50. She is talented in mathematics. She regularly participated in mathematics class but sometimes she missed the mathematics classes due to some reason. When I observed the mathematics classes, I found that she was actively presented in classes and her activities inside the class were very good. She respected all teachers and friends. She helped her friends inside the classroom when her friends were in trouble while solving the mathematics problem. As a result, she is very good in mathematics and she said that mathematics is a very easy and interesting subject than other subjects. Her father is a farmer and she lives in Kathmandu with her brother to study mathematics.

Respondent III

Respondent III is a male student in grade XII of Sample College. He also came from Ramechhap district to Kathmandu to continue his study. At school level, he chose optional mathematics as a major subject. According to campus records, he is a medium in mathematics. He obtained 20 marks in mathematics under the full marks 50 on the first terminal examination. He also participated in class regularly. He said that mathematics is an easy subject. From the school level, his performance of mathematics was so good rather than other subjects. He is helpful and kind to all

friends. When I asked informally about his personal life he said that his father's economic condition was poor. . He did not manage the proper time for studying mathematics at home. Although his performance of math's in college was good. He was actively presented in the class while the teacher taught mathematics. He said that mathematics is practicable. More practice is most important for study math. Otherwise forget it.

Respondent IV

Respondent IV is a female student in grade XII of Koteshwor Multiple Campus of Kathmandu district. She came from Ramechhap district to Kathmandu to continue her higher study. She is too good. She is a more talented student. Her lecture impressed me. On the first terminal examination of grade XII, she got 23 marks in mathematics under the full marks 50. She says that there was a lack of good female mathematics teachers. So she will become a mathematics teacher in her village in the future. She said that there was no perfect mathematics teacher in her village. She also said that mathematics is an easy and interesting subject. She is free for her academic decisions. In her house, she has no restrictions. Her parents do not compel her to study. She can choose at which time to study and at which time to do other things and go outside with her friends. Generally, she does not need to help her family members in household works. According to the campus she is excellent in all subjects as well as she participates in extracurricular activities on campus. She said that practice is most important to construct the mathematical content and taking tuition is also another way of constructing the mathematical content.

Respondent V

Respondent V is the female students in grade XII of sample college. She came from a Sarlahi district to Kathmandu district to continue her higher study and fulfill

her aim. She is also the daughter of a farmer. According to the first terminal examination of grade XII, she got 18 marks in mathematics under the full marks 50. According to the result I conclude that she is poor in mathematics. She said that she obtained higher marks in mathematics than other subjects. So, she chose mathematics as a major in +2 level. Her record of college was good, she is kind and helpful. She did not give sufficient time to study mathematics in her room but she focused on studying mathematics at college when she was free. She is also actively presented in the class while the teacher teaches mathematics. Her performance in class was good. She said that mathematics is an easier and more interesting subject than others. She also said that it is a foundation of other fields such as engineering, science, management etc. She has used more practice of mathematical content to construct more mathematics knowledge.

Respondent VI

Respondent VI is a male student in grade XII of sample college. He came from Sindhuli district to Kathmandu district to continue his study and fulfill his aim. His aim in life is to be a good mathematics teacher. At school level he chose optional mathematics as a major while he studied in grade 9. He said that his performance at school level was so good. Sometimes, he takes a 3rd, 4th position in result at school level. He spent more time studying at home. According to the college record, his performance was not so good. According to his result he was a medium student but his performance of mathematics was better than other subjects. According to the first terminal examination of grade XII, he got 18 marks in mathematics under the full marks 50. He said that mathematics is an easy subject and interesting. He said that he discussed the lesson with friends when he was absent in mathematics class. His family background is not good. His father is a farmer.

Class Observation of Respondents Students

Learning environment of the case college is the totality of the education atmosphere in the college. In the college environment students need to feel secure and positive about the college, teachers need to feel value and be professionally enriched by their teaching. The college climate refers to the sum of the values, safety, practices and organized structure within a college. Teaching practices, diversity, and the relationship among administration, teachers, and students contribute to school climate.

I observed 5 classes in the college of which two episodes are presented below

Episode - 1

It was the first class observation. The teacher entered the classroom and I entered the class. All the students stood up and said good morning sir. Teachers said 'Good morning' and 'sit down'. Then the teacher wrote the title permutation and combination all students were silent in the classroom. Then the teacher said you could not have the pre concept of permutation. The students were listening to the teacher by noting. Then the teacher started to teach the concept about permutation. Eye contact of the teacher and students was good. All students were actively presented in the classroom. They asked things which they did not understand. At last, the teacher gives a task about the concept of permutation. I don't know where time has gone.

From the above activities, I concluded that all students were interested in mathematics. They were active in mathematics class. From their activities, I concluded that mathematics is an interesting subject to learn more than other subjects. Therefore mathematics is an interesting subject and is one of the motivational factors of choosing mathematics as a major.

Episode- 2

It was the second class observation. There were 8 students in that class. The class was well managed. All of the students participated in the classroom and they were quiet. The teacher was lecturing on permutation and combination. Then he asked the students what they know about the combination. The students responded without any hesitation after that he defined the combination. Then he wrote a problem from the exercise book and solved it explaining. The teacher gave a simple classwork. Most of the students performed the class work correctly. In the end he gave homework from the exercise book.

In this episode I found that the class was well managed. Students were not fully participating. However, the teacher seemed to be aware of the importance of student participation in the classroom. Some of the students seemed very enthusiastic in mathematics class. There was no differentiation between the back benches and other students. Teacher behaved equally but he did not give special attention with good manners when students were asked questions but he did not focus on the particular students, he behaved equally to all students.

Teacher's and Student's views

I had collected the following views using interview schedule formed in semi-structured form (Appendix I, II, III) with mathematics students, and teachers to find out the motivational factors for choosing mathematics as a major subject, way of construction the mathematical content teacher's and student's views were most importance to reach my aim of these research.

Teacher's views

The teacher's opinion was collected about the motivational factors of choosing mathematics as a major and way of constructing the mathematical content. The

following responses were obtained. The teacher's responses were about the lack of mathematics students in the education faculty following responses.

He said that Mathematics is a hard subject for mathematics students, mathematics is hard for remote area students. Mathematics is difficult for mathematics students who come from remote areas due to the lack of English language. There is no option other than to choose a career as a teacher rather than other sectors in future. So, at present time there is a lack of mathematics student's in mathematics faculty than other faculty.

Mathematics is a hard subject and there is no option other than to choose teaching as a career affects the mathematics students and they feel bored and irritated to choose math as a major.

The response for the question asked about the motivational factors for choosing mathematics as a major are as follows.

He said that mathematics is everywhere such as mathematics in population, mathematics in management, mathematics in science, mathematics in rural development .So that mathematics is important and the foundation of other sectors.

He said that mathematics is important for us for the job in the future. There is a lack of mathematics teachers so it will secure the job in the future.

He said that mathematics is important for the study of GRE, IELTS. In help's to get a good scholarship for further study.

From the above responses of the teacher I concluded that mathematics is the foundation of other subjects such as population, rural development, management and science. So, it is one of the motivational factors of choosing maths. Mathematics helps to secure a job in the future so it influences the mathematics student's mathematics.

The responses for the questions about how students learn the mathematical content are as given below.

Teacher said that he teaches three level student's (School level, +2 level and bachelor's level). He said that he understands the psychology of student's. He said that mathematics is a critical subject so that the previous knowledge about the lesson is most important for learning mathematics. He said that in a free environment student's construct mathematical content. So, a free environment is one of the ways of constructing mathematical content. He also said that mathematics is learned through the guardian, talented students. He said that mathematics is a practical subject so it is better that mathematics learn from practice.

From the above responses I conclude that mathematics is a critical subject. Free environment and talented students, guardian are ways of constructing mathematical content. Free environment is most important for learning mathematics.

Student's views

Following responses were obtained for the questions through the students.

"Do you like mathematics, why?"

"I like to read mathematics because it is an easy subject."

"I like mathematics because it will be possible to get the job in the future."

"I like mathematics because I obtained good marks in mathematics more than other subjects."

"I like mathematics because I feel it is easy from my childhood."

From the above response, it can be said that most of the students have understood the importance of mathematics but because of household obstacles, they don't have enough time to practice etc.

The responses to the questions asked about the reason for live in Kathmandu district are as follows:

"I live in Kathmandu to complete my higher studies."

"I live in Kathmandu and study here because there is no perfect mathematics teacher in my village."

From the above responses I conclude that most of the rural area's students come to Kathmandu to complete their higher study and fulfill their aims in future.

The responses for the questions asked about their position in school level are as follows:

"I have a third / fourth position in a school."

"I take the first position in girl's students."

"I am a medium student, not talented but mathematics is an easy subject."

From the above responses, I conclude that most of the students are excellent those students who choose mathematics as a major.

The responses for the question asked about the reason to choose a mathematics as a major are as follows:

"I choose mathematics as a major because I take optional math as a major subject in school."

"I chose mathematics as a major because it is difficult to find the mathematics teachers."

"I choose mathematics as a major because there are many sectors in the mathematics field."

From the above responses, I conclude that mathematics is an interesting, critical subject. Most of the student's feel mathematics is an easy subject.

Mathematics is that subject which helps to get a job in the future. There are many sectors in the mathematics field.

The responses for the questions about the motivational factors of choosing mathematics as a major are as follows:

The students said that it will be possible to get the job in the future: students said that mathematics is an interesting subject itself. It is an easy subject. Students said that math helps to obtain better marks than other subjects. Students said that it is the foundation of other subjects such as population, management, engineering, science etc. They said that it helps to be a businessman. They also said that it helps to prepare the governmental job. They said that there are many sectors in mathematics.

From the above responses I conclude that mathematics is an interesting subject, foundation of other subjects, critical subject, it will help to get a good job in future etc. are motivational factors of choosing maths as a major.

The responses for the questions asked about the method of mathematics learn are as follows:

The students said that more practice at home is most important for learning mathematics which teaches the teacher at college. Similarly another student said that more practice and trying to understand at home which teacher at college is most important. Similarly another student said to do practice and asked with friends which is confusing is the best way to construct mathematical content. Similarly another student said that tuition, discussion with friends, regularly after the mathematics class, and assignments which are given by the teacher are the ways of learning the mathematics content.

In another class, *students said that practice is the most important way to construct mathematical content. Similarly they said that self-study, peer group*

discussion, discussion with friends, tuition, and assignments after the mathematics class regularly are the best way to learn mathematics.

From the above responses I conclude that there are several ways to construct mathematical content: practice, peer group discussion, discuss with friends, do assignment, tuition is the best way to construct the mathematical content.

In the above different views of teachers and students I conclude that mathematics is an interesting and creative subject. It will help to get a good job in the future, it is the foundation of other sectors such as population, management, science, engineering etc. It makes student's smart, it increases the social value are the motivational factors of choosing maths as a major and tuition, assignment, practice, peer group discussion, discussion with friends, after regular mathematics class, are the best way to learn and construct mathematics.

Motivational Factors of Choosing Mathematics as a Major Subjects

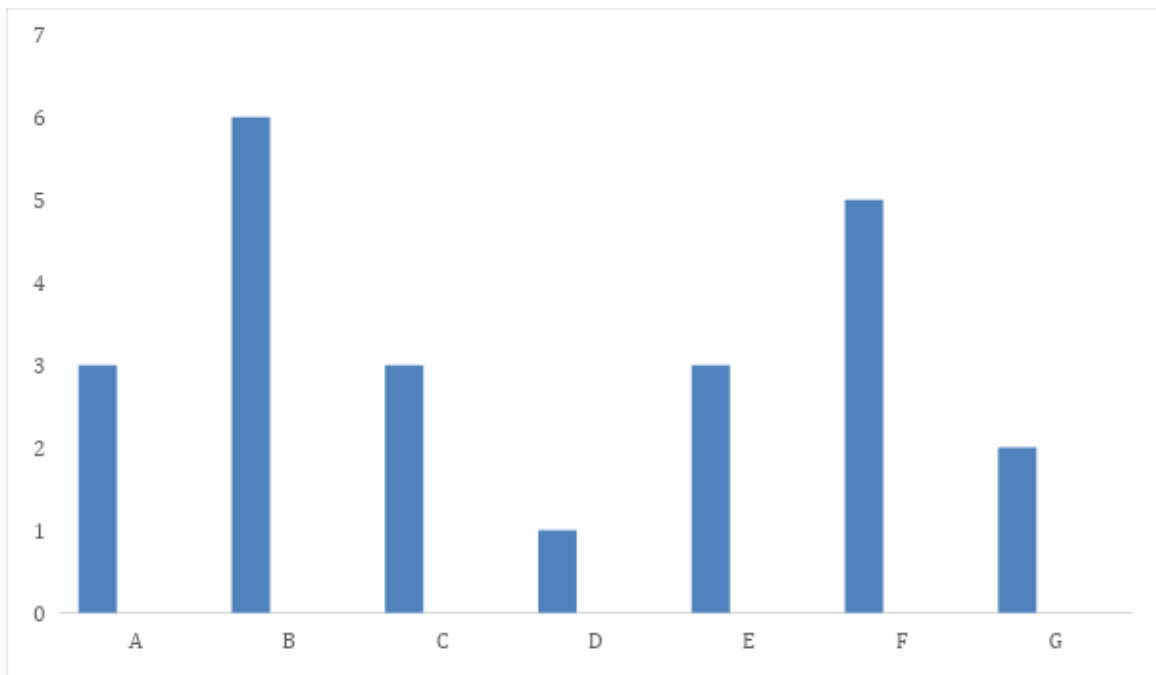
Motivational factor

Motivational factors are drivers of human behaviour related to the intrinsic nature of the work, but not necessary to the surrounding circumstances or environment. Motivational factor a term defined in the content of the two-factor (motivation hygiene) theory as a so-called "satisfier" e.g., achievement, advancement responsibility that motivates a person to work harder and more efficiently. Motivating factors include achievement, advancement, autonomy, personal growth, recognition, responsibility, and the work itself.

Preliminary Results

The results presented are the factors that the mathematics students of grade XII mentioned in their narratives as motivating to study mathematics. Some students mentioned more than one motivating factor during the interview. The researcher

classified these factors into many categories. Figure 1 shows the frequency for each of those categories.



Where,

A: They like mathematics

B: They realized they are good in mathematics

C: Economic factor

D: Mathematics teacher

E: Foundation of higher study

F: Interesting subject

G: Creative subject

Figure 1: Some factors that motivate the students in our sample to study mathematics

In the above figure, researchers show that different types of motivational factors which are said by the case students while taking the interview. Now creative subjects, Interesting subjects, they like mathematics, they realized they are good in mathematics are merged in the theme of value in mathematics because of their nature and researcher explain four main themes of motivational factors are as follows.

Value in mathematics

Mathematics has many educational values which determine the need of teaching the subject in schools. These values are Practical values (mathematics has great practical value. Everyone uses some mathematics in every form of life. Mathematics is needed by all of us whether rich or poor, high or low), Cultural value (mathematics has got a great cultural value which is steadily increasing day by day. mathematics has made a major contribution to our cultural advancement), Disciplinary value (mathematics trains or disciplines the mind also. It develops thinking and reasoning power. According to Locke, "Mathematics is a way to settle in the mind a habit of reasoning. "Thus we see that mathematics has many educational values which show the increasing importance of the subject in schools and in social life.

The researcher merged the creative subject, interesting subject, they like mathematics, they realized they are good in mathematics in these themes because of their nature.

In the classroom, when I took an interview of case students and subject teacher of case college about the factors which motivates the students to choose mathematics as a major, the following responses were obtained.

When I asked that what is the reason of choosing mathematics as a major, the responses of the students about the value in mathematics as follows:

Students said that mathematics is an interesting subject. They chose optional mathematics as a major in school level and they got higher marks in mathematics than other subjects. Some students said that mathematics is easier than other subjects. Some students said that they like mathematics from their childhood. They took mathematics as a major from their school level. They feel that mathematics is easier

than other subjects. They also said that mathematics is a creative subject. (Student's view)

The student's responses obtained that they like mathematics, mathematics is an interesting subject, and mathematics is a creative subject which is included in the value of mathematics.

When I observed the classroom while the teacher was teaching mathematics, I found that students fully participated in learning mathematics and they were interested. They were active and noted the problem in their copy which was taught by the teacher. Teacher also actively present in the classroom.

From the above responses I conclude that most of the student's choose mathematics as a major who feel that mathematics is easy and those students who realized that they are good in mathematics. Mathematics is interesting and creative, also the reason for choosing mathematics. Which represent the Value in mathematics. So, value in mathematics is most of the important motivational factors to choosing mathematics as a major.

According to Vygotsky's constructivism, knowledge construction is influenced by the interaction, direct teaching, belief, language, thinking, language, modeling, previous knowledge. In mathematics teaching, Vygotsky's constructivism is taken as instructional scaffolding. According to this, firstly the teacher hardly performs the performance, then slowly the teacher removes his performance and the learner freely performs the performance about the problem.

When I observed the classroom I found that at first the teacher solved the problems, then he gave the related problems to students for solving. SO, teaching learning activities were done according to Vygotsky's constructivism.

Economic factors

Economic factor is also the most important factor to motivate the students to choose mathematics as a major. It is one of the subject which secure a good job in the future which helps to keep good economic conditions for their life.

When asked what is the reason of choosing mathematics as a major, some student's simply responded that:

Mathematics helps to get a good job in the future. Some students said that there are many sectors in mathematics. Some students said that there is a lack of mathematics teachers so they choose mathematics to improve their economic condition. (Student's view)

The responses of teacher about this as follows

Teacher said that mathematics is important for the study of IELTS, GRE for further study which helps to earn more money. It is only one subject which secures the job in the future. (Teacher's view)

I conclude that mathematics is important for students because it is one of the way to get a good job in the future. It will be possible to get a job and there are many sectors in mathematics which positively affect the economic condition in our life. According to vygotsky's constructivism, social interaction is the most important for knowledge build up. In classroom the children of rich families are actively presented in the interaction with their friend and teacher but children of poor families do not interact with their friend and teacher. They are present in the classroom with silent mode.

Mathematics Teacher

Not all students like math, but a good math teacher has the power to change that. A good math teacher can help students who have traditionally struggled with

arithmetic begin to build confidence in their skills. For students who are usually bored with numbers, a good math teacher can breathe new life into the subject. A good math teacher makes her class a place where students want to be.

Mathematics teacher is one of the most important motivational factor for choosing mathematics as a major because some students choose mathematics due to influence by the mathematics teacher. There are several aspects that students highlight about their teacher. Some mentioned that they like the way they taught for example by presenting step by step and detailed explanations of the topics.

When researcher asked about the reason of choosing mathematics as a major one student simply responded that

She said that there is no perfect mathematics teacher in her village So, she come to Kathmandu from her home town to continue her higher study and she said that she will be became a good and perfect mathematics teacher in the future in her village another students simply responded that there is a lack of mathematics teacher than other so he choose a mathematics for became a good mathematics teacher.

(Student's views)

When I observed the classroom I found that mathematics teacher and students actively presented in the classroom. Their eye contact was good. Teacher interact with students related to the problems and solve the problems on white-board by describing them step by step.

From the above responses I conclude that most of the students choose mathematics as a major subject for becoming a good and perfect mathematics subject. So it is also one of the motivational factors to choose mathematics as a major.

According to Vygotsky's constructivism, knowledge is constructed through the teacher and learner's direct interaction. SO, interaction plays a vital role in building

up knowledge. In the classroom, I found that teacher and students keep direct interaction in teaching learning activities. So, Vygotsky's constructivism is mathematics teaching in sample college for teaching learning activities.

Foundation of other sector

Mathematics is only one of those subject which is necessary for study in other sectors such as population, management, engineer, doctor, etc. Without mathematics nobody studies these sectors. So it is also one of the motivational factors for studying mathematics. Mathematics is necessary for daily life for every person to keep a record. Mathematics helps to do IELTS, GRE which helps to get a good scholarship for further study.

When I asked about the reason of choosing a mathematics as a major some students responded that

Students said that mathematics helps to study in other subjects of other sectors such as engineering, science, management, population, rural development etc. So, mathematics is important for us. (Student's views)

Teacher said that it helps to study GRE, IELTS, which helps to get a good scholarship for further study. Mathematics also helps to compete for LSC which is the base for getting a government job. (Teacher's views)

I conclude that mathematics is the base for study in different sectors. Without mathematics nobody studies science, engineering, management, population, rural development, etc. So, foundation for higher study is also one of the motivational factors for choosing mathematics as a major.

Ways of Knowledge construction the mathematical content

Mathematics, the science of structure, order and relation that has involved elemental practices of counting, measuring, and describing the shapes of the object. It

deals with logical reasoning and quantitative calculation and its development has involved an increasing degree of idealization and abstraction of its subject matter.

Knowledge construction is the process by which knowledge new to the individual or group is created based on the generative process. Knowledge construction refers to the act or process of contributing to the development of the body of ideas, attitudes and beliefs. It is the collaborative process which aims to produce new understanding or knowledge which exceeds something that anyone alone could not achieve. It is based on each other's ideas and thoughts. The knowledge construction process relates to the extent to which teachers help students to understand, investigate and determine how the implicit cultural assumptions, frames of references, perspectives and biases within a discipline influence the ways in which knowledge is constructed within it (Banks, An introduction to multicultural education, 2002, p.14).

Mathematical knowledge content is subject matter-knowledge is subdivided into common content knowledge, specialized content knowledge and knowledge on the mathematical horizon. There are several way to knowledge construction of mathematical content which are as follows:

Practice, Practice and More Practice

It is one of the ways of constructing mathematical content. It is impossible to study math's property by reading and listening. To study maths and construction knowledge we have to roll up our sleeves and actually solve some problems. The more practice answering maths problems in the better. Each problem has its own characteristics and it's important to have solved it in numerous ways before tackling the exam. There is no escaping this reality, to do well in a maths exam we need to have solved a lot of mathematical problems beforehand.

When I asked about it student's simply responses that

Students said that mathematics is a practical subject. So, more practice is the best way to learn mathematics. They said that more practice at home which is learned at school is the best way. Whenever we do not practice more time the mathematical knowledge and content cannot be learned and constructed. (Student's views)

When I observed the classroom, I found that students also practiced the same problem while teacher solving the problem on white board. Then students try to solve related to this problem of text book.

From the above responses I conclude that without practice mathematics learning is impossible. Mathematics is a practical subject. So practice, practice and more practice is an important and best way for knowledge construction of mathematics content.

According to Vygotsky's constructivism, ZPD is one of the most important concepts. ZPD is the distance between the actual development level as determined through problem solving under adult guidance or in collaboration with mere capable peers. But in the field, I could not find this type of measuring.

Self-Study

Self- studying mathematics is not easy, but it is significantly easier to check own mathematical mistakes than our own English essays or our own complex computer programs. Each step of mathematical calculation or proof should be written down in such a way that we can understand it ourselves the next ay and it is this which makes it possible for those child prodigies that self-study mathematics and go to college at ridiculously low age, it could not happen in any other subject because in mathematics reduce all the extraneous stuff way.

When I asked questions about the learning styles about the mathematics students simply responses that

Students said that self-study is also important for knowledge construction mathematical content. They said that at home mathematics learning themselves is very important otherwise mathematics cannot learn. (Student's views)

From the above response I conclude that many theorems and mathematical content are discovered through self-study. Self-study helps to construct new mathematical knowledge. So, self-study is one of the best ways to knowledge construction mathematical content which is important for mathematical learning.

In self-study, learner's need help with apprenticeships on which they do not understand. Apprenticeships help learners where students feel difficult to understand and make it easier to learn. According to Vygotsky's constructivism, Apprenticeships are also taken as an implication for teaching and learning.

Group discussion

Group discussion generates different questions from the members of the group. Every individual has unique ideas, views and thinking capacity. When group discussion is done by a group of students it helps them to learn from other views too. It develops creative thinking in solving problems and clearing doubts. In mathematics group discussion helps to solve problems, create new ideas for solving problems, discover new mathematical content and construct mathematical knowledge. Group discussion involves exchange of ideas where important things are learned from each other which helps to knowledge construction mathematical content.

When I asked questions about it, some students simply responded that

Students said that mathematics is learned by asking friends. They said that when they were absent they asked with friends and discuss with them which knowledge they missed. (Student's views)

Teacher said that mathematics is a practical subject. So, mathematics learns students by discussing with talented and excellent students. (Teacher's views)

When I observed the classroom, after ending the classroom, I found that outside the classroom, some students discussed the problems which they did not understand while the teacher was teaching mathematics in the classroom. I also found that some students also discussed with talented students about the mathematical problems which they had missed.

I conclude that by group discussion many mathematical knowledge is developed. So, for construction knowledge of mathematical content group discussion plays a vital role. So, it is also one of the best way to construct mathematical knowledge. According to Vygotsky's constructivism, knowledge is socially constructed. He focused on peer collaboration and peer collaboration focused that collective activity. In the classroom I found that students discussed problems which they did not understand. So, Vygotsky's constructivism was used in this mathematics class.

Work along with teacher

Mathematics is a practical subject. So, in the class students must be active while the teacher teaches mathematics. When the teacher solves problems at the front of class, then students must work along with the teacher in the notebook. Then students must work on any sample problems that their teacher posts or them to do. This work develops their intellectual capacity and thinking capacity. Which helps them to construct mathematical knowledge.

Students must participate while the teacher is working on a problem. They must be sure that their notes are clear and easy to read. Students must write down anything that the teacher says that increases their understanding of the concepts.

When I asked with students about the learning and construction way of mathematical content most of the students simply responded that

Students said that mathematics is a practical subject, so more practice is necessary for learning mathematics and actively presented in the mathematics class. Working with a teacher is also important for learning mathematics and construction knowledge. (Students views)

When I observed the classroom, I found that when teacher solve mathematical problems, students were active and noted these problems in their notebook. Also they practiced related to this problem in the classroom. But in some class's students and teachers interaction was not good.

I conclude that one of the way of knowledge construction in mathematical content is to work along with the teacher. When students work along with the teacher, they get the opportunity to ask the teacher where they are confused and where they did not understand which helps to develop mathematical knowledge. So it helps to construct mathematical content.

Vygotsky's constructivism is used as instructional scaffolding in teaching learning activities. According to this theory, teachers provide support to learners and extend the range of the learners. But in the classroom I found that teachers provide help and support while students work together with the teacher but the teacher was not active to extend the range of students. SO, Vygotsky's constructivism is used but not perfectly in the classroom.

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CHAPTER - V

SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary

Nowadays, there is a lack of students in the sectors of mathematics education which becomes a great issue. So, Researcher research entitled 'Factor for choosing Mathematics as a major at higher secondary level.' to find out the motivational factors to choose mathematics as a major and way of mathematical knowledge construction. For this researcher used in-depth interview, document analysis and observation form to collect the data. Interviews with students are the main tools for collecting the data. After collecting the data researcher had explored the motivational factors and way of mathematical knowledge construction by descriptive method. In this research, researchers used case study design because the large sample of girls cannot be involved in the research in Kathmandu district.

From the above analysis, the major findings are given below.

Findings

Findings based on motivational factors to choose mathematics as a major subject

- All of the students realized that they are good in mathematics.
- Most of the students feel that mathematics is an easy subject from their childhood.
- Students are more interested in learning mathematics than other subjects.
- Some of the students want to become good mathematics teacher in the future.
- It will be possible to get a good job in the future for mathematics students.
- Mathematics is the basis for the study of different sectors such as population, management, engineering, RD, science.

- Major motivational factors of choosing mathematics as a major are mathematics teacher. They like mathematics, they realized that they are good in mathematics, economic factor, interesting subject and creative subject, base for the study of other sectors.

Findings based on the ways of knowledge construction in mathematical content

- Practice and more practice is the most important for studying mathematics.
- Students build up mathematical knowledge through the works along with the teacher.
- Nowadays students learn mathematics through self-study by using the internet.
- Student's interaction in a group when they did not understand the mathematical content.
- So, Some of the ways of mathematical knowledge construction are practice, practice and more practice, work along with teacher, peer group discussion and self-study.

Conclusion

From the above analysis, Researcher find out different motivational factors for choosing mathematics and different ways of constructing mathematical knowledge. There are many motivational factors to choose mathematics as a major subject. It is possible to get a good job in the future for mathematics students. Although there is a lack of mathematics students because there is no priority for mathematics students in our society. It is a trend that people think mathematics is a difficult subject. There is a trend in our society that mathematics is male dominated subject so there is no capacity for girls to study mathematics. There is a lack of knowledge which motivates the students to study mathematics as a major. If we give priority to the mathematics students in our society, then there will be an increase in the mathematics students. If

we bring the new trend of thinking of people that mathematics is a not difficult subject, it is an interesting subject, then students will be motivated to study mathematics.

Implications

In this study “Factors for choosing mathematics as a major subject at higher secondary level..” researcher found many types of motivational factors and ways of mathematical knowledge construction. This study was carried out within a certain particular area. So, its findings cannot be generalized. Anyway this research will help to further researchers who will be held for further improvement in liked topics. The conclusions of this study cannot be more generalized to all levels of college due to limitations in this study. On the basis of this study the following implications are made.

- Similar types of studies could be conducted at a higher level of college and samples could be selected from different districts.
- Similar types of studies with large samples could be taken in order to obtain more valid findings for broader generalizations.
- This study help to understand what motivates girls students to choose mathematics as a field of study.
- We also believe that our research can produce pedagogical recommendations to promote the study of mathematics among young women in our country.
- To encourage the mathematics students to be regular in the class.
- Time to time modern and refreshment training and orientation should be provided to teachers.
- This study helps us to understand the different ways of mathematical knowledge construction.

- A similar study can be extended in other subjects and other levels as well.
- This study was conducted in Kathmandu district. To get a more valid and reliable result it would extend to nation -wide.

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www.collegeconfidential.com

Appendix-I

Class observation form

Name of college:

Date:

Name of teacher :

Time:

Students No:

Period:

Topic:

1.Initiation of lesson	Vg	Go	Sa	Po	Remarks
Teacher's punctually					
Self confidence of teacher					
Introducing of objective of lesson					
Based on previous lesson					
Class management					
Interestingly class starting					

2.Presentation and developing of lesson	Vg	Go	Sa	Po	Remarks
Providing suitable example and learning guidance					
Encouraging for sharing and small group discussion					
Appropriate of question answer between student and teacher					
Teacher and student interaction for eliciting the performance					
Use of teaching materials					

Student's participation in discussion					
Providing reinforcement and feedback to the weak students					
Listen to student's opinions					
Student listen attentively					

3. Used method of teaching	Ne	So	Of	Ad	Remarks
Lecture					
Discussion					
Problem solving					
Question answer					
Demonstration					

4.Closing of lesson	Yes	No	Remarks
Did the teacher summarize the lesson?			
Is the lesson evaluated?			
Does evaluation come out satisfactory?			
Is the classwork given?			
Is the homework given?			

5.Classroom organization	Yes	No	Remarks
Is the whiteboard at appropriate place?			
Are there sufficient seats for students?			
Is the door and window are appropriate place?			

Where, G means good, Sa means satisfactory, Po means poor, Of means often

Ne means never, So means sometimes, Ad means almost daily

Appendix-II

Interview guidelines for Students

1. Do you live in Kathmandu to continue your studies ?
2. Do you feel mathematics is easy ?
3. Do you like mathematics ?
4. Do you obtain high marks in mathematics at school level ?
5. Do you like mathematics from your childhood ?
6. Which subject do you choose as a major at school level ?
7. Do you take first position in maths ?
8. Do you choose mathematics by influencing your relatives ?
9. Do you discuss mathematics problems in the classroom ?
10. Do you give sufficient time to study mathematics at home?

Appendix III

Interview guidelines for teachers

1. Which subject do you teach in this college ?
2. Do you teach other colleges except Koteswor Multiple Campus ?
3. What is the reason that nowadays, there is a lack of mathematics students?
4. What is the reason that some students choose mathematics as a major ?
5. Does mathematics help to get a good job in the future ?
6. What is the way students learn mathematics effectively ?
7. Does group discussion help to construct mathematical knowledge ?