STUDENTS' DIFFICULTIES IN LEARNING MATHEMATICS: A CASE STUDY

A

THESIS

BY

BIKASH BHUSAL

THE PARTIAL FULFILLMENT OF THE REQUIREMENT

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LETTER OF CERTIFICATE

This is to certify Mr. **Bikash Bhusal**, a student of the academic year **2018/2019** AD with thesis number **1581**, Exam Roll No. **7428250**, Campus Roll No. **327,** and T. U Regd. No. **9-2-305-106-2014** has completed his thesis under my supervision during the prescribed by the rules and regulations of T. U Nepal. The thesis entitled **"Students' Difficulties in Learning Mathematics: A Case Study"** embodies the result of his investigation conducted from **2020 to 2021** at the Department of Mathematics Education, University Campus, Tribhuvan University, Kirtipur, Kathmandu. I recommend and forward that his thesis is submitted for evaluation to award the Degree of Master of Education.

.....

Prof. Dr. Bed Raj Acharya

(Head)

Date: 9 August 2021

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LETTER OF APPROVAL

Thesis Submitted

By

Bikash Bhusal

Entitled

"Students' Difficulties in Learning Mathematics: A Case Study" has been approved in partial fulfillment of the requirements of the

Degree of Master of Education.

Viva-Voce Committee	**Signature**
Prof. Dr. Bed Raj Acharya (Chairman)	.....
Prof. Dr. Indra Kumari Bajracharya (External)	.....
Asst. Prof. Krishna Prasad Adhikari (Supervisor)	.....

Date: 8 August 2021

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RECOMMENDATION FOR ACCEPTANCE

This is to certify that Mr. **Bikash Bhusal** has completed his M. Ed. thesis entitled **"Students' Difficulties in Learning Mathematics: A Case Study"** under my supervision during the period prescribed the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward his thesis to the Department of Mathematics Education to organize the final viva-voce.

.....

Asst. Prof. Krishna Prasad Adhikari

(Supervisor)

Date: 9 August 2021

DEDICATION

This thesis is dedicated to my father **Mr. Gokarna Bhusal**,

my mother **Mrs. Lalita Bhusal,** and my brother **Mr. Mahesh Bhusal**.

Whose love, support, and encouragement have enriched my soul and inspired me to purpose and completed this research.

DECLARATION

This dissertation contains no material which has been accepted for the award of another degree in any institution. To the best of my knowledge and belief, this dissertation contains no material previously published by any authors except due acknowledgment has been made.

Defense Date: 9 August 2021

9 August 2021

Date

Bikash Bhusal

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9 August 2021

Date

Bikash Bhusal

ABSTRACT

This study entitled "Students' difficulties in learning mathematics: A case study" is the emerging field of mathematics education in Nepal. The main objectives of this study were to explore the causes of difficulties faced by the students in learning mathematics and also to explore the ways to improve the interest of students in learning mathematics. The approach of this study was a case study under the qualitative research method. This study was bounded on Mahendra Ratna Campus, Tahachal and Sanothimi Campus, Bhaktapur. This study was only related to the students studying mathematics in B.Ed. and also, the respondents of the study were two mathematics teachers, six mathematics students, and their parents. Classroom observation, in-depth interviews, and document analysis were used as tools of data collection.

This study found that mathematics teaching-learning ways in the selected colleges were good but not excellent. All the students were taught based on equality rather than based on equity. Teachers did not teach the mathematical problems in connection with students' daily life and also most of the teachers taught mathematics only based on exam-oriented.

Also, this study found that misconception and pupil's weak perception about mathematics subject, students not being able to spend enough time to learning mathematics at home, lack of students previous knowledge in subject matter, the learner does not have his interest, lack of teachers teaching technique, teachers should not teach the mathematical problems in connection with students' daily life, teachers should not motivate the students to learn mathematics and teachers should always give priority only to the good students and not give opportunities to the weak students in the classroom are the main causes of students difficulties in learning mathematics. And also this study found that to use digital technology in the mathematics classroom, to teach mathematical problems in a practical way rather than theoretical way, to use cooperative learning method in the mathematics classroom, to motivate the students for mathematics learning in the classroom, to teach the mathematical problems in connection with students' daily life, to conduct the national/school level awareness program about mathematics subject, to use the student-centered method in classroom are the main ways to improve the interest of students' in learning mathematics.

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LIST OF ABBREVIATION

MRC = Mahendra Ratna Campus

SMC = Sanothimi Multiple Campus

NVTC = National Vocational Training Center

ODL = Open and Distance Learning

TU = Tribhuvan University

ICT = Information and Communication Technology

ZPD = Zone of Proximal Development

B.S = Bikram Sambat

S.L.C = School Leaving Certificate

B. Ed = Bachelor of Education

M. Ed = Master of Education

Ph. D. = Doctor of Philosophy

NGO = Non-Governmental Organization

INGO = International Non-Governmental Organization

% = Percentage

Chapter I

Introduction

This chapter presents the background of the study, statement of the problem, the objective of the study, justification of the study, delimitation of the study, and definition of related terminology.

Background of the Study

I am a mathematics student. I have been studying mathematics continuously for the last 17 years. When I was in grade nine, I started to study optional mathematics, and then I did start to get excited about mathematics. After that, in the upper classes, I continued to learn mathematics and continued to enjoy it. By the time I was studying for a bachelor's level, I was beginning to be matured, and I began to associate connected mathematics with my daily life. And I was motivated to solve the problems that came up in my daily life through mathematics. Similarly, when I started studying at the master's degree level, I started to take mathematics not only as a subject, I began to see mathematics as my life, my profession, and my career. Based on the time I have spent in mathematics and in my experience, the school level mathematics seems to be related to helps the problem solving of our daily life. But the undergraduate level mathematics seems to be related only to a large amount of study, rote learning contents, memorization, and also related to only exam-oriented learning. In this way, I found a lot of difference between I studied at school level mathematics and I studied at undergraduate level mathematics. In this way, I felt that mathematics which was easy at the school level, but while I was studying at the undergraduate level, I felt mathematics was a bit difficult subject.

The above-mentioned view depicts that, the life I spent in mathematics, my thinking towards mathematics, and also, I feel a lot of difference between school level mathematics and undergraduate level mathematics. There is a famous quote by William Paul Thurston that "Mathematics is not about numbers, equations, computations or algorithms, it is about understanding". In fact, mathematics is very important in our daily life. For example, it helps to solve the problems in our domestic life such as profit, loss, bill payment, area, rectangle, percentage, interest, etc. Mathematics is one of the most crucial subjects for students. Mathematical knowledge is an essential part of our life. It is almost everywhere such as engineering, science

technology, etc. Scientists and engineers cannot do anything without the use of mathematics because famous mathematician Gauss says that "Mathematics is the queen of all science". Every moment of our life requires knowledge of mathematics. Mathematics is important for life and supports all-around personal development. Mathematics significantly influences pupils' and students' education both in a special branch and in terms of moral education. We can find mathematical applications in nature, technology, architecture, machinery, the building industry, the banking sector, research, cartography, etc. There are very interesting applications in genetics and in using mathematics in nature. By using mathematics, we can create statistical descriptions of quantitative relations. Mathematics is the basis for research methods. We can develop pupils' interest in mathematics with the help of quality education because mathematics is a part of our daily routine and influences the quality of our life and the quality of our professional orientation. Mathematics is a methodical application of matter. Mathematics makes our life orderly and prevents chaos. Certain qualities that are nurtured by mathematics are the power of reasoning, creativity, abstract spatial thinking, critical thinking, problem-solving ability, and even effective communication skills and everyone needs mathematics in their day-to-day life. Students should study math to help them how to solve problems and meet practical needs such as collect, count, and process data. Mathematics is of central importance to modern society. It provides the vital underpinning of the knowledge of the economy. It is essential in the physical sciences, technology, business, financial services, and many areas of ICT. Mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematical knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art. In my experience, most of the students are not taking mathematics seriously at their undergraduate level because they do not find mathematics quite interesting. According to Audsley (2019), there are six main reasons why mathematics is important for our daily life, namely excellent for your brain, real-world applications, better problem-solving skills, helps almost every career, helps understand the world better and it is the universal language.

In Panini Multiple Campus Sandhikharka Arghakhanchi, the number of students enrolled B.Ed. the first year in Mathematics in 2072 BS, 2073 BS, and 2074

BS were 20, 16, 11 respectively (PMC, 2072). Looking at the statistics, it is seen that the number of students studying mathematics is decreasing. Is the reason for the decrease in the curiosity of the students towards the mathematics subject being a difficult subject? Or is it there is no effective teaching of mathematics? So, mathematics is really a difficult subject here or we have made it difficult? the question arises. Similarly, mathematics is considered as a subject to be studied only by smart and competitive students and it is also considered as a male-dominated subject (Ajai & Imoko 2015). Mathematics is only for talented and competitive students? Is it possible that students with other general intellectual abilities can study it? So, mathematics is really a difficult subject compared to other subjects? Or is it the teachers have not been able to arouse the interest and curiosity of the students therefore the students take it as a difficult subject? I am intrigued by the question of why so many students take mathematics as a more difficult and awkward subject than other subjects. May be different reasons behind it such as physical facilities, lack of textbook, lack of teaching materials, the large size of the class, home environment, parent's education and so on. I was curious as to why so many students have taken mathematics as a difficult subject compared to other subjects. Therefore, I am interested in studying this area.

According to Acharya (2017), as mathematics is emphasized like language, most students feel it as a difficult subject and it seems that it is affected by various factors like home and school environment, students' anxiety, the negative feeling of mathematics, economic condition, physical facilities, and the teaching-learning process. We cannot achieve the expected goal without improving appropriately the management of the above-mentioned factors to facilitate the students learning. Nepali (2020) has conducted a Master's degree thesis entitled "Difficulties faced by Gurung students in learning mathematics". In this research, it has been found that the main factors that make the mathematics subject complicated for the Gurung students are economic family background, parents careless, teaching materials, the lake of discussion, language problem, lack of using ICT, and lack of trained teachers. Similarly, Acharya (2020) in his research entitled "Causes of low achievement of Gurung students in mathematics". In this study, it is explained that students consider mathematics as a more complex subject than other subjects due to which their achievement level in mathematics is low. And also, in this research, the researcher

found that parent education, learning opportunity at home, culture & customs, teaching methods, the interest of learner, assessment technique, household work, negative attitude of teacher and communication gap with guardians are the main causes of low achievement of Gurung students in mathematics. According to Gofoor & Kurukkhan (2015) in his research article entitled "Why high school students feel mathematics as difficult subject?". In this article, there are discussions about some factors which are related to mathematics difficulty. What are the possible reasons behind the decreasing interest of students in mathematics? And how can we encourage the students in learning mathematics by minimizing those factors? My research moved forward to find out these reasons/factors why many students feel mathematics is a difficult subject and how to increase the number of students studying mathematics by removing these factors.

Statement of the Problem

In Nepal, the school education system has introduced mathematics as a compulsory subject under grade 10 and an elective/optional subject in grade 11/12 (Aryal, Shrestha & Regmi, 2019). It shows that mathematics has been placed as an important subject in school education. It provides a platform for the development of entire mathematics education as well as a foundation for the higher study of science and technology. In general mathematics learning helps people to understand and interpret the quantitative except living and natural phenomena. In my experience, people who have not studied mathematics beyond grade 10 consider mathematics as a more difficult subject than other subjects, and in the same way, I have seen that even the senior people who have spent their entire life in mathematics also considered mathematics as a difficult subject and assume that only talented students can study mathematics.

Students are losing their interest in science and mathematics in Nepal (Joshi, 2017) the finding of this study generated many questions. Why the interest of students in studying mathematics is decreasing? The reason for this decreasing interest of students in learning mathematics is that mathematics is a difficult subject? Or, is it due to an ineffective teaching-learning process? Is mathematics really a difficult subject or we have made it difficult? Why the number of students studying mathematics is constantly decreasing? I was curious to study about why so many

students have taken mathematics as a difficult subject. Therefore, I am interested in studying this area. I am also a mathematics-related person, so it is necessary for me to study about how to increase the number of students studying mathematics, how to teach mathematics effectively, and how to improve the interest of students in learning mathematics. Therefore, this topic has become a problem for me and I got to connected with this problem.

Objectives of the Study

The research objectives of this study were as follows;

1. To explore the causes of difficulties faced by the students in learning mathematics.
2. To explore the ways to improve the interest and enthusiasm of students in learning mathematics.

Research Questions

The research questions of this study were as follows;

1. What are the causes of difficulties faced by the students in learning mathematics at undergraduate-level?
2. Why did students feel difficulty in learning mathematics at this level?
3. How to improve the interest of students in learning mathematics?

Justification of the Study

When a researcher studies a subject, it is very important for him/her to be aware of the benefits of the study for himself/herself. I am also a future math teacher. The findings of this research have helped me personally. I have been able to find out the reasons why students take mathematics as a difficult subject and how to increase the number of students studying mathematics by minimizing students' misconceptions about mathematics subject. Now in the days to come, I will embrace mathematics as my profession, my career and take it as my source of income and spend my whole life in mathematics. In practice level, I hope that these findings help for the teachers who are teaching mathematics and those teachers who are a beginner in teaching career they may take benefit from this research. It also helps the teacher to select effective teaching strategies to motivate the students in learning mathematics. And also, it provides for an increase in the number of students studying mathematics by eliminating the factors that

affect students' learning mathematics. At the policy level, this study also helps the author who will write the textbook of mathematics about which type of problem to be included in the mathematics textbook. And also, it is beneficial for the curriculum planner about how the mathematical content is associated with the curriculum. It is helpful for the government to adopt globally for the education level. And the benefit of this study at the research level, the findings would also form a data bank for reference and helps us an area for further educational research.

One of the main challenges to mathematics teachers is to make a positive feeling in students toward learning mathematics. Therefore, teachers should be aware of teaching/learning mathematics then they can improve students' interest in learning mathematics by reducing their negative beliefs. In short, the justification of this study as follows,

- It contributes to finding out the difficulties faced by the students in learning mathematics at the undergraduate level.
- It is helpful for mathematics teachers to select effective teaching strategies to motivate the students in learning mathematics.
- This study provides for NGO & INGOs that handed for the educational programmer.
- I hope that these findings also help mathematics teachers, curriculum planners, textbook writer, policy maker, and students itself
- This study provides the parents to create a learning environment for their children
- It is also helpful for data bank reference and further educational research.

Delimitation of the Study

According to Khanal (2019) delimitation is the process by which a researcher determines the scope of his study area and what kind of tools he wants to study based on the available resources & time. This study was delimited as follows;

- This study was only related to the students studying mathematics in B.Ed.
- This study was bounded on Mahendra Ratna Campus, Tahachal and Sanothimi Campus, Bhaktapur.
- This research was included on the responses of two mathematics teachers, six mathematics students, and their parents.

- In-depth interview, classroom observation, and document analysis were used as tools of data collection.
- This study was based on case study approach under the qualitative research method.

Definition of Key Terms

Difficulty. Difficulty refers to the problems that come up while teaching and learning mathematics in the classroom. Also, it means any obstacles that may problem to deal with understand mathematics concepts during the period of teaching and learning mathematics classroom.

Improve. Improve refers to motivate and encourage the students in learning mathematics by reducing their negative belief towards mathematics. It indicated that the factors such as the interest of learner, self-confidence, prior knowledge, minimize anxiety, and so on in mathematics learning.

Teacher. A person formally engaged in teaching mathematics and especially enrolled in undergraduate level. The term "teacher" is restricted only to those teachers who were teaching mathematics at the undergraduate level in Mahendra Ratna Campus and Sanothimi Campus.

Home environment. In this study, the home environment indicates that the factors that affect the student learning towards mathematics at home such as parent's qualification, economic background, gender discrimination, etc. are denoting home factors. It is a crucial component that is directly associated with the learning of students.

Instructional materials. Instructional materials are those materials that facilitate the student to learn mathematics. It helps the mathematics teacher to explain new concepts clearly, resulting in a better student understanding of the concepts being taught.

Digital technology. In this study, digital technology refers that the Laptop, Projector, PowerPoint, GeoGebra software, Mathematica software, and Maple software used by the teachers to make mathematics learning effective in the mathematics classroom.

Chapter II

Review of Related Literature

The review of related literature is systematic identification and analysis of documents containing information related to research problems (Niure, 2018). In my experience, the literature review is a comprehensive summary of previous research on a topic. In my research, the main purpose of the literature review was studied about what research has been done in mathematics difficulties and what research has not been done in mathematics difficulties. In addition, the purpose of the literature review was to cited previous research related to mathematics difficulties as evidence in my study, to study different research which is related to students' difficulties in learning mathematics, to identify inconstancies gaps in research, and at last analysis & interpret the data by using a theoretical and conceptual framework.

Review of Empirical Literature

There is a famous quote by Gagne that "There are two mathematical objects: direct and indirect. Direct objects are fact, skill, concept, principle and indirect objects are self-discipline, transfer of learning, problem-solving, and application of structures" (Acharya, 2017, p.16). I had collected some books, journal, thesis, articles which are related to difficulty in learning mathematics. After the review of different literature, I have divided my topic into different themes. Here I have explained about some theme which I had generated for my review, these are

Nature of mathematical knowledge. What is the structure of mathematical knowledge? How mathematical contents are constructed? How to analyze mathematics? The answers to these above-mentioned questions give a clear view regarding the nature of mathematical knowledge (Chhetri, 2016, p.34). Different types of symbols (∀, ∃, ≡, ⇔, ∉, ⊆, ∈, ∂, Ψ, Ω, ≅) are also used in mathematical learning. Thus, in learning mathematics, students need to know about different types of symbols. Since these different symbols have given different meanings, students need to pay attention when using them, therefore students take some mathematical contents as abstract concepts. In my experience, our higher-level contents are more related to the only exam-oriented and problem-solving method than practical learning, so students take mathematics as a more difficult and abstract subject than other subjects.

Mathematics is all around us in everywhere we do, it is the building block for everything in our daily life (Elaine, 2013).

Some mathematicians take the nature of mathematics as the Absolutist view on the nature of mathematics. They take mathematical knowledge out of the human construction of knowledge. Also, they take mathematical knowledge is not an invention of human beings it is their research and mathematics is always real & statics everywhere (Acharya, 2017). The Platonist view portrays mathematics as a "statics body of knowledge, mathematics is the process of discovering their pre-existing relationships" (Earnest, 1988, p.10). In our context, there are still some teachers who use the only teacher-centered method in teaching mathematics, emphasize only problem-solving method and they say that only solve the problem by following the teacher's procedure then you will pass the exam. Also, these types of teachers considered mathematical learning is an objective. Therefore, students feel that mathematics is a difficult subject.

But some mathematicians and philosophers consider mathematical knowledge as the social construction process, its result relative to time, place, and subject to revolutionary change as much as other forms of knowledge (Bloor,1976, cited as Acharya,2017). According to the fallibilities view, mathematical knowledge cannot go beyond the human mind and its activities. Mathematics studies as an outcome of the social process are associates with constructivist and post-modernist thought in education. In the fallibilities view, the nature of mathematics is dynamic, changeable, and supports the constructivist view (Davis & Hersh, 1980). Similarly, in our context, mathematics is also taught to follow the fallibilities view. These types of teachers respect the work done by the students and motivate the students for learning mathematics. Also, these types of teachers use the student-centered teaching method in the classroom, which makes the students consider mathematics as an easy and comfortable subject.

In other words, according to social constructivism mathematics is based on conversational & dialogical nature. In dialogical nature, mathematics knowledge can be a creation by interaction, discussion & conservation (Reyni,2006). Also, some mathematicians believe that cultural practice is the source of mathematical knowledge. According to Bishop (1988), mathematical knowledge as a plan is a

cultural phenomenon. In our context these types of teacher, they divide the students into small groups and teach mathematics through discussions between student-student and student-teacher. In addition, all the tasks in mathematics learning are done by the students themselves and they play a facilitator role. Also, they take that students are considered as the main source of knowledge. As a result, students feel that mathematics is a beautiful subject.

At last, I concluded that some mathematicians consider the concept of mathematics to be naturally abstract, difficult, and beyond the creation of the human mind. However, some mathematicians consider that mathematical knowledge as a human creation and social process. In our context, there are still some teachers who follow the absolutism view in teaching/learning mathematics. These types of teachers considered as mathematical knowledge are objective. Therefore, students feel that mathematics is a difficult subject. Similarly, in out context, some teacher who follows the fallibilities view in the mathematics classroom. These types of teachers respect the work done by the students and use the student-centered teaching method in the classroom. Which makes the students consider mathematics as an easy and comfortable subject. In addition, some type of teachers who follow the social constructivism view in the mathematics classroom. They teach mathematics through interaction between student-student, student-teacher and also they connect the mathematical contents with our cultural context and daily life problems. As a result, students feel that the nature of mathematical knowledge is beautiful.

Difficulties in learning mathematics. Bhatta (2017) carried out the research entitled "problems faced by students in learning set". The main objective of this study was to find out the problem faced by students in the learning set at grade X and to compare the problem faced by boys and girls in the learning set at grade X. Descriptive survey research design was adopted to conduct the study. The researcher has selected 10 schools in the Baitadi district by using random sampling and also, he selected the 500 students of grade X for the population. The questionnaire and interview schedule were the tool of data collection. Mean weightage was used to determine the problems faced by students in learning the content of the set and the z-test was applied to compare the problem between the boys and girls. The researcher found that most of the students faced the problem due to the verbal problems of the set. Also, teachers did not use the student-centered method in the classroom and lack

of group discussion, lack of exercise book, and lack of use electronic instructional materials were the main problems for the students in the learning set. I concluded that Teachers should teach mathematics by emphasizing only problem-solving methods rather than discussing and explaining problems with students in the classroom. Lack of group discussion, lack of student-centered method in teaching mathematics, lack of book and materials for practice mathematics are the mail problem of students in the learning set. If we decrease these difficulties/problems then students can easily learn that content.

I reviewed the literature of Chapagain (2019) carried out the research entitled "difficulties in learning algebraic word problem". The main purpose of this study was to analyze the causes of difficulties in learning algebraic problems of grade ten students and to investigate how to effective teaching of algebraic problems in the mathematics classroom. His study was based on a mixed-method research approach and also he was selected 100 students in three public schools of Kirtipur, Kathmandu by using random sampling. The researcher used the achievement test of algebraic word problems for all the students of related schools and interview guidelines for three teachers and fifteen students who achieve fewer marks in the respective test, as the tool of data collection. He used mean and percentage to determine the difficulties. He found that the reason for most of the student failure in algebraic word problems was on translating and representing verbal problems into an algebraic expression. Difficulty in applying problems to manipulate formulas, difficulty in understanding the given statement, difficulty in calculation problems in an arithmetic operation, difficulty in generalization of the pattern are the main reason for difficulties in learning algebraic problems for the students. I concluded that the main causes of difficulties in learning algebra were lack of pre-knowledge, no proper interaction between teachers and students, most of the students did not practice sufficiently at home, lack of motivational role of parents and teachers. If we decrease these difficulties then students can easily learn that content.

Adhikari (2019) conducted a Master’s degree thesis entitled "difficulties of students in learning trigonometry". The main objectives of this research were to find out the difficulties of students in learning trigonometry and to explore the remedies of difficulties of students in learning trigonometry in grade 10. This study was based on a survey research design. For the population, the researcher has selected two public

and two private secondary schools in the Kathmandu district by using random sampling. In that school, he was selected from 155 students, 3 teachers, and 3 mathematics experts. Data were collected by achievement test and interview guidelines, also only 5 students were selected for interview. He has used the split-half method and triangulation method for reliability and validity of the tool respectively. He was analyzed and interpreted the data by using mean, standard deviation, and general induction methods. The researcher found that misunderstanding about trigonometric ratios and mathematical terminology, definitions & formulas need to be kept in mind for a long time, different formulas should be used according to the situation are the main problem of the students in learning trigonometry. Also, he found that lack of clear concept about the reflection of the object, emphasis only on rote learning & exam-oriented learning rather than conceptual learning, and negative attitude towards mathematics are also related factors of difficulty in learning trigonometry. I concluded that many formulas have to be memorized to solve the trigonometry problems, different formulas should be used depending on the situation, and also the lack of prior knowledge related to this topic is the mail problem of students in learning trigonometry. If we want to eliminate these difficulties, we need to study the formula & definition by making a chain or picture and also teach the abstract mathematical concept with connecting to our daily life problems.

Nepali (2020) conducted a case study design entitled "difficulties face by Gurung students in learning mathematics" with the main aim of this study was to explore the difficulties face by the Gurung students in learning mathematics and to analyze the causes of difficulties faced by the Gurung students in learning mathematics. The researcher was limited to his study on three community schools of Gorkha district and five students from these schools were selected as a sample. Classroom observation form, interview guide line with students, parents, mathematics teacher and head teachers, and document review were used to collect data. Also, thematic and triangulation methods were used for data analysis. The researcher found that home and school environment are not similar for the mathematics learning of Gurung students, low economic family background, students do not read & practice at home, parents careless in their children's education are the main causes of difficulties of Gurung students in learning mathematics. After the study, this research I concluded that lack of teaching and learning in the mathematics classroom thought mother

tongue, occupation & education problem of family background, language problem of Gurung students in learning mathematics, and lack of inter-relationship between students & teacher are the main problem of Grung students in learning mathematics.

Causative factors of difficulties in learning mathematics. Adhikari (2006) carried out the study entitled "Cultural discontinuity and learning difficulties in mathematics: A case study of primary Dalit school children". The researcher was determined the objective identify the cause of difficulties in learning mathematics of Dalit children and to identify the impact of the home environment of the Dalit children in learning mathematics. The researcher has used a case study research design under a qualitative research approach. The researcher was limited to his study on two public schools of Kaski district by using purposive sampling. For the data collection tools, he was selected to participate in observation and in-depth interviews. It was concluded that the caste system in Nepal appeared to be a focal point that has affected the everyday lives of people. The caste system seems to be an influencing factor for perception and thinking towards other people. In every field, whether in the community or school, they have to be dominated, humiliated, and oppressed due to their culture & poor languages. So cultural discontinuity is one of the main causes of difficulties in learning mathematics. I concluded that the negative home environment of Dalit children, low income of the family, uneducated family environment, and excessive household chores are the main factors of difficulty in learning mathematics for the Dalit children.

Acharya (2013) carried out research entitled "Problem Encountered in Teaching-Learning Mathematics in Multicultural Classroom". The main objective of this study was to explore the problems faced by students in learning mathematics in the multicultural classroom at the secondary level and to explore the challenges faced by the teachers in teaching mathematics in the multicultural classroom. The researcher was used a qualitative research approach and ethnography research design. The researcher has selected one public school of Kavre district and also he was selected 3 mathematics teachers, 5 mathematics students & 2 parents by using purposive sampling for the population. The research tools were interviews and observation. The researcher found that the school environment was not suitable for mathematics learning for culturally diverse students. Also, he found that there was a communication problem between teachers & students and also teachers' hegemony

may have to create problems in mathematics teaching/learning activities in the classrooms. I also concluded that it needs to present mathematics curriculum should be revised. It should be better to include the contextualize problem in our mathematics curriculum. The knowledge of learners is not given priority in our mathematics curriculum and the lessons are not contextualized. So, we need to change the education system of Nepal.

I reviewed the literature of Acharya (2017) conducted the research article in the International Journal of Elementary Education entitled "factor affecting difficulties in learning mathematics by mathematics learner". The main purpose of this study was to explore the causes of difficulties in learning mathematics. This study was based on a case study research design under the qualitative research approach. Classroom observation of three schools in the Arghakhanchi district and interviews were taken to the research tools for achieving the research objective. The researcher was concluded that teachers lack linkage between new mathematical concept and previously learned mathematics structures, mathematics anxiety, the negative feeling of mathematics, economic condition and their educational backgrounds, school management system, lack of infrastructure of the school and lack of regular assessment system of school are main causes of difficulties in learning mathematics. I concluded that there are many sorts of factors that affect learning mathematics. Students themselves are not interested in learning mathematics, students not being to spend the time daily in learning mathematics, and family environment of the students are some factors of difficulty in learning mathematics by mathematics learner. Also, the teachers did not encourage the students towards the subject and did not solve the mathematical problems by connecting with our daily life. Due to various reasons like this, the students take mathematics as a difficult subject.

Acharya (2020) conducted a Master's degree thesis entitled "causes of low achievement of Gurung students in mathematics". The main objectives of this research were to explore the cause of low achievement of Gurung students in mathematics and to explore the mathematics learning environment of Gurung students at home & school. This study was based on a case study design. For the respondent, the researcher has conducted four Gurung students (2 boys and 2 girls) from grade X of Shree Himali Secondary School in Gorkha District. The students were selected based on the purposive sampling method. Tools of the data collection were an

interview with students, parents, mathematics teacher, head teacher, and school management committee. The researcher found that parents' education & occupation, learning opportunity at home, culture & customs, teaching method, language problems, assessment techniques are the causes of the low achievement of Gurung students in mathematics. After study this research I concluded that the interest of learners, encouragement & motivational factors, the interaction between students & teachers, communication gap between students & teachers are the main factors of low achievement of Gurung students in learning mathematics.

Mathematics learning strategies. Bhatta (2016) conducted experimental research on "Effectiveness of problem-solving method in learning mathematics at secondary level" with the objective to compare the achievement of the students taught by problem-solving method and traditional teaching method and to find the effectiveness of the problem-solving method in teaching mathematics. The researcher was limited to his study on two schools in the Kathmandu district. This study was an experimental type having two groups, experimental group, and control group. The researcher, the experimental group was taught by problem-solving method and the control group was taught by the traditional method of teaching mathematics. The population of the study was included the ninth-grade students of the government school of Kathmandu. The researcher was selected 23 students of two schools, 12 as experimental groups from Shree Gram Shikshya Mandir Higher Secondary School and 11 as control groups from Shree Baluddhar Higher Secondary School by using random sampling. For data collection, the researcher has selected an achievement test that also consisted of a subjective type of questions, and the test scores were descriptively analyzed by using different mathematical tools as mean percentage and t-test. She found that the problem-solving method was more effective than the usual traditional method. I concluded that the problem-solving method will better to students for understanding and achievement in teaching/learning mathematics than the traditional method.

Kafle (2016) carried out the research entitled "Teaching/Learning Strategies in Mathematics at School Level". The main objective of this study was to find out the role of the headmaster in improving instructional strategies and to identify the teaching strategies of teachers in the mathematics classroom. This study was based on descriptive and explanatory research design. For this study, the researcher has

selected an effective public school in the Arghakhanchi district. Also, the researcher was collected data by using direct observation of the school, face to face interviews with the head-teacher, teacher, parents, and students. The researcher found that the mathematics teacher teaches mathematics using a lot of the discussion method, lecture method, sometimes using project work, and also using the discovery methods in the classroom during teaching/learning mathematics. Also, there were highly qualified and sufficient numbers of the teacher. Most of the teachers were trained and some of them experienced but untrained. And also, she found that immediate rewards after each good action of students were the best methods for motivation in the classroom. I concluded that the problem-solving method and lecture method are mostly used in teaching/learning mathematics rather than interacting with each other.

Basnet (2016) carried out the research entitled "Effectiveness of inductive method in teaching mensuration at lower secondary level" with the objective to compare the achievement of the students taught by inductive method and traditional teaching method and to explore the effectiveness of the inductive method in teaching mathematics. The researcher was limited to his study on two public schools of Dolakha district. This study was an experimental type having two groups, experimental group, and control group. The researcher's two groups were taught the same topic Mensuration, the experimental group was taught by using the inductive method and the control group was taught by using the traditional method of teaching mathematics. The population of the study was included the grade VII students of Dolakha district. The researcher was selected 50 students from two schools, 25 students were selected from Devi Higher Secondary School as a control group and 25 students were selected from Prithivi Narayan Lower Secondary School as the experimental group. For data collection, the researcher has selected teaching modules, achievement test also consisted of the subjective type of questions, and the test scores were descriptively analyzed by using different mathematical tools as mean standard deviation, variance, and t-test. He found that the inductive method of teaching had better achievement than that of the traditional method of teaching. I concluded that the inductive method will better for students for the effective achievement in learning mathematics than the traditional method. The inductive method helps students to motivate and apply the known fraction concepts in unfamiliar conditions.

Implication of the review for the study. The above literature review indicates that conceptual & procedural difficulties, notation, memorization, symbols, pre-knowledge, teaching methods, materials, and motivational factors are the mail problems in learning mathematics for the students. In addition, other research has shown that the teaching methods used by teachers in the classroom, the classroom environment, and the family environment are also affecting the students' mathematics learning. Thus, from above empirical literature review, I found that student is not the only one factors for mathematics difficulties, there are various other factors which are affected in students' learning mathematics.

Thus, the above reviews have been used in my study for making the conceptual framework and determining the components of data collection tools. Another implication of the above review has been used to find out the research gap between previous research and my research. Also, it has been used to maintain credibility and validity for my research. Other researches have also shown that students take mathematics as a difficult subject in some only particular cast and also I have used these reviews as evidence for my research.

Research gap. In the above empirical literature review, some research shows that "students' difficulty in learning set", "students' difficulty in learning algebra", "students' difficulty in learning trigonometry", and so on. So, if we remove the difficult contents (trigonometry or set or probability, etc.) from our mathematical curriculum then do students take mathematics as a beautiful and easy subject? As shown in other researches, students take only mathematics content as a difficulty? Or, whether students take the whole mathematics subject as a difficulty? Thus, the research gap between other research and my research was mathematical contents (set or trigonometry or probability, etc.) are not the only one factors for mathematics difficulties, there are various other factors which have been affecting the students' learning mathematics. Those other factors have been discovered and explored from this research.

In addition, many other types of research were done only related to school-level mathematics but my research was moved forward by relating to undergraduate-level mathematics. Thus, another research gap between other research and my research was mathematics is difficult at undergraduate level rather than school level.

Theoretical Framework

The researcher chooses some suitable theories related to his research to explain his research work and draws concrete conclusions by interpreting the data collected based on those theories this is called the theoretical framework (Niure, 2018). There are various learning theories related to children's learning and development, some of them are classical conditioning, operant conditioning, trial and error, social learning, constructivism, cognitive learning, socio-cultural, multiple intelligence, and so on. These various theories are also related to learning mathematics. I had chosen constructivism learning theory as the theory that directs my research. Thus, I have drawn concrete conclusions by interpreting and analyzing the collected data related to this theory.

Constructivism theories in learning mathematics. The constructivism theory has been in Vygotsky's since the 1960s. Various philosophers including Kant and Dewey appear to be in favor of constructivism, while the contributions of psychologists Piaget and Vygotsky are considered specific. The main aspect of this theory is that the learners build new knowledge using the pre-existing knowledge and mathematics knowledge can be a creation by social interaction (Pandit & Bhattarai, 2011). Generally, in constructivist theory, students need to construct the knowledge from their understanding and practice. The new knowledge that learners build by interacting information with their previous experience is called constructivist learning theory (Acharya, 2017). According to this theory, students are free to solve their problems in their way. Students can build real knowledge by interacting with other people or the environment. Knowledge is not a fixed object; it is constructed by own experience. Therefore, learning based on social interaction, emphasis on double interaction, learner-centered method, collaborative teaching-learning, scaffolding, contextualize learning, Zone of Proximal Development (ZPD), and so on are specific aspects of constructivist learning theory (Sharma & Sharma, 2010, p.298). I concluded that social interaction, discussion, debate, and collaborative learning among students are essential for learning mathematics. Also, the mathematics teacher should be taught the mathematical contents according to the individual ability of the student, using the learner-centered method, interacting with each other, and motivate the students to solve their problems.

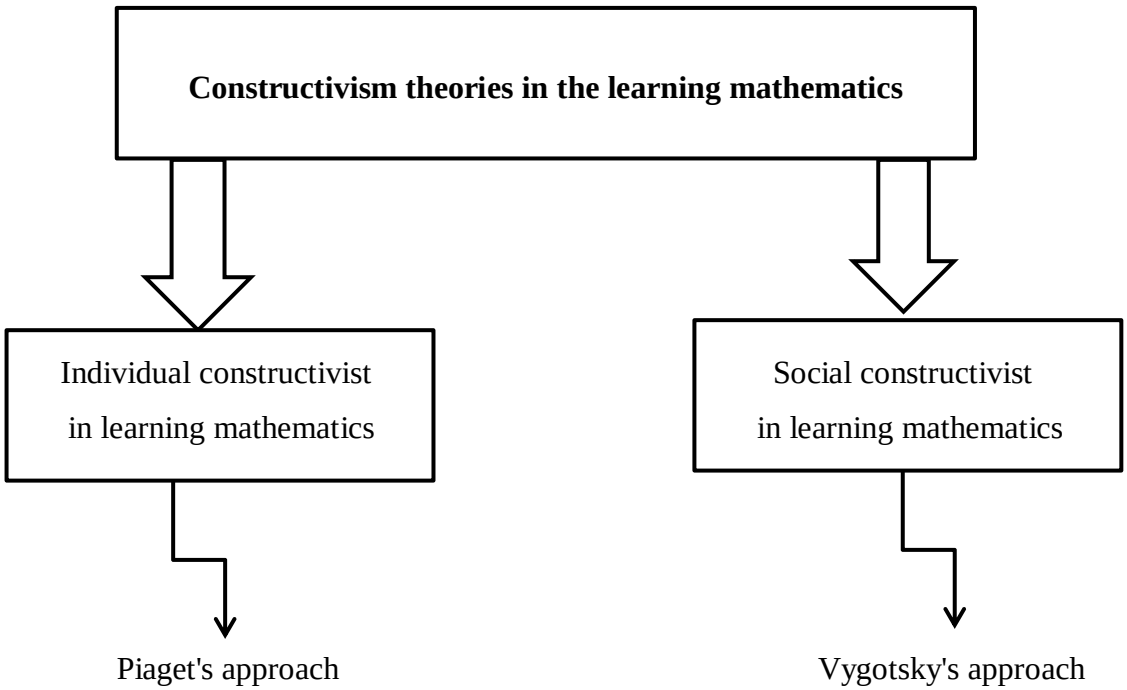
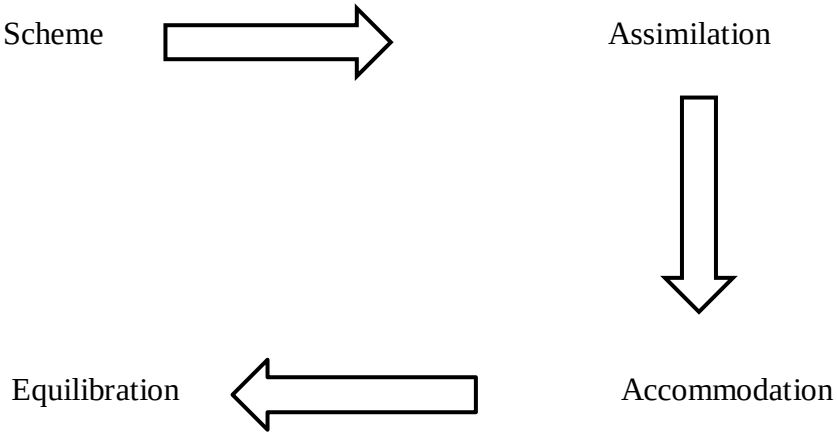


Figure: 2.1. Constructivism learning theories

Piaget's constructivist learning theory. Piaget's theory of constructivism argues that the learner learns mathematical knowledge by modifying and changing the previous knowledge. The learner accepts the knowledge obtained from the environment as selecting, analyzing, and modifying it (Bhattarai, 2017). According to Piaget, seeing and hearing is not the construction of knowledge, understanding is the construction of knowledge. Similarly, according to Piaget, there are four stages of learning in the development process, they are sensory-motor stage, pre-operational stage, concrete operational stage, and formal operational stage. According to Sharma and Sharma (2010, p.298)

> *"The first stage is from birth to 2 years, its stage the children develop the sensorimotor skill, the second stage is from 2 years to 7 years, in this time the children begin to gain experiences in words and give symbolic meaning to the object. The third stage is from 7 to 11 years, in this time children can think logically and rationally, start thinking based on solid objects, and begin to understand mathematical concepts in general. The fourth stage is after the age of 11. In this stage, children can think, reason, and even analyze, as well as learners develop the ability to formulate hypotheses, test them, and draw conclusions."*

According to Piaget, how students develop the mind or create knowledge about anything depend on the four key components. Process of constructivism new knowledge has shown as below



In the above Piaget's knowledge construction process, before the start, the working student makes an image or plan in mind about the work it is called a scheme. The scheme is a mental figure to do new work as well as it is related to personal ideas for enters the new situation. In the real situation, the scheme matches with the problem then it is called assimilation but if the scheme does not match the new situation then people correction the scheme according to the new situation this process is called accommodation. And also, equilibration involves the assimilation of information to fit with an individual's own existing mental schemes and the accommodation of information by adapting it to their way of thinking. Equilibration is the balance of work between assimilation and accommodation.

So, In Piaget's constructivist learning theory I concluded that learners learn the new contents according to the process of scheme, assimilation, accommodation, and equilibration. If the student does not have any scheme then he/she can't understand the problem as well as the future solving process. In point, new knowledge can be built from pre-existing knowledge, own experience, learning requires an emphasis on mental processes and thinking. In addition, the learner must be active in learning, and also the learner can build mathematics knowledge by discovering and exploring.

Vygotsky's constructivist learning theory. According to this theory, mathematics knowledge can be a creation by social interaction (Acharya, 2017). A fundamental aspect of Vygotsky's theory is the Zone of Proximal Development (ZPD). Another part of this theory is scaffolding, which is giving the learner the right amount of assistance at the right time. This theory shows that students learn from each

other and co-construct knowledge. According to Vygotsky, social constructivism is focused much on cooperative group learning and it emphasizes our cultural context. According to this theory, mathematical knowledge can be built from our context and our society. Social interactions are more effective in building knowledge than in thought processes and cognitive structures (Bhattarai, 2017).

So, in Vygotsky's constructivist learning theory I concluded that this theory can be applied in our mathematics classroom in several ways. Mathematics can be taught by dividing the students into small groups with having discussions and interactions with each other. For example, if a student cannot solve the problem of mensuration then give an opportunity for another student to explain this concept who knows about it. And also, effective mathematics teaching/learning depends on the learner's pre-existing knowledge, co-operative with each other, learner's previous experience, students' abilities, and interaction between student-student and student-teacher.

Finally, in this theoretical framework lesson, I concluded that how does a child construct her mathematics knowledge using constructivist theories? In this question, mathematical knowledge is not imitation, for that you must be active and you should build the knowledge for yourself. When we solve the mathematical problems, first of all, we need to understand that problem then modified and finally grasped this problem. In addition, learners can build mathematical knowledge by participating in a variety of social activities, interacting with others, and debating with others. In point, mathematical knowledge can be a creation by social interaction, co-operative, and discussion with each other students. Thus, the learners can build mathematical knowledge from their cultural context and own understanding. And also, in this study the implication of this constructivism learning theories, the collected data has been explained related to how the mathematical contents can be taught effectively by connecting to our culture, our social activities, and our daily life problems.

Conceptual Framework

The conceptual framework is the pictorial description that is based on theoretical concepts and shows the interrelationships between the concepts and the variables related to the research (Khanal, 2019). My research was based on the following conceptual framework;

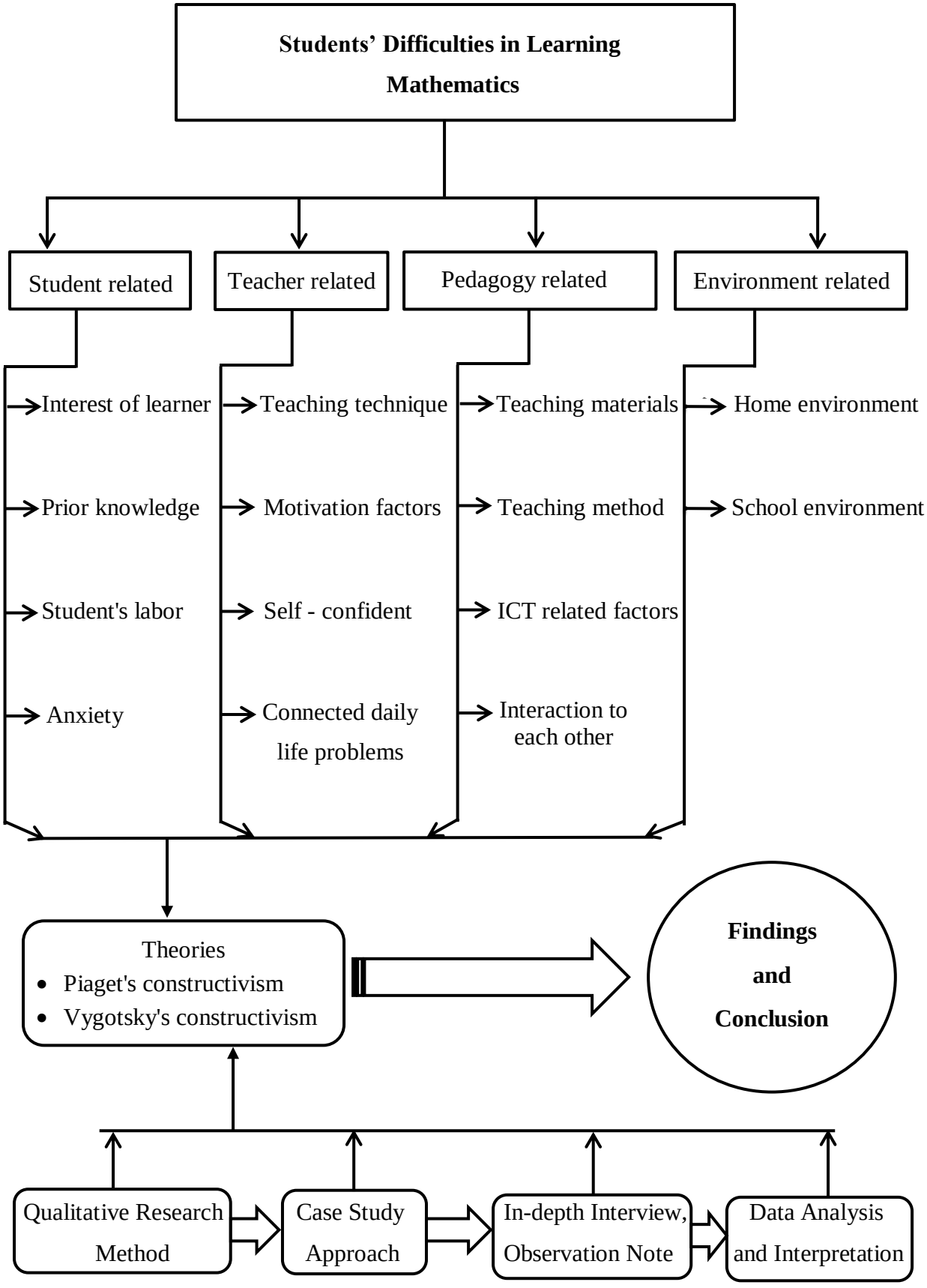


Figure: 2.2. Conceptual Framework

In my experience, there are many sorts of factors that affect learning mathematics. In the above conceptual framework, factors of difficulty in learning mathematics for the students are divided into four categorize as students related factors, teacher-related factors, pedagogy-related factors, and also environment-related factors. And again, based on the study of related literature review, these 4 categorize are divided into different factors like the interest of learner, teaching technique, teaching material, home environment, and so on.

Student-related and environment-related factors were collected from students and parents by using in-depth interviews. Similarly, teacher-related and instructional pedagogy-related factors were collected by using interview schedules with the mathematics teachers and also the observation in the mathematics classroom. Constructivism learning theory (1960) is used for analysis and interpretation of the data. Student-related and environment-related factors are connected with Piaget's constructivist learning theory. And also, teacher and pedagogy-related factors are interlinked to Vygotsky's constructivist learning theory. Thus, using this constructivism learning theory, the collected data has been explained related to how the mathematical contents can be taught effectively by connecting to our culture, our social activities, and our daily life problems.

Chapter III

Methods and Procedures

This chapter begins with its design of the study, area of study, selection of respondents, data collection tools and techniques, data collection procedure and data analysis procedure, quality standard, and ethical consideration.

Design of the Study

The qualitative research design/method helps to discover the individual views for data collection such as group discussions, individual interviews, and participation of others (Carol, 2016). It is difficult for measuring and calculates the numerical value of students' difficulties in learning mathematics from the quantitative method; therefore, I used the qualitative research method. Qualitative research can be regarded as 'naturalistic inquiry' in the sense that it is conducted in the natural setting by trying to avoid any intentional manipulation and distortion of the environment of the informants by the researcher (Creswell, 2007).

Case study approach. According to Jack & Hersh (2008) case study research approach is a research methodology that helps in exploration of a phenomenon within some particular context through various data sources, and it undertakes the exploration through variety of lenses in order to reveal multiple facets of the phenomenon. In case study, a real-time phenomenon is explored within its naturally occurring context, with the consideration that context will create a difference (Peter & Kaarbo, 1999). The major concern of my study was to find out the perception of students about which factors are affected in their learning mathematics. So, for achieving this major concern the case study approach was adopted under the qualitative research method because according to Creswell (2007) in the case study approach, the data is collected through direct observation in a natural setting and the actual incident on the spot. Here, the case is the process of selecting a limited number of students & doing research on those students and then collecting data from them. And also, the objectives of this study were to explore the causes of difficulties faced by the students in learning mathematics and to explore the ways to improve the interest of students in learning mathematics. I thought that only the case study approach could fulfill these objectives, so I applied this approach in this study.

Area of the Study

The research area selection was also a very important task for the study in order to obtain easy access, establishing immediate rapport with informants and gathering data directly related to the research objectives. The area of this study was based on undergraduate level students under the two colleges from Kathmandu and Bhaktapur district. I had chosen Mahendra Ratna Campus, Tahachal and Sanothimi Campus, Bhaktapur. I had a convincing reason for selecting the colleges that it was located in urban area where all the services are available for the students. In rural colleges, there may be a shortage of qualified teachers, students may not have access to the necessary learning materials, but in urban areas, students have access to all services. Even though all the services are available in an urban area but why urban area students feel mathematics is a difficult subject. By relating to that side, I had chosen the colleges of Kathmandu Valley under the urban area.

Selection of Respondents

In qualitative research, the sample size of this inquiry depends upon the researcher what s/he wants to know, what the purpose of inquiry was, what can be credibility of the study and what can be done with available time and resources (Shrestha, 2016). For participants, Mahendra Ratna Campus, Tahachal and Sanothimi Campus, Bhaktapur were selected using the purposive sampling technique (based on my convenience). According to the purpose of my study, I used purposive sampling to select the colleges. Thus, the six students were selected as samples for the case study. And also, one mathematics teacher, three mathematics students, and their parents from each of the sample colleges were selected as respondents for data collection. Base on the college's annual result with high, medium, and low score abilities students were selected according to their knowledge level. Thus, I had used the purposive sampling technique for the selection of participants.

Tools of Data Collection

Creswell (2007) visualize data collection as a series of interrelated activities aimed at gathering good information to answer emerging research questions. The research tool is the most important part of data collection in the study. On the basis of the data, we can study and analyze every aspect of the study. Research tools are the basic instruments to gather data, to seek possible solutions for observed problems

(Shrestha, 2016). To fulfill the purpose of the study different tools were selected for data collection. Thus, the in-depth interview, observation notes, and document analysis were used as tools for the data collection.

In-depth interview. According to Kerlinger (1986; as cited in Shrestha, 2016) describes interview as face to face interpersonal role situation in which one person, the interviewer, asks a person being interview, the respondent and questions designed to obtain answers pertinent to the purpose of the research problem. In-depth interview also known as unstructured interview could be regarded as informal interview. It was used to discover the in-depth understanding of people in the context under the study (Bailey, 1982; as cited in Adhikari, 2006).

I had developed the different interview schedule forms for students, parents, and mathematics teachers. The in-depth interview was conducted with the mathematics teacher, students, and their parents using open-ended or semi-structured questions. After observed the mathematics classroom, I had taken an interview with the mathematics teacher and students then I asked some questions to the mathematics teacher and students related to difficulties in mathematics. The in-depth interview helped me for face-to-face communication with the students and also to get information about the personal gestures, habits, attitudes of the students towards mathematics. It also helped me to understand the personal thoughts, ideas, and experiences of the students. I used this tool as required to the key students and their mathematics teacher. On the basis of objectives, I developed the interview theme in semi-structured form which have kept on appendix (See Appendix; II, III & IV).

Observation note. Observation is a kind of tools that helps to seek knowledge through the use with sense i.e. eyes, nose, tongue, and skin. It has great importance not only in research work but also in our daily lives (Adhikari, 2006). Observing in a setting is a special skill that requires addressing issues such as the potential deception of the people being interviewed, impression management, and the potential marginality of the researcher in a strange setting (Hammersley and Atkinson, 1995; as cited in Creswell, 2007).

Observation note was used to identify the student's activities, teacher's activities, the interaction between students-students and students-teachers, classroom management and physical environment of the classroom while teaching/learning

mathematics. The already established semi-structured observation forms were used to fulfill the intended objective of the study. The different outlook of the student's behavior in the classroom and the activity of mathematics classes were carefully observed in the school. I observed three times mathematics teaching/learning classrooms of each sample college. And also, I had observed the family background of the students like their daily life, their home environment, their parent's professional and economical condition. Observation helped me in collecting detail information about respondents, their everyday practices and capture actual experiences of the participants. The observation guidelines have kept on appendix (See Appendix; I).

Document review. The review of documents is an approach, which researchers use to gain a detailed understanding of the setting analyzing the content of a given document (Bajaracharya, 2009 cited in Shrestha, 2016). In this study, I reviewed some documents which are closely related to students such as students' previous result sheet, students' marks sheet, files of schools, etc. And also, I reviewed various journals and articles which helped me identify the guideline for observation and components for an interview as well as arriving at the research objectives.

Data Collection Procedure

Data collection refers to gathering information from vivid sources through the application of multiple data gathering methods to attain the objectives of the research under consideration (Niure, 2014). For this study, the data and information were collected using tools as observation, in-depth interview and documents analysis and so on in order to collect information the respondents. With the help of semi-structured interview schedule and questionnaire, the in-depth interview was taken with key students and mathematics teachers. The interaction with the respondents was carefully listened and listed properly.

First of all, I had gone to college and I met HOD of mathematics education. I told all about my study, and I gave my research proposal. He informed for all teachers about my study. After that, the HOD agreed to give permission for me. I got permission to observe B.Ed. second and third-year class. After continue three days class observation, I had chosen six mathematics students from two different college for case study. Then, I organized the interview schedule in a related person. A few days after, the interview schedules were prepared with related students, teachers,

parents, and experts then the data was collected according to the interview schedule time. I had collected the data by a separately in-depth interview with the concerned related person and students. And also, I had observed three times mathematics classroom only to take the permission with head-teacher or mathematics teacher of related colleges.

Primary sources and secondary sources were used for the data collection process. The primary information was collected from mathematics teacher, mathematics students, their parents, and as well as from educated people of the society. And secondary information was collected from books, articles, reports, newspapers, and so on. After collecting the data, the collected data is interpreted and analyzed then the finding and conclusion have been drawn. Related documents also reviewed and analyzed on the basis of need.

Data Analysis Procedure

Data analysis in qualitative research consists of preparing and organizing the data for analysis, then reducing the data into themes through a process of coding and condensing the codes and finally representing the data in figures, tables or a discussion (Creswell, 2007). Cross match or triangulation was adopted to maintain the quality stand of the results of the study. Mainly the three sources of the information were triangulated in classroom observation, teaching learning styles of mathematics, and interview with mathematics teachers, mathematics students and their parent in addition with field notes. This study was limited to a qualitative research approach therefore the major part of data analysis is based on descriptive analysis. According to Niure (2018, p.146) *"After collecting the data, the collected data can be analyzed based on Organizing the data, Editing the data, Coding and Decoding the data, Building theme, Reporting and Finding procedure"*.

Similarly, I have followed the above procedure. First of all, I have organized and edited the collected information from interviews and classroom observation then I have generated the difference code according to the responses of participants. I have adjusted those codes according to their similarities and also, I have given the title for them which is known as a theme. At last, I have analyzed and interpreted those themes by using the constructivism theory and conceptual framework which I have developed in the literature review.

Quality Standard

After completing the construction of the research tools, it is necessary to maintain quality standards. For quality standards, I used cross-match, triangulation, member checking, prolong stayed in the field. For quality standard, I followed the following ways;

Credibility. Credibility is the key criteria of the quality standard in qualitative research. To maintain credibility of my research I have spent more time for interview, one weeks for classroom observation. I also gave special focus on document analysis. And also, to maintain the credibility of my research I tried to spend as much time as the observation needed and engaged with different people with their work.

Transferability. Transferability is in preference to external validity in the positivist approach. Guba and Lincoln (1985) "Transferability showing that the finding have applicability in other contexts." To maintain transferability, I took photos of classroom teaching and voice recorded while taking interview from participants. And also, to maintain transferability, I had tried to capture most of the scenario by using the thick description of observation, interview, and my meaning-making.

Dependability. Dependability is in preference to reliability. It shows that findings are consistent and could be repeated. This is the third standard for judging qualitative standards and refers to the stability or consistency of the inquiry processes used over time. For this I took rational idea to select the people. Also, I tried to ensure credibility and transferability to maintain dependability. To maintain it I had presented the logic used for selecting people and events to observe, interview and include in the study.

Conformability. Another quality standard for qualitative research is conformability, which refers to the quality of the results produced by an inquiry in terms of how well they are supported by informants who are involved in the study and by events that are independent of the inquiry (Khanal, 2019). So, to maintain conformability before concluding information I reviewed that information myself several times and sometimes I conform that information to my other students/friends before concluding information as well.

Ethical Considerations

If any kind of research involves the person, special attention should be paid to the person's rights, dignity, freedom, and privacy (Khanal, 2019). The ethical considerations of my study were I had observed the classroom only to take the permission with the subject teacher of related colleges, interviews were conducted only after giving all the prior information to the participants about the study and getting their approval, data has not been collected for my personal gain and my personal benefit, respecting the diversity in colleges the data was collected in a biased manner, comfortable language was used in the data collection process for easily understandable to the participants, and at last name & address of participants have been published in the statistics only with theirs approval.

Chapter IV

Analysis and Interpretation

This chapter deals with the analysis and interpretation of the collected information using the descriptive method. This was a case study approach under the qualitative method; therefore, I had selected six mathematics students for the case study from two different colleges. For the collection of information, I had used an in-depth interview, classroom observation, and document analysis as tools of data collection. The in-depth interview was taken for related mathematics teachers, students, and their parents by using an open-ended or semi-structured questionnaire. The main research questions of this study were what are the difficulties faced by the students in learning undergraduate level mathematics? Why did students feel difficulty in learning mathematics at this level? And how to improve the interest of students in learning mathematics? Also, I had observed the mathematics classroom three times in each sample college. In classroom observation, each activity and behavior of the students and teachers were carefully observed and noted. Also, the responses of the respondents were carefully noted during a face-to-face interview with related persons. There was no limitation to their responses for respondents and they were able to freely express whatever they have in their mind. I had minutely studied about student's mathematics annual result and their attendance from colleges document. The open-ended or semi-structured questionnaires of the interview schedule with mathematics teachers, students, their parents and model questions set are presented in Appendix-II, Appendix- III, Appendix- IV, and Appendix-V respectively.

The descriptive method is mainly used in this research for analysis and interpretation of the collected data. For analysis of the data, first of all, the collected information is categorized into different themes in the text of the interview and observation notes. Thus, the collected data is analyzed and interpreted under the following headlines or sections;

- Introduction of sample colleges
- Introduction of case students
- Classroom observation episode

- Causes of students' difficulties in learning mathematics
    a. Students related factors
    b. Teacher related factors
    c. Pedagogy related factors
    d. Environment-related factors
- Way to improve the interest of students in learning mathematics

Introduction of Sample Colleges

One of the colleges I have chosen for my studies was Mahendra Ratna Campus Tahachal. This college is located in the Tahachal area of the Kathmandu district. According to the Mahendra Ratna Campus;

> *"MRC was a pioneer teacher education campus under Tribhuvan University (TU) established originally as a College of Education in 1956 to continue the teacher training programs of Nepal government that were initiated in 2008 in the name of Normal Educational Training. As a pioneer institute for teacher education in Nepal, MRC has been dedicated to teaching, training, and mentoring the students of education right from its establishment. It is in affiliation with Tribhuvan University (TU) and it is running Bachelor and Master level degree in the teacher training program. It has been an extended family of almost 5,000 students, their guardians, more than 200 teachers (Prof., Associate Prof., Lecturers, Contract and part-time teachers), more than 50 office bearers, and many more advisors and well-wishers. MRC has recently extended its educational programs in the subjects like B. Ed. in ICTE (in semester system), M. Ed. in all subjects (semester system), including M. Ed. in Health Education and Economics Education, and so on".*

According to the mathematics teacher of this college, all types of students from the low ability to high ability students are found to be studying mathematics subject in the classroom and also teaching is being done by using lecture method, discussion method and problem-solving method depending on the nature of the content. Different cast and different family backgrounds of students were studying in this college. According to document analysis of MRC (secondary data), three year's achievement level of the students studying B.Ed. second year is presented below;

Table: 4.1. *B. Ed second year result from last three years (secondary sources)*

Years	Pass	Fail	Total number of students
2074	31	12	43
2075	22	10	32
2076	14	7	21

Table 4.1 refers to the result of the annual examinations of the students who studied mathematics in B. Ed second year at Mahendra Ratna Campus Tahachal, and also it can be seen that the achievement level of the students in studying mathematics is good but not excellent. Looking at the college's annual result, it can be claimed that most of the students were failed in the real analysis subject. During the interview time, I had asked the question to subject teacher "W*hy many students are failed in your real analysis subject?"* In this question, the teacher replied that;

> *"Nature of real analysis subject is more abstract than other subjects, it may be necessary to rote some things in this subject but students do not give enough time to learn this subject at home and many students fails in this subject because they study only during the examination time as in other subjects."*
>
> (Interview; 15th February 2021)

Finally, in MRC, it can be seen that all the teachers were to be qualified, efficient, and trained in this college who teaching mathematics. But during the classroom observation time, I noticed that all the students were taught on the basis of equality rather than on the basis of equity. And also, mathematics was not taught according to the condition and ability of the students in the classroom which is covered later in episode 1.

Another college I have chosen for my research was Sanothimi Multiple Campus Bhaktapur. It is located at the heart of Madhyapur Thimi Municipality under the Bhaktapur district. According to this campus;

> *"Sanothimi Multiple Campus was established to produce vocational technicians and teachers with the name of National Vocational Training*

Center (NVTC) in 2024 B.S. This campus was affiliated to Tribhuvan University in the name of Sanothimi Campus after the implementation National Educational System Plan (NESP- 2028). It began to produce trained teachers for vocational education according to the newly introduced curriculum (2028) at the school level. Now the subjects of specialization at the bachelor level are English, mathematics, science, population, health & physical education, Nepali, home science, political science, economic geography, etc. Similarly, in master level ICT Ed., EPM, Curriculum, Health, and Mathematics education has been offered. It is a matter of pride that SMC has started ICT Ed at the Bachelor level from 2065 onward. Since 2070, Sanothimi Multiple Campus has begun M.Ed. in Open and Distance Learning (ODL). The campus owns a well-equipped computer lab with 75 computers along with 2 Mbps internet bandwidth facilities".

According to the students of this college, due to the high content of the course and lack of time to do other extracurricular activities, the teachers mostly used the problem-solving method in the classroom. Different family backgrounds of students were studying in this college. According to document analysis of SMC, three year's achievement level of the students studying in B. Ed third year is presented below;

Table: 4.2. *B. Ed third year result from last three years (secondary sources)*

Years	Pass	Fail	Total number of students
2074	23	11	34
2075	14	9	23
2076	10	6	16

Table 4.2 refers to the results of the annual examinations of the students who studied mathematics in B. Ed's third year at Sanothimi Campus and also it can be seen that the achievement level of the students in studying mathematics is medium. During the classroom observation time, I saw most of the students seemed passive but only some top 10 students seemed to be active. The students said that the teacher should

not motivate us to learn mathematics. Finally, in SMC, it can be seen that all the teachers were to be qualified and trained in this college who teaching mathematics. But during the classroom observation time, I noticed that there was a lack of peer interaction between student-student and student-teacher. The teachers mostly used only the problem-solving method and lecture method in the classroom. But only this method was not sufficient for effecting teaching content. And also, the teacher would not use any ICT-related software (GeoGebra, Mathematica, Maple, etc.) to motivate the students in the classroom rather than solve the problem of questions. It could be seen that, which had a direct impact on student's mathematics learning. Classroom observation activities of this college is covered later in episode 2.

Introduction of Case Students

This study was only related to students studying mathematics in B.Ed. at MRC and SMC. And also, the respondents of the study were six mathematics students as a case study. Here, the address and other information of respondents have been published only with their approval.

Respondent A. The name of respondent A was Mahesh Sharma (Pseudo name). He was a student studying at Mahendra Ratna College. He was 21 years old boy studying in B. Ed's second year. According to Mahesh, his permanent residence was Gulmi district and he has come to Kathmandu as there were no good colleges for B. Ed in his district. Now, he was living in a rented room with his friend in the Tahachal area. He had a father, mother, one sister, and one brother in his family. His sister was married and his brother was in 10^{th} grade. His father was an employer of a private company and his mother was a housewife. Judging by the results of his annual examinations, his achievement level in the field of education was very good. According to his, he had 1^{st} position in the previous class on the final examination of class XII. He had good support from his family for his studies. The goal of his life was to become a good teacher at the secondary level by getting a degree in mathematics.

During classroom observation time, I saw that he was always sitting at the first desk and he would actively watch and listen to what the teacher teaching in the classroom. He preferred to read alone rather than discuss with his friends. He always participates in extracurricular activities held by the school. He was actively involved

in political activities at school and was seen to be interested in politics. Sometimes he did cross-question to the mathematics teacher. He has good relations with his friends. According to his subject teacher, he is a very knowledgeable student but he seems a bit weak in terms of derivative and integration rather than other content. In an interview with the student, I had asked the question *"Why do you feel difficulty in learning derivative and integration?"* In this question, he replied that;

> *"I studied in class 12 on a rural area school where a math teacher never taught us the derivative & integration content based on our ability and skill. The teacher always taught the subject only during the examination time. The teacher has never taught this topic well, therefore I am not interested in this topic and I feel uncomfortable in myself."*

(Interview; 15th February 2021)

From the above response of student, it can be concluded that he was filling some mathematical contents that are really more complex, which may be due to his prior knowledge on this topic. And he had no interest or enthusiasm in learning that topic and he himself initially took that topic as a more difficult topic. Therefore, from the above evidence, it can be claimed that the lack of interest of learner, lack of self-motivated, lack of previous knowledge in mathematics contents are some causes of students feel that mathematics is a difficult subject.

Respondent B. The name of respondent B was Pashupati Banjade (Pseudo name). He was a student studying in B. Ed's second year at Mahendra Ratna College. He was 22 years old boy. He came from Surkhet with his brother and sister. He stayed in a rented room at Kalimati Kathmandu. According to him, there are seven family members in his house. His parents were not employed and a few years ago his father went abroad to earn money. His father and mother were farmer and mother also worked in housewife. He has not enough time to read in the room, he reads only two hours in the room, and other times he has been teaching in a private boarding school. Due to the poor financial condition of his family, he has continued his studies by working in a private school. He was good relation with his teacher and his friends. His parents always support him in learning. His family's economic condition was not good because his father and mother were a farmer.

In the observation period, I saw that he was active and energetic in the classroom. He does cross-question in the classroom and he always wants to do a problem on the whiteboard. He wants to be extra than other students in the classroom. He likes the cooperative teaching method in the classroom because he wants to learn mathematical problems connected with our daily life. He always participates in extracurricular activities held by school but his family background was not good. He takes a mathematics subject as hard for him because he can't give enough time in the room to learn mathematics. During the interview time, I had asked the question "*How to affect the home environment in your mathematics learning?"* In this matter, he replied that;

> *"My family's economic condition is not good. My result of mathematics is medium because of my parents' economic situation I cannot get a chance to read tuition. I have not enough materials related to mathematics to do practice in the room. Therefore, I feel it is a bit difficult subject for me."*
>
> (Interview; 25th February 2021)

According to his subject teacher about the student;

> *"Due to his family situation, he is not able to devote enough time to learn mathematics at room and college, so he is a bit weak in mathematics."*
>
> (Interview; 25th February 2021)

From the above responses of teacher and student, it can be concluded that the lack of tuition opportunity, lack of home environment, lack of poor economic status of parents, lack of socio-cultural background, and also not being able to spend enough time for learning mathematics at home can be the factors that affect student's mathematics learning. Therefore, from the above evidence, it can be claimed that the environmental-related factors are also affected student's mathematics learning.

Respondent C. In my study, respondent C was a twenty-one year's girl and her name was Asmita Magar (Pseudo name). She was B. Ed second-year student at Mahendra Ratna Campus. She entered this college from two years. She came from Butwal with her family. She lives in Dallu Kathmandu with her parents in a rented room. Her father worked in a photo studio in Kalimati and her mother worked in a private office as a helper. Her family's socioeconomic status is not good. She was

enough time at home but she gave few times for mathematics learning because she had no interest in learning mathematics. According to her, she felt difficult in mathematics formula must be remembered, without remembering the formula we cannot solve the mathematical problem.

During classroom observation time, I saw that she was always sitting on the last bench and talking with each other. She did not any questions to the mathematics teacher during mathematics classroom and she seemed always passive in the classroom. She told me, sometimes boys dominate girls in the classroom and they did not want to give more chances for girls in the classroom. In the mathematics classroom, she had not activated while the teacher was doing problems on the whiteboard. After finished the class, I had asked her, *"Why didn't you listen carefully while the teacher was teaching in the mathematics classroom? Do you have any problem in learning mathematics?"* In this question she replied;

> *"I have no interest in the mathematics class because sir never gives chance for me, I am weak in mathematics, I don't understand anything. Sir always gives chance for first and second students. I am also weak in English, our mathematics teacher preferred English medium book, so I felt difficult in all parts of mathematics".*

(Interview; 1st March 2021)

Also, I had asked the question to her brother, *"How is your opinion about your sister's mathematics learning?"* Her brother replied that;

> *"My sister-in-law studied from government school so her English base is a bit weak. However, I had forced her to study mathematics without her interest in her bright future, but now she doesn't seem to have much interest in studying mathematics at home. And sometimes she says to me, the teacher doesn't give me the opportunity to learn mathematics at college".*

(Interview; 1st March 2021)

From the above responses of student and her parents, it can be concluded that there is discrimination in the mathematics classroom. Teachers were ignoring weak students in the classroom and they were giving more chances to talented students rather than weak students. Therefore from the above evidence, it can be claimed that

the lack of motivational factor, lack of teaching technique, lack of teaching materials, lack of teaching strategy, lack of teaching process through interaction with each other, don't give the opportunities for low ability students, don't teach based on the equity in the classroom are some causes of difficulties faced by the students in learning mathematics.

Respondent D. In my study, respondent D was Deepak Thapa (Pseudo name) which was studying in Sanothimi Campus Bhaktapur. He was a student studying in B. Ed's third year. According to his previous result, he was a class first student in Sanothimi Campus. He came from Nuwakot district with his family and he stayed in the rented room in Sanothimi, Bhaktapur. His father was a personal fancy shop and his mother was a housewife and also supports his father in the shop. He was a very good student in the field of education. The economic condition of his family was normal. His father and mother were educated, so he could get support from his parents for his learning at home. The goal of his life was to become an officer of the Government of Nepal.

In classroom observation time, I saw that he was sitting at the first desk and he would actively watch and listen in the classroom. He was also actively involved in political activities at school and also was seen to be interested in politics. Sometimes he did cross-question to the mathematics teacher. He has good relations with his friends. He preferred to read discuss with his friends. According to his friends, he is a very talented student in all sectors. During the interview time with the student, I had asked the question *"How is your view on learning mathematics subject?"* In this question, Deepak replied that;

> *"The content of upper-level mathematics is more complex than that of secondary-level mathematics. And the theory we have studied in subjects like analysis, algebra doesn't apply anywhere in our life. Therefore, it is necessary to make graduate/undergraduate level mathematics subject applicable and practical like secondary level mathematics".*
>
> (Interview; 10th March 2021)

From the above response of student, it can be concluded that to make mathematics learning effective, it is necessary to teach the mathematical problems linkage with our daily life, and also teachers are needed to use appropriate teaching

methods and materials for effective mathematics teaching/learning in the classroom. It is also necessary to motivate and awareness for the student from their family member and school. And also, it is necessary for to teachers follow the teaching-learning activates that should be conduction as an effective technique for average and poor ability students. Therefore, from the above evidence, it can be claimed that, lack of teaching materials in the classroom, teachers should teach by traditional methods, do not linkage mathematical problems with our daily life, do not use appropriate teaching technique in the classroom are some causes of students feel that mathematics is a difficult subject rather than another subject.

Respondent E. The name of respondent E was Madhav Chhetri (Pseudo name). He was twenty-two years boy. He was B. Ed second-year student at Sanothimi Campus. He came from Kapilvastu with his brother. He lives in Sanothimi, Bhaktapur with his brother in a rented room. His father went abroad to earn money and his mother was a farmer and worked as a housewife. His father and mother were uneducated. His family's socioeconomic status is not good. According to him, he was interested in a subject like Nepali but not English and Mathematics. According to his friends, he has enough time for other activities like gaming Pubg, Freefire but he gives few times for mathematics learning in the room because he had no interest in learning mathematics.

During classroom observation time, I saw that he was always sitting on the last bench and making noise with his friends. He seemed always passive in the classroom. He did not have his own interest in learning mathematics. During interview time, I had asked the question, "*How is your view/perception on learning mathematics subject?"* In this question he told me;

> *"I'm not interested in studying math. I am studying only under pressure from my family. My interest is in other fields than studies. Mathematics is only for the most talented students. It is not suitable for students with a weak base like us".*

(Interview; 15th March 2021)

Also, I had asked the question to his brother, *"According to the previous class result your brother is in 12th position in the classroom. What is your opinion about your brother's mathematics learning?"* In this question, his brother replied;

"He has no interest in studying any other subjects, not just mathematics. He spends more time hanging out and having fun with his friends than he does in his studies. Now that he is mature, it may not be appropriate to remind him many times. But looking at his activities, it can be seen that he is not interested in learning any subjects".

(Interview; 15th March 2021)

From the above responses of student and his parent, it can be concluded that he was feeling mathematics as a complex subject and he had no interest in learning mathematics that may be because of self-motivation in learning. He spent more time on extra activates, enjoy with his friend like as gaming, visiting, and enjoying but he was not serious about his mathematics learning. Therefore, from the above evidence, it can be claimed that the lack of interest of learner, lack of self-motivated, lack of anxiety in mathematics subject are some causes of student's difficulties in learning mathematics.

Respondent F. The name of respondent F was Bhagwata Bhusal (Pseudo name). She was a student studying in B. Ed's third year at Sanothimi Campus. She was 22 years old girl. Her permanent house was Dhading district and now she was living with her family in a rent room. Her house was 0.5 km far from the college. All members of her house followed the Hindu religion and spoke the Nepali language. According to her, there were six members in her family. Her main aim in life was to be a good singer. According to Bhagwata, her interesting subjects were English, Nepali, Mathematics, and another subject respectively. In extracurricular activities, she regularly participated in the singing program and almost won the prize. She did not want to miss the class but sometimes she missed the class because of her household works. According to her, she could not solve every time all the mathematical problems because no one guided her in a study at home.

During the observation period, I saw that she was a medium student for mathematics learning. She likes teaching methods by using discussion methods. She does participate in extracurricular activities held by the school. According to her, mathematics subject was not the favorite subject. She takes mathematics as hard for his because she can't give enough time for learning mathematics at home. During the

interview time, I had asked the question "*How to affect your home environment in your mathematics learning?"* In this matter, she replied that;

> *"The home environment has a direct impact on learning all other subjects not only on mathematics learning. Seeing other members of the household watching Television, using YouTube Facebook, I also like to have fun with them. If I stay in the room to study for some time, some other members of my family come to my room and talk to me, which have a direct effect on my learning"*
>
> (Interview; 10th March 2021)

Also, I had asked the question to his brother *"Why your sister's mathematics achievement is low?"* His brother replied;

> *"Her goal is to become a better singer, so she spends most of her time practicing singing. She is not interested in her studies. Her mathematics achievement level is not good because she spends less time in her studies."*
>
> (Interview; 15th March 2021)

From the above responses of student and her parents, it can be concluded that she seemed more interested in extracurricular activities such as singing, dancing, and poetry reading conducted by school rather than in learning mathematics. According to her past result, she was a middle student in mathematics learning. She used to spend only a few times for mathematics learning at home. So, it refers that, she did not seem to have much interest in learning mathematics that maybe because of her interest and her workload at home. Therefore, from the above evidence, it can be claimed that not being able to spend enough time learning mathematics at home and lack of interest of learners are some causes of students' difficulties in learning mathematics.

Classroom Observation Episode

I had observed three times mathematics classrooms in each sample colleges. Out of the three times, mathematics classroom observed, but here I have presented only the sample of one-time classroom observed of each sample colleges. In classroom observation, each activity and behavior of the students and teachers were carefully observed and noted.

Episode 1

Figure:4.1. Observing Classroom in MRC

On 15/02/2021, I observed the mathematics classroom of B. Ed's second year in Mahendra Ratna Campus Tahachal. First of all, the teacher went to the class and then I also entered the classroom. All the students stood up and said good morning sir. The teacher told them to sit down. There were 12 students out of 17 in the classroom. The physical environment of the classroom was good. Firstly, he reviewed the previous lesson of simplifies then wrote a problem from the textbook and solved the problem on the whiteboard by explaining step by step. After one demonstration, again the teacher had taken another problem from the textbook, and also, he had solved this problem using the problem-solving method. It seems that the teacher does not provide the opportunities for the students' problems and also teacher teaches the mathematical problem based on equality approach rather than equity approach. Overall, the teacher used the problem-solving method, and only sometimes he used the discussion method in the mathematics classroom.

The above classroom observation indicates that there is a lack of active participation of students in the mathematics classroom. From classroom observation episode, it can be concluded that most of the students were weak in mathematics, and also students had no interest in learning mathematics that may be because teachers do not give opportunities and do not motivate students in the mathematics classroom.

Thus, from the above observation it can be claimed that there was no active participation and discussion between students-students and student-teacher in the mathematics classroom which is a cause of students' difficulties in learning mathematics.

Episode 2

Figure:4.2. Observing Classroom in SMC

On 03/03/2021, I observed the mathematics classroom of B. Ed's third year in Sanothimi Multiple Campus. The teacher went to the class and then I also entered the classroom. There were 14 students out of 16 in the classroom. The classroom was not cleaned, there was dust on the last desks. Boys and girls students were sitting on the same benches. After entered the classroom, sometime later teacher wrote the topic on the whiteboard 'Polynomials Rings' from Modern Algebra subject and explains its basic ride and property with different figures. The teacher has discussed its property and some examples then he had allowed the students to discuss this topic for individual practice but only a few students were active in the discussion and other students were making noise. It was due to the teacher was not using any mathematical software for visualized this content and there was a lack of teaching materials in the classroom. Mostly, the teacher was using the lecture method in the classroom. But the teacher, classroom environment was controlled by his lecture method because his voice command was excellent and interesting.

The observation classroom of episode 2 refers that, the teachers have mostly used lecture method and problem-solving method in the mathematics classroom. And also, sometimes the teacher used a discussion method but it was not sufficient. Hence, the above-expressed realities and observation indicated that there were no sufficient chances to learn students themselves. The teacher has a belief that students can learn from forced exposition and adequate drill and practice. The most teacher was using the lecturer method for teaching mathematics. Teaching materials were not using, which helps students to understand the content knowledge. Therefore, from the above evidence, it can be claimed that the lack of teacher's teaching technique, lack of cooperating learning, and also lack of pedagogy in the classroom are some factors that influence the students' interest in learning mathematics.

From a theoretical view, Acharya (2015) argue that teaching-learning mathematics need to be linkage with the culture of students, associating it with the real-life situation, mitigating the existing dilemma of making culture unfriendly curriculum and promoting multiculturalism as well as culture friendly assessment is to be the other important aspects to make mathematics education culturally relevant. Excellence in mathematics education requires equity - high expectations and strong support for all students. All students regardless of their characteristics, backgrounds, or physical challenges must have opportunities to study and support to learn mathematics (Kant,2001, as cited in Acharya, 2015).

Causes of Students Difficulties in Learning Mathematics

First of all, I organized and edited the collected information from interviews and classroom observation then I generated the difference code related to reasons of difficulties faced by the students in learning mathematics according to the responses of the participants. I have adjusted that code based on their similarities and also, I have given the title for them which is known as a theme. At last, I have analyzed and interpreted those themes by using the constructivism theory**.**

Students-related factors. According to Acharya (2017), a student's related factor is one of the important aspects of high failure rate in mathematics plays a vital role in a teaching-learning process. Without students' interest in the teaching-learning actives, there is no possibility to achieve knowledge in the subject matter. Student's achievement depends on their need, interest, practices, and seriousness in the subject

matter (Shrestha, 2016). In this concern, to fulfill my research objectives I have conducted in-depth interview and class observation with two mathematics teacher, six mathematics students and their parents. From these tools, I found that teachers and students have different views on mathematics at the undergraduate level from the side of students' related factors. Some views of them are presented as follows which I have analyzed and interpreted according to the similarities of respondents on the following sub-heading.

Interest of learner. If the learner himself is not eager for learning then learning cannot be effective and fruitful even if it is taught using effective methods and materials. Learning cannot be achievable unless the learner is in a state of self-preparation for learning (Winne, 2015). Therefore, the learner must first prepare himself for learning. During the interview time, I had asked the question teacher *"How to affect the interest of learners in learning mathematics?"* In this question, teacher B replied that,

> *"If the students are interested in mathematics then he/she gives enough time to study mathematics and ultimately gets good achievement in this subject. But if the students regard mathematics as a hard subject then they don't take more time for this subject".*

(Interview; 3rd March 2021)

Also, I had asked the question with the students *"How is your view/perception in learning mathematics subject?"* In this question the respondents had a different view, which is presented as follows;

> *"Mathematics is interesting but I could not give time at home, so some contents of mathematics are difficult for me."* (Respondent C)

> *"It should be applied and practical base to mathematics learning through visualization rather than rote learning."*

(Respondent A)

> *"Mathematics is only for the most talented students. It is not suitable for weak base students; like us."* (Respondent E)

During classroom observation time, some students were sitting at the last desk in the classroom and making noise at each other. They did not seem eager to learn this

content which was taught by the teacher on the whiteboard. In mathematics classroom teaching, the teacher used only the problem-solving method and ended the class that day. Students were not active for learn this topic and also teacher do not motive the students. During the interview time, I had asked the question for the students *"How is your opinion on mathematics subject?"* In this question, most of the students were replied that *"some mathematical content is naturally abstract, for this we need to remember or rote this content but I can't rote and remember any content for a long time. Therefore, I am not interested in learning some abstract mathematical content"*. Therefore, from the above evidence, it can be claimed that students were not active in learning mathematics in the classroom because of their own interests. So, the lack of student's interest in learning mathematics is a cause of students feel that mathematics is a difficult subject.

Based on constructivist perspectives on learning, Students should be active in their learning (Acharya, 2017). According to this learning principle, the learner must build knowledge for himself, and also the teacher should use a student-centered teaching method in teaching/learning mathematics in the classroom. This theory focuses on real-life learning environment, social interaction and the use of complex ideas share with another outside of the classroom early. It encourages the students to involve themselves actively and use techniques of learners centered, group work, discussion, and learning by doing use outside tools to be more practical.

Prior knowledge. Prior knowledge is the information and educational context a learner already has before they learn new information (Glossary, 2017). A learner's understanding of educational material can be improved by taking advantage of their prior knowledge before dealing with the new material. The basic knowledge of mathematics at the secondary level is the key factor for determining good performance in undergraduate-level mathematics. It helps them to construct connections between old and new knowledge. During the interview time, I had asked the question *"Why pre-knowledge is necessary for new mathematical content learning?"* In this question I have listed participant's views in the following lines;

> *"To learn the mathematical problems in an enjoyably and motivated way; pre-knowledge is required"*. (Respondent B)

"To understand the new mathematical concept in a short time, pre-knowledge is necessary". (Respondent E)

"Just like a child needs to know about numbers system for learning addition, subtraction, multiplication, and division. Similarly, for undergraduate level mathematics learning, it is necessary to know school level mathematics".

(Respondent F)

And also, in another question *"How does pre-knowledge affect your learning mathematics?"* In this question, respondent A replied that;

"I did not seriously study the concept of derivative and integration in secondary level. Now, I am feeling difficulty in studying calculus subject due to lack of pre knowledge about derivative and integration concept".

(Interview; 1st March 2021)

The above-mentioned view of students indicates that prior knowledge is necessary for good achievement in mathematics subjects. During the interview time, I had asked the question for the teachers "*How does pre-knowledge affect student's learning mathematics?"* In this question, teacher B said that *"students are promoted unnecessary without the concept of mathematical knowledge in the lower level, so in the present time; some students are feeling mathematics as difficult subject."* and also in this same question another mathematics teacher A was said that *"students do not have sufficient basic knowledge in mathematics at undergraduate level. Due to which, they do not pass in the examination because of their higher-level mathematics learning is based on rote learning"*. These all responses indicated that the students cannot able to assimilate or relating new mathematical concepts and principal to previously learned mathematical structures. Therefore, from the above evidence, it can be concluded that the lack of previous knowledge of students in related content is another cause of students' difficulties in learning mathematics.

Based on Piaget's constructivism perspectives on learning, new knowledge can be built from pre-existing knowledge, own experience, learning requires an emphasis on mental processes and thinking (Bhattarai & Pandit, 2072). In addition, the learner must be active in learning, and also the learner can build mathematics knowledge by discovering and exploring.

Student's labor. Mathematics achievements determine student's labor in the present situation; students are not laborious in mathematics learning, consequently, the mathematics achievement of students is diseasing (Acharya, 2017). In my pre-experience, some mathematics contents are naturally more complex for understanding this and it takes a lot of time to solve this problem. But the students are not serious to do hard labor in learning mathematics and also they don't have enough time to learn mathematics at home. In the interview time, I had asked the question for the students *"How much time do you spend in daily learning mathematics?"* In this question the respondents had different views, which are presented as follows;

> *"I spend maximum 2 hours in daily mathematics learning. Other time I spend for other subjects, rest, entertainment, sleep, game, etc."* (Respondent C)

> *"I am continuing my job along with my studies, due to my family's economic condition. I spend daily only 2-hour time for learning mathematics at home. And also, I know only that 2-hour time is not a good time for mathematics learner".* (Respondent E)

And also, another question, *"How does the student's labor affect in learning mathematics?"* In this question I have listed the teacher's view in the following lines;

> *"Students' continuous labor/practice in learning mathematics increases their thinking and reasoning capacity".* (Teacher A)

> *"All mathematical problems may not be solved in a single round of practice. In that case, if the student stops practicing, then he may gradually feel the mathematics subject is complicated. The continuous practice that students do at home to learn mathematics, helps to make their long-lasting learning".*

> (Teacher B)

The above view of mathematics teachers and students indicates that most of the students are not giving sufficient time to learn mathematics at home. Students are engaged in an unnecessary task instead of learning activates. According to some students, they did not have enough time for learning mathematics in their room because they were doing jobs in another place. They want to pass the exam without doing hard labor and practices in mathematics. They would be weak in mathematics and they feel mathematics a more difficult subject than another subject. Therefore,

from the above evidence, it can be concluded that the lack of students' labor at home is another cause of students feel that mathematics is difficult rather than another subject.

Based on the constructivist perspective, mathematical knowledge is not imitation, for that student must be active and student should be built the knowledge for himself (Vygotsky, 1998, as cited in Khanal, 2013). We must have to practice in the particular field regularly in which we want to succeed. There is a famous quote by Vince Lombardi *"Practice does not make perfect. Only perfect practice makes perfect."* Students themselves have to practice constantly for learning. So, teachers should teach the students to play the role of facilitator by asking them to solve the problems rather than solving the problems of mathematics.

Anxiety. According to Acharya (2017) anxiety of students is another aspect of student-related factor which is a cause of difficulty faced by students in learning mathematics. In my opinion, mathematics anxiety is a negative feeling to the mathematics learning process, when examining student's problems mathematics anxiety is a feeling of tension, apprehension, or fear that interferes with the mathematics performance, and mathematics anxiety refers to forget and confidence in the subject matter. During the data collection period, I had observed the mathematics classroom, and then I had taken the interview with students. I had asked a question for low-ability students, "*Why do you feel mathematics a bit difficult rather than another subject?"* In this question respondent C replied that;

> *"Mathematics is very difficult for me but why I don't know. I am not good at the English language. Real analysis subject is very difficult for me, I feel bored with the proof theorem in this subject. My mother is uneducated, my father is far for his job. So, there is no one to help me in my home while I am learning mathematics. And also, I am afraid to ask the question for the teacher at school. So, I feel it is boring for me".*
>
> (Interview; 1st March 2021)

In the same question, another respondent B replied that;

> *"Mathematics is not too hard but I feel it is a more difficult subject. Some friends are weak in mathematics as well as me because we do not give more attention in the classroom. I had listened that mathematics is a very difficult*

subject at the undergraduate level and I found that some mathematics subjects are more complex for learning. I cannot understand anything. Our teacher many times teaches by using lecture method so, I do not understand clearly. Therefore, I don't want to study above the undergraduate level in mathematics subject".

(Interview; 1st March 2021)

Therefore, from the above responses of students, it can be claimed that most of the students are feeling some mathematical contents are more complex than another subject. In classroom observation time, I saw that most of the student's prior knowledge were weak in mathematics and also teachers used lecture method and only problem-solving method in the classroom, which was not sufficient for the students. Thus, from above evidence indicates that mathematics has several formulas which are very difficult to understand them and also, they are not related with students' life. As a result, students are feeling mathematics as an abstracts subject. Therefore, from the above evidence, it can be concluded that the student's and pupils' weak perception about mathematics subject is a cause of students' difficulties in learning mathematics.

In this regard, Furner & Duffy (2002, as cited in Smith, 2004) state that the mathematics teacher should be taught the mathematical contents according to the individual ability of the student, using the learner-centered method, interaction with each other, and motivate the students to solve their problems. Then we can minimize the students' anxiety or misconception about mathematics subject.

Teacher-related factors. Student's learning is directly linked with the teacher's behavior. Teachers must be liberal for the student such that students may express their feeling, confusion, problems about subject matter without any hesitation and fear (Khadka, 2014). Most of the students feels that mathematics subject is more difficult from other subjects in terms of its nature or contents and also, some of them are taking this subject as not too hard, but most of them are taking this subject as to hard subject (Acharya, 2017). On interview time, I found that teachers and students have different views on mathematics at the undergraduate level from the side of teacher-related factors. Some views of them are presented as follows;

Teaching technique. Effective learning in the classroom depends on the teacher's ability to maintain the interest that brought students to the course in the first

place (Erickson, 1978). Teachers must recognize the diversity and complexity in the classroom such as ethnicity, gender, culture, language abilities, etc. Classroom diversity exists not only among students and their peers but maybe also be exacerbated by language and cultural differences (Barberos, 2018). The teacher must recognize individual differences among his/her students and adjust instructions that best suit the learners. In the interview time, I had asked a question for respondent C, *"How do the teaching techniques that teachers use in the classroom affect your mathematics learning?"* In this question, he replied that;

> *"The learning style of all students in the classroom may not be the same. In such a case, the teacher has to solve the same problem in different ways. But the teacher always teaches us using the same technique so that we have no motivated for learning mathematics at the classroom".*
>
> (Interview; 25th February 2021)

In the same question another respondent A said that;

> *"The teacher always teaches us by following the traditional technique and only exam-oriented in the classroom. Which makes me bored feel during mathematics class. Therefore, we want the teacher to teach us mathematics by telling us jokes and poems in the mathematics classroom".*
>
> (Interview; 15th March 2021)

In classroom observation time, I saw that teacher had never smiled at the classroom, never told any joke. The teacher had used only problem-solving methods in teaching and ended the class that day. After wrote the statement and formula on the whiteboard the teacher solved the problem by using the formula deductively and students were copied this. During the interview time, I asked the question for some students *"How is your opinion about the teaching technique used by the teacher in your classroom?"* In this question, most of the students were replied that *"our teacher never used any new materials rather than textbooks, marker, and whiteboard. He usually taught us by lecture method and teacher center method".* Thus, from the above responses of students, it can be claimed that the students were not active in learning in the classroom that may be because of the teacher's teaching technique and they can't express their expression, feeling, a problem which directly linked with student's difficulties in learning mathematics. Therefore, from the above evidence, it

can be concluded that the teachers should teach traditionally without using appropriate techniques in the classroom is another cause of students' difficulties in learning mathematics. I can say that to make mathematics teaching effective, teachers need to adopt the appropriate technique in the classroom. No matter how good the curriculum and subject matter, if the teacher does not teach in the appropriate technique/way in the classroom, that learning cannot be effective for the students. Therefore, to motivate the students in learning mathematics, the teachers need to be active in the classroom and use the appropriate technique/way for teaching mathematics.

From, the constructivist approach in mathematics learning is argued to lead understanding of mathematics when applied to the physical, social and cultural experiences and developmental contexts of the learner whereas traditional mathematics use highly structured worksheets, step-wise rulers practice examples, and formulaic solutions to word problems has been criticized for its poor survival of understanding and application beyond the classroom (Rana, 2019). According to Khanal (2019) teacher's teaching becomes successful and effective only when his/her students feel confident of the contents they are taught. Constructivists argue that it is impractical for teachers to make all the current decisions and dump the information to students without cling students in the decision process and accessing students' abilities to construct knowledge (Acharya, 2017, as cited by Shrestha, 2016).

Motivation factors. According to Yahara (2010), 57.9% (out of 100%) of students agreed on the statements that the teacher was a motivational factor for them in learning mathematics. In my previous experience, if a student has a negative emotion such as fear or disliking towards their teacher, that can negatively affect their attitude toward the subject as a whole. If a teacher shows a preference towards certain students or uses derogatory and humiliating language, that can lower their motivation in education (Forum, 2008). Thus, Motivation is an influential factor in the teaching-learning process. The success of learning depends on the high or low motivation of students. It can drive learners in reaching learning goals. Therefore, motivation is the key to success in the learning-teaching process. During the interview time, I had asked a question for teacher A, *"How does the teacher's motivation factors affect students' mathematics learning?"* In this question teacher, A replied that;

> *"By motivating the students in the classroom, we can increase the thinking and interest of the students about mathematics subject. And also, mathematics can be taught enjoyably. If we can eliminate the misconception of students towards mathematics subject, then we can increase the number of students in studying mathematics".*

(Interview; 15th February 2021)

In the same question, another respondent E said that;

> *"When a teacher starts a new chapter in the classroom, if we have the concept that the chapter is complex, then we are not interested in studying this chapter from the beginning. So, the positive and negative motivation that the teachers give us is affecting our interest in learning mathematics".*

(Interview; 10th March 2021)

And also, I had asked the question for the brother of respondent E, "*Do you ever motivate your brother to learning mathematics at home?"* In this question his brother was replied;

> *"I spend a lot of time in the office for my work. While I'm at home, I encourage him to devote his time to study. But now he is mature, he can make his own decisions about his life. So, it may not be appropriate to say him the same thing over and over again".*

(Interview; 10th March 2021)

In classroom observation time, I had seen when an absent student asked about the previous class problem to the teacher then the teacher was replied that it is already taught yesterday, why did you absent? So, ask your friend. At that time, I was looking at the student's face and I saw that the teacher's reaction had a negative effect on the student. During the interview time, I asked the question for another student *"Why you are not questioning the teacher about the subject matter?"* In this question most of the students were replied that "*we are suffering from fear of the teacher, he is a strict person and he does not motivate us in the classroom*". Thus from the about responses of students, it can be concluded that students were suffering from teacher's behaviors and they were not active and enthusiastic about learning mathematics in the classroom. Thus, the students have felt that mathematics is a more complex subject

rather than another subject that may be because teachers don't give enough time for the student's problem. Therefore, from the above evidence, it can be concluded that the teachers should not motivate the students to learning mathematics in the classroom is cause students feel that mathematics is a difficult subject rather than another subject.

From the view of constructivism theory, we can be applied in our mathematics classroom in several ways. Mathematics can be taught by dividing the students into small groups with having discussions and interactions with each other. For example, if a student cannot solve the problem of geometry then give an opportunity for another student to explain this concept who knows about it. And also, effective mathematics teaching/learning depends on the learner's pre-existing knowledge, co-operative with each other, students' abilities, and interaction between student-student and student-teacher. Thus, in the mathematics classroom, the teacher needs to opportunity students to discuss with each other to solve their problems.

Self-confident. Self-confidence is about believing in one's abilities and a self-confident child or adult is more likely to be optimistic and motivated and have a "can-do" rather than a "can't do" attitude to classroom learning and education (Liut, 2002, as cited in Geit, 2012). Generally, teacher's self-esteem is important for their success in teaching and that teacher's positive and high esteem positively affects student's self-esteem and enhances student's learning (Mbuva, 2016). Self-esteem also can have a marked effect on academic performance. Low self-esteem can lessen a student's desire to learn, his/her ability to focus, and his/her willingness to take risks. Unfortunately, students can be quick to spot a lack of confidence, which can lead to issues with classroom management. We are responsible for developing and nurturing our self-confidence. In the interview time, I had asked the question for respondent F *"How does a teacher's self-confidence affect your mathematics learning?"* In this question, he replied that;

> *"At some times, when our teacher solves a mathematical problem in whiteboard then the teacher's solution becomes wrong and our teacher cannot handle the weakness immediately. As a result, there is noise in the classroom and disturbing in our mathematics learning".*
>
> (Interview; 3rd March 2021)

In this same question, another respondent E replied that;

> *"When we ask some mathematical problem to the teacher then the teacher tells us to practice at home but we can't even satisfy from teacher responses. As a result, our perception of mathematics learning is becoming negative".*
>
> (Interview; 3rd March 2021)

Thus, the overall view of students indicates that teacher's self-confidence is a necessary part of affecting teaching/learning mathematics in the classroom. In classroom observation time, I saw when a student asked the question for his subject teacher, *"excuse me sir, this method is complicated, it cannot be solved by any other simple method?"* but the teacher could not immediately answer that student. The teacher was silent for some time and told the students to go home and learn other methods by themselves. Due to, there was noise between students in the classroom for some time. Thus, from the above evidence, it can be claimed that the teacher's self-confidence affects the student's learning and students feel that mathematics is a more complected subject rather than another subject that may be because teachers cannot convince the students about the subject matter. Therefore, from the above evidence, it can be concluded that the teacher's self-confidence in subject matter is another cause of students' difficulties in learning mathematics.

In this regards Vygotsky's (1978, as cited in Acharya, 2015) voice that the child's understanding of how knowledge develops requires an understanding of social and historical origins of knowledge and of changes in that knowledge. In this matter Acharya (2015), also argues that human knowledge originates in socially meaningful activity and is shaped by language mathematics knowledge can be a creation by social interaction and teacher/student must be active in their learning. This theory shows that students learn from each other, they can assist one another and co-construct knowledge. Student-teacher interaction is more effective in building knowledge than in thought processes and cognitive structures (Bhattarai, 2017).

Connected daily life problem. Traditionally, vocational mathematics and precollege mathematics have separate in schools but the technological world in which today's students will work and live calls for an increasing connection between mathematics and its applications (Barberos, 2018). During the interview time, I had

asked a question for teacher B, "M*athematics is a really difficult subject or we have made it difficult?"* In this question, teacher B replied that;

> *"In my opinion, whole mathematics subject is not complicated, but some of its contents are naturally abstract rather than others.*
>
> (Interview; 10th March 2021)

In the same question, another respondent A said that;

> *"Our teachers do not teach mathematical problems with linkage to our daily life in the classroom. In my belief, we are complicating mathematics ourself because many teachers, students and our parent's beliefs that we can achieve the good marks in exam only after rote the theorem and formula in mathematics subject".*
>
> (Interview; 10th March 2021)

And again, I had asked the question for respondent C *"Why is it necessary to teach mathematics in connection with our daily life problems?"* In this question respondent C replied that;

> *"To make mathematical learning practical and lifelong learning, it is necessary to teach mathematical problems with connection to our daily life".*
>
> (Interview; 15th February 2021)

In the same question, another respondent B said that;

> *"To discourage rote learning, to learn mathematics through play gaming and to motivate students towards mathematics, it is necessary to teach mathematical problems to linkage with our real-life".*
>
> (Interview; 15th February 2021)

In classroom observation time, I saw that the teacher mostly used only the problem-solving method in teaching mathematics which observation is presented in episode 2. After wrote the statement and formula on the whiteboard then the teacher solved the problem by using deductively and students were copied this. During the interview time, I asked the question for some students *"How do you feel about teaching mathematics in connection with our daily life?"* In this question, most of the students were replied that *"mathematics learning would be suitable if the teacher*

taught the mathematical problem using practical way rather than in a theoretical way. But our teacher only teaches us exam-oriented, so that we can't remember for a long time what we learned in the classroom". Thus, from the above responses of students, it can be claimed that students have felt that mathematics is a more complicated subject than other subjects that may be because teachers should not teach the mathematical problems in connection with our daily life problems. Therefore, from the above evidence, it can be concluded that the teachers do not teach the mathematical problem in connection with our daily life is another cause of students feel that mathematics is a difficult subject rather than another subject.

In this regard, Goff and Futter (1982, as cited in Acharya, 2015) state that; *"Knowledge of mathematics is indispensable to our daily life, counting objects, reading and writing numbers are tasks most people perform in their life. A strong background in mathematics is necessary for almost all technical careers in society".* In this view, mathematical knowledge is not imitation, for that you must be active and you should build the knowledge for yourself (Acharya, 2017). In my experience, when we solve mathematical problems, first of all, we need to understand that problem then modified and finally grasped this problem. In addition, learners can build mathematical knowledge by participating in a variety of social activities, interacting with others, and debating with others. In point, mathematical knowledge can be a creation by social interaction, co-operative, and discussion with each other students. Thus, the learners can build mathematical knowledge by relating the mathematical problem to our society, our cultural context, and our understanding.

Pedagogy-related factors. In my previous experience, I can say that to make mathematics teaching effective, teachers need to adopt appropriate teaching pedagogy in the classroom. No matter how good the curriculum and subject matter, if the teacher does not teach in the appropriate teaching pedagogy in the classroom, that learning cannot be effective for the students. Therefore, for effective teaching/learning mathematics in the classroom teachers need to use appropriate teaching pedagogy. This kind of situation may create a social injustice because students do not have the opportunity to learn at their pace and learn through interaction and negotiation (Panthi 2016). It may be unfair to some students just to continue lecturing and not allowing them to reflect on what they learned. I found that teachers and students have different

views on mathematics teaching pedagogy at the undergraduate level. Some views of them are presented as follows;

Teaching materials. Teaching is an art, the teacher is considered an artist and by the use of teaching materials and method, the teacher completes his art (Khadka, 2014). So, teaching materials are considered as the best instruments in the period of teaching-learning activities. During the observation time, I saw that some mathematics teachers not used any teaching materials in the mathematics classroom. After finished the class, I had taken the interview with the mathematics teacher and I had asked the question for the teacher *"Why you did not use teaching materials in the classroom?"* In this question, teacher B replied that;

> *"Our college has not proper mathematics lab and also has not sufficient manipulative interactive and physical materials. But available materials (projector, laptop, etc.) in our college, generally I used them related with our content".*

(Interview; 10th March 2021)

Again, I asked him *"How does the effect on students learning mathematics without the use of teaching materials in the classroom?"* In this question he said that;

> *"I have already told you about teaching materials. I don't have full knowledge about ICT for use various mathematical software in teaching classroom and I use some materials at the required time depending on the nature of the content. If we teach mathematics without the use of materials, that learning may not be long lasting for the students, but if we teach mathematics using materials, then we can increase the interest of the students in learning mathematics".*

(Interview; 10th March 2021)

Teachers can easily explain the lesson/content by using effective teaching materials but during the classroom observation time, I saw that the teachers did not use any effective teaching material other than textbooks, whiteboard, and marker during the teaching/learning activities in the mathematics classroom. I had asked the question for some students *"When a teacher teaches without using any teaching materials in the classroom, how does it affect your mathematics learning?"* In this

question, most of the students were replied that *"when the teacher teaches us real analysis subject, the teacher should not use any teaching materials in the classroom other than textbook and marker. And also, the theorems of this subject should not be taught through visualization. As the result, we have to rotate the theorems of real analysis subject"*. Thus, from the above responses of students indicates that most students have felt that, mathematics a more difficult subject that may be because teachers should not use any teaching materials in the classroom. Therefore, from the above evidence, it can be concluded that the less use of teaching materials in the mathematics classroom is another cause that makes mathematics more difficult for the students.

According to Panthi (2017) from the perspective of social constructivism, in our context, the reason for students' weakness in mathematics is lack of teaching material in the classroom, our traditional curriculum, conventional assessment system, and classroom size. The objective of our curriculum does not focus on the construction of new knowledge by students or it does not encourage teachers to engage in the active construction of knowledge by students. The assessment system emphasizes rote learning and getting good grades in exams. An essential feature of learning is that awakens a variety of internal development process that can be operating only when the child in the action of interacting with people in his learning environment and in cooperation with peers (Vygotsky,1998, as cited in Khan, 2017).

Teaching methods. Teaching methods are quite important for ideal outcomes in the learning process (Fuit, 2018). Every good teacher must be flexible and always seek new ways to communicate with the pupils irrespective of culture, religion, etc. Mathematics is the subject of practical knowledge, so sufficient use of teaching materials is necessary for the study of this subject (Nepali, 2020). An experienced teacher can make his class effective. The students can understand the problem if the teacher uses the tricky method in the classroom. A trained teacher can use the right and appropriate teaching materials and makes the teaching/learning easy and interesting. During the interview time, I had asked the question *"How does the teacher's teaching method that uses in the classroom affect your mathematics learning?"* On this question the students had different views, which are presented as follows;

> *"I am weak in mathematics but still I am excited to learn mathematics. Our mathematics teacher always gives opportunity only to the talented students in the classroom. As a result, my interest in learning mathematics subject is decreasing".* (Respondent D)

> *"The teacher should not use ICT and technology in the mathematics classroom. So, I feel that the Mathematics and Nepali subject classes are the same".* (Respondent A)

> *"The teacher most of the time uses the lecture and problem-solving methods in the classroom. So that, we weak students does not get the opportunity to learn at mathematics classroom".* (Respondent C)

On classroom observation time, it could be seen that there was no proper interaction between teacher and students. And also, the teacher did not use the student center learning method in the classroom. The teacher mostly used only the lecture method in the classroom and sometimes he used the problem-solving method but that method was not sufficient. Thus, from the above evidence, it can be concluded that using the traditional type of lecture method and problem-solving method in the mathematics classroom is another cause of students' difficulties in learning mathematics.

Lev Vygotsky (1978) suggests that the teaching method should be student-oriented, discussion-oriented, and discovery-oriented (Acharya, 2017, as cited in Nepali, 2020). In mathematics teaching, many methods are being used like problem-solving, discussion, question answer, practice, experimental, discovery, etc. There are many issues with applying the theory of social constructivism in teaching mathematics. According to this theory, mathematics knowledge is constructed through social interaction. Vygotsky described ZPD as a distance between a child's ability in independent problem solving and the potential ability to problem-solve with guidance (Burton, 1999). Thus, it is better to use the student center method rather than the teacher center technique while teaching mathematics in the classroom.

ICT-related factors. ICT has not been properly addressed by the curriculum. ICT as a subject or as a tool of teaching-learning has not been clearly defined (CDC 2007 p. 18, as cited in Panthi, 2017). Many mathematics teachers have a lack of relevant skills to use computers and applications to use in teaching mathematics.

Many of them do not know how to use Excel Spreadsheet, GeoGebra, and other applications for teaching arithmetic, algebra, and geometry in general. The Ministry of Education (MOE) of Nepal does not have a concrete micro-level policy regarding how to support each school/college and teacher in the implementation of ICT in classroom teaching and learning integrated with mathematics and other subjects despite the formulation of macro policy (Wagley & Jha, 2013). In interview time, I had asked the question for some respondents *"Why it is necessary to use ICT in the classroom for effective mathematics teaching/ learning?"* In this question the teacher and students had different views, which are presented as follows;

> *"It is necessary to use ICT in the classroom for to present the abstract mathematical concept simply through visualization".* (Teacher B)
>
> *"To make our clear perception about mathematical contents".* (Respondent D)
>
> *"Teacher needs to use ICT in the classroom for to focus our attention, to get excited about mathematical content for us and to teach much content in less time".* (Respondent A)

During classroom observation time, it could be seen that teacher was not used any ICT-related materials/software (Projector, PowerPoint, GeoGebra, Mathematica, etc.) in the classroom. The teacher mostly used only the problem-solving method and lecture method in the classroom. But only this method was not sufficient for effecting teaching content. During the interview time, I had asked the question for students *"How does the use of ICT affect your mathematics learning?"* In this question, most of the students were replied that *"Our teacher always teaches us the mathematical theorems in the traditional way without presenting them through figure and visualization. To pass the exam, we have to do rote learning of mathematical theorems like blind learning".* Thus, from the above responses of students, it can be claimed that students are not interested in enjoying in learning mathematics that may be because of teacher teaches mathematics using traditional methods rather than effectively presenting mathematical problems through 2D / 3D using ICT in teaching. Therefore, from the above evidence, it can be concluded that teachers don't use ICT in teaching mathematics classroom is another cause of student's difficulties in learning mathematics.

In our context, most of the students and teachers in public schools cannot afford the new technology in general. It is very costly for them to have computer labs in the schools and it is very expensive for many parents to purchase a computer and connect to the internet for their children to use at home. Most of the schools do not have mathematics labs with computers and overhead projectors, smart boards, and other tools. This issue is not limited to the schools, community, and parents but it is the national issue in teaching and learning mathematics with technology. The integration of technology in teaching and learning mathematics helps in creating collaborative teams and working groups to help each other among the teachers and students as a part of teacher professional development (Trigueros & Lozano, 2012).

Interaction with each other. In this study, the discussion about the subject matter between student-student and student-teacher in the classroom is called interaction to each other. Knowledge can be constructed through active participation (Acharya 2017, as cited in Khadka, 2014). Students gain knowledge while reflecting on their actions. In the classroom activities are individually performed judged based on each performance. Activities are detached from meaningful context and real-life situations and communities of practice (Khanal, 2013). I interviewed six students and two mathematics teachers then I found that peer interaction influenced student's mathematics learning. During interview time I had asked the question "*How do you feel about learning mathematics by interacting with each other?"* The students had different views on this question, which are presented as follows;

> *"Talented friends did not take interest in peer interaction and did not give time on the discussion in the classroom for us".* (Respondent C)
>
> *"There is the workload of all subjects and so we have not enough time for peer interaction only about mathematics subject".* (Respondent E)

And also, I had asked another question for teacher B *"How to affect peer interaction in students' mathematics learning?"* In this question, teacher B replied that;

> *"The students who participate in peer interaction they had got better achievement in mathematics. So, I tried to motivate all of these students for peer interaction but they ignore".*
>
> (Interview; 15th March 2021)

During the classroom observation time, I saw that there was a lack of peer interaction between student-student and student-teacher in the classroom. In the leisure time, students were busy with mobile activities, joking, and something else. In interview time I had asked, *"How do you feel about group learning and individual learning in the mathematics classroom?"* In this question, most of the students were replied that *"when we learn unfamiliar content in discussions with our friends, then even complex topics we can be learned simply and remembered for a long time. But most of the time, our teacher uses only a problem-solving method in the classroom, which makes us boring at that time in the classroom"*. The above view of students indicates that students who less participated in peer interaction got low achievement and they feel mathematics a difficult subject. Therefore, from the above evidence, it can be concluded that teachers don't teach the mathematical problem by interacting with each other and students should not seek to participate in classroom activities are some causes of students' difficulties in learning mathematics.

From the perspective of radical constructivists, teachers should follow the various teaching techniques focusing more on individual and group presentations, discussions, tests, debates, and student decisions, and the application of mathematical models for solving the problems (Poudel, 2016). We realized that students build their mathematical concepts of what they learn through the active cognitive and adaptive process (Glasersfeld, 1995). The teaching and learning processes undergo through schema, assimilation, accommodation, adaptation, and reconstruction (Guit, 1997). The theory of radical constructivism accepts that students build their concepts of what they learn through the active cognitive and adaptive process. Students may give their reflection and argument about the content, process, and product in teaching and learning and they construct the knowledge of mathematics (Leo, 1990, as cited in Panthi, 2017).

Environment-related factors. In this research environment-related factors indicate that the home environment of student and school environment of student, which are presented as follows;

Home environment. In my experience, the home environment is regarded as the first school for all child/learners and school is the second home for the child. The students spend most of their time in their house. The children learn about many

aspects from their parents. They learn how to behave, how to respect elders, how to cooperate in a home environment. If the home environment maintains the educational environment in society then the school environment becomes good for students to learn about the current knowledge (Nepali, 2020). During the interview time, I had asked the question for student's parents *"What do you think about your brother/sister's mathematics learning?"* In this question the parents had different views, which are presented as follows;

> *"It is difficult for me to pay their education fee; it would be comfortable for me if he does a job as well as the study".* (Parents of Respondent D)
>
> *"It is difficult to live without education, so I want to see him become a great man in the future".* (Parents of Respondent F)
>
> *"My income is not sufficient for good health, cloth and shelter; it is difficult to pay for their education".* (Parents of Respondent E)

And also, during interview time, I had asked the question for the students *"How does the home environment influence your mathematics learning?"* In this question the respondents B and C replied as follows respectively;

> *"I have not separate room for study at home, it is difficult to concrete the mind in the study sitting among all members in the same rooms".*
>
> (Interview; 1st March 2021)
>
> *"I have to help my parents in the home I could not be regular in the class time to my study. And I could not give more time at home for learning mathematics. So, I feel mathematics is difficult for me".*
>
> (Interview; 1st March 2021)

Thus, from the above responses of students, it can be claimed that the student's workload was hampering their study. They have to be irregular in school because of the work at home. They could not give enough time for mathematics practice at home. Also, the above parent's responses found that most of the parents have not enough income sources for their children a good education. It can be said that the income of the family influences the student's learning mathematics. Therefore, from the above evidence, it can be concluded that lack of parent's education, lack of parent's economic condition, and student's workload at home are

some causes of students' difficulties in learning mathematics because students do not spend enough time learning mathematics at home.

From the perspective of Vygotsky's (1978) constructivism theory, learners can build mathematical knowledge by participating in a variety of social activities, interacting with others, and debating with others. Mathematics is conceived as a cultural product, which has developed as a result of various activities (Bishop, 1988, as cited in Shrestha, 2016). In point, mathematical knowledge can be a creation by social interaction, co-operative, and discussion with each other students (Acharya, 2017). Thus, the learners can build mathematical knowledge from their cultural context and own understanding.

School environment. School is the second home of all children/learners. The teachers, students, and parents are the component of the school. The school environment reflects the belief and tradition of the school community delineating the relationships among parents, students, and teachers (Nepali, 2020). During the interview time, I had asked the question for students *"Do your school-related factors affect your mathematics learning?"* In this question the respondents E, F and D, E replied as follows respectively;

> *"I come from Dhading district, all members of my family speak the Nepali language. I have also the habit in speak Nepali. I am weak in English but our mathematics teacher preferred English medium book, so I am feeling difficult in learning mathematics".*
>
> (Interview; 3rd March 2021)

> *"There is no effective library for reference books and materials for us, so we can't gain extra related knowledge".*
>
> (Interview; 3rd March 2021)

> *"My father works in Dubai and mother is in household work. I have no more time to read at home, I read only two hours at home. Teachers never want to understand my problem at home and my interest in mathematics. Because of the unmatched environment of my home and school, I am suffering from the problem of mathematics".*
>
> (Interview; 10th March 2021)

"I have no interest in the mathematics class because sir never gives chance for me, I am weak in mathematics, I don't understand anything. Sir always gives chance for first and second students".

(Interview; 10th March 2021)

Therefore, from the above responses of students, it can be claimed that there is discrimination in the mathematics classroom. Teachers were ignoring weak students in the classroom and they were giving more opportunities to the talented students. Therefore, weak students have felt that mathematics a difficult subject. And also, it could be seen that there was a problem between home and school environment for some students such as language and different cultural background. Students came from different cultural backgrounds, which have different languages, different socioeconomic status, different norms, and values. But the school has followed the same treatment for all students. Thus, from the above evidence, it can be concluded that discrimination in the classroom, language problem in the classroom, different cultural background problems, lack of physical facilities in the school are some causes of students' difficulties in learning mathematics.

Piaget's theory of constructivism argues that the learner learns mathematical knowledge by modifying and changing the previous knowledge. The learner accepts the knowledge obtained from the environment as selecting, analyzing, and modifying it (Bhattarai, 2017). When we solve the mathematical problems, first of all, we need to understand that problem then modified and finally grasped this problem. If the student does not have any scheme then he/she can't understand the problem as well as the future solving process. In point, new knowledge can be built from pre-existing knowledge, own experience, learning requires an emphasis on mental processes and thinking. Thus, the learner must be active in learning, and also the learner can build mathematics knowledge by discovering and exploring.

Way to Improve the Interest of Students in Learning Mathematics

Based on the above causes of students' difficulties in learning mathematics through the classroom observation, in-depth interview and review of documents analysis with key responses of a mathematics teacher, students, and their parents the ways to improve/increase the interest and enthusiasm of students in learning mathematics are presented as follows;

Use cooperative learning in mathematics classroom. According to Salvin (1978) investigate on comparison between the student's achievement in cooperative learning and traditional learning in the classrooms. In this article, the researcher found that 89% of students were earned higher scores on achievement tests when they had participated in cooperative learning. Cooperative learning helps to improve racial relations in school. During the interview time, I had asked the question for teachers and students *"What strategies/pedagogy do teachers should adopt to improve the interest of students in learning mathematics?"* In this question the respondents had different views, which are presented as follows;

> *"Students need to involve in group discussion while teaching mathematics in the classroom. They will get a better understanding from their friends rather than their teacher because they are afraid to ask with the teacher directly."*
>
> (Teacher A)

> *"When the teacher solves mathematical problems in the classroom, it is necessary to give the opportunity to the students to discuss with each other".*
>
> (Respondent E)

> *"Teachers should give the opportunity to demonstrate our work and discuss to each other in the classroom".* (Respondent F)

> *"Teachers should teach the mathematical problems in the classroom using group learning, cooperative learning, and student center learning to improve the interest of the student in learning mathematics".* (Respondent B)

Thus, from the above responses of students, it can be claimed that the mathematical communications can play an important role in learning mathematics. Exchange of knowledge is another basis of cooperative learning in mathematics. Cooperative learning strategies are an effective pedagogy in teaching/learning mathematics (Acharya, 2017). According to Nepali (2020) when we communicating about the mathematical problem with the students, then students enhance their understanding of mathematics, establish share knowledge, become more active learners, learn in a comfortable environment and assist the teacher in gaining insight into their thinking. Teaching is most effective when the teacher and learner have a healthy relationship. Therefore, from the above evidence, it can be concluded that, if

the teacher interacts between student-student and student-teacher in the classroom, then the interest of the students in learning mathematics can be increased.

Provide opportunities for learning mathematics at home. In the case of the students who were staying in rent room, most of the parents were far from them. These students were staying with some relatives and themselves together with siblings. They were not capable of managing their time for the study properly in the room and their home environment was not silent for their learning. In regards to the way of engagement of the students in mathematics learning at home, the environment of the home play a vital role. The home environment is directly related to their culture, social class, economic status of the family, educational background, etc. During the interview time, I had asked the question for respondents *"How to improve the student's interest in learning mathematics?"* In this question I have listed the respondent's view in the following lines;

> *"I have no one to guide at home for mathematics learning. Individually I am not able to do the homework and study mathematics at home. Therefore, I am expecting a tuition class or the extra class for mathematics learning. So, I want my family, to create an environment for me to tuition classes".*
>
> (Respondent B)

> "*My brother feels that mathematics is the hard subject but it was also beyond my capacity to help this level myself that's why I told them for the tuition".*
>
> (Parents of Respondent B)

> *"Most of the students were not doing homework and even they are not sincere about the learning of mathematics at home".* (Teacher A)

The above evidence and cases of the students indicates that the students were not motivating towards learning mathematics and they were not guiding properly at home. It can be seen that most of the students are not involving in the learning tasks of mathematics at home. Therefore, to motivate the students for mathematics learning, parents are needed to create a suitable environment for their children at home. Home is the first school of the child and the family members are the first teachers of his/her children. Children's learning is directly affected by the home environment. In various dimensions development of the child and their learning are also guiding by the home

environment. Therefore, from the above evidence, it can be concluded that to create an effective environment by his/her parents at home to students for mathematics learning, then the interest of the students in learning mathematics can be increased.

Connect mathematical problems with our daily life. We need math in our everyday lives and just doing the essentials is dependent on our ability to do mathematics (Snipt, 2019). However, understanding mathematical logic helps us understand ambiguity and disagreement. It helps us understand whether it comes from different use of logic or different building blocks. When I had observed in the mathematics classroom, I saw that teachers did not linkage homemade materials in mathematics teaching/learning. But on the interview time, he had said that it is necessary to connect mathematical problems in our daily life for long-lasting learning and I always linkage mathematical problems with our life. During the interview time, I had asked the question for the respondents *"What strategies/pedagogy do teachers should adopt to improve the interest of students in learning mathematics?"* In this question I have listed the respondent's view in the following lines;

> *"To make students' learning long-term and to make learning practical by removing rote learning, it is necessary to teach mathematical problems by linkage with our daily life problems".* (Teacher A)
>
> *"I have to use homemade materials and local materials which help the students to know mathematics and they can solve mathematical problems by linkage with their daily life problem".* (Teacher B)
>
> *"Mathematics should be taught in a practical way rather than in a theoretical way".* (Respondent A)
>
> *"Teachers need to teach mathematical problems in connection with our real-life problems".* (Respondent C)

Supporting this view, it can be claimed that, to teach mathematical problems in connection with student's daily life is a way to improve the interest of students in learning mathematics. Through the classroom observation, I discussed and suggested that being a mathematics teacher we need to practice in our teaching interlink with student's daily life and his/her cultures. Use meaningful learning materials to create effective environments in the mathematics classroom which includes cultures, beliefs, and customs for the students. Therefore, to motivate the students to learn

mathematics, teachers need to linkage mathematical problems in our daily life while teaching in the classroom. Therefore, from the above evidence, it can be concluded that, students' interest in learning mathematics can be increased by teaching mathematical problems in connection with students' daily life.

To motivate the students for mathematics learning. In my previous experiences, misconceptions about mathematics among students, parents, and teachers create more difficulties to learn mathematics easily for the students. So I think, we should be conducted a motivational program for students. Motivation is an influential factor in the teaching-learning process and the success of learning depends on the high or low motivation of students (Khan, 2017). Therefore, motivation is the key to success in learning mathematics for the students. During the interview time, I had asked the question for the respondents *"How to improve the interest of students in learning mathematics?"* In this question the respondents had a different view, which is presented as follow;

> *"Teacher calls by our names in the classroom, by gives the time for our problems, by allows demonstrating our work, then the teacher can make us active and motivated in the classroom".* (Respondent D)
>
> *"Teachers should adopt the student center method and discussion method in the mathematics classroom to improve the interest of the student in learning mathematics".* (Respondent B)
>
> *"Our students think that mathematics is a difficult and cumbersome subject. To overcome this, a mathematical awareness program is needed".*
>
> (Teacher B)

From the above responses of students and teacher, it can be claimed that motivational programs can change the misconceptions of students/parents about mathematics subjects. So, to stop the misconceptions about mathematics we need to conduct and involve in an awareness program for students. The most of parents of the students as respondents in this study are uneducated, so mathematical educational awareness programs will better to feel them the importance of mathematics in our life. Constructivist learning environments foster learning activates that develop critical thing skills, social interaction with peers and teachers, and self-awareness of the knowledge construction (Discoll, 2008, as cited in Nepali, 2020). Therefore, to

motivate the students to learn mathematics, we need to conduct a national/school level motivational/awareness program. Therefore, from the above evidence, it can be concluded that, if the teachers motivate the students by giving the opportunity to solve their problem, by listening to them, by giving them the opportunity to demonstrate their works in the classroom then the interest of the students towards learning mathematics can be increased.

Use digital technology in the mathematics classroom. Here, digital technology refers that the Laptop, Projector, PowerPoint, GeoGebra software, Mathematica software, Maple software used by the teachers to make mathematics learning effective in the mathematics classroom. It is essential that teachers and students have regular access to technologies that support and advance mathematical sense-making, reasoning, problem-solving, and communication (Nepali, 2020). These technologies support students in exploring and identifying mathematical concepts and relationships. Technology provides students with easy-to-access information, accelerated learning, and fun opportunities to practice what they learn (Prett, 2020). Effective teachers optimize the potential of technology to develop students' understanding, stimulate their interest, and increase their proficiency in mathematics.

During the interview time, I had asked the question of the respondents *"How to improve the interest of students in mathematics learning using technology?"* In this question the respondents had different views, which are presented as follows;

> *"As in the case of Covid-19, different mathematical teaching/learning programs should be continued through by online schedule such as Zoom, Microsoft team, Google schedule, etc."* (Respondent A)
>
> *"Teachers need to keep students active in mathematics learning by regular class testing using online medium not only physically".* (Respondent C)
>
> *"Teacher should teach the mathematical theorems through visualization using technology or mathematics-related software in the classroom".* (Respondent D)

From the above responses of students, it can be claimed that teaching mathematics with technology provides dynamic opportunities for instruction in mathematics classrooms. We can enhance the learning process and make concepts come alive through engaging and interactive. Use of technology in the classroom assists teachers in the construction of realistic complex problems in the class setting.

These problems are modeled after real-world problems that the student might encounter in real life. Some research on the attitude of teachers to teaching with technology found that most experienced teachers with strong mathematics backgrounds were at first half-hearted about teaching with technology (Pierce & Ball, 2009). When using technology, teachers were encouraged to broaden curriculum objectives, make use of more problem-solving examples and utilize an inquiry-based approach to learning (Jurdak, 2004). Therefore, from the above evidence, it can be concluded that, if the teachers use technology or ICT-related software in the mathematics classroom for visualizing the mathematical problems/theorems in 2D/3D then the interest of students in learning mathematics can be increased.

Overall by supporting all these above views refers that, to use cooperative learning method in the mathematics classroom, to provide an opportunity for students in learning mathematics at home, to teach mathematical problem in connection with students' daily life, to motivate the students for learning mathematics in the classroom, to conduct the national/school level awareness program about mathematics subject, to create the student-student and student-teacher interaction environment in the classroom, to decrease the misconception of students about mathematics subject, to provide scholarship for the students which family condition is really weak, mathematics teacher must focus on student-centered method in the mathematics classroom, to teach mathematics in a practical way rather than theoretical way, to use digital technology in the mathematics classroom are the main ways to improve the interest of students in learning mathematics.

Chapter V

Findings, Conclusion and Implications

This chapter includes that a summary of the whole study. It also includes findings and conclusions derived from the analysis and interpretation of the previous chapter and finally recommends how these findings can be used in the academic field. This chapter concerns in the following heading or sections;

- Findings of the study
- Conclusion of the study
- Implications of the study
- Recommendation for the further researcher

Findings of the Study

This study entitled “Students' difficulties in learning mathematics: A case study” is the emerging field in mathematics education in Nepal. The main objectives of this study were to explore the causes of difficulties faced by students in learning mathematics and also, to explore the ways to improve the interest of students in learning mathematics. The approach of this study was a case study under the qualitative research method. Observation notes, in-depth interviews, and document analysis were used as tools of data collection. The respondents of the study were six mathematics students, their parents, and two mathematics teachers from the undergraduate level. The major findings of this study are as follows;

- This study found that, all the students were taught on the basis of equality rather than on the basis of equity in the mathematics classroom. And also, teachers did not teach the mathematical problems according to the condition and ability of the students, which is the cause of students' difficulties in learning mathematics.
- It is found that, the teachers taught the mathematical problems only based on exam-oriented and teachers did not teach mathematical problems in connection with students’ daily life, which is the cause of students' difficulties in learning mathematics.
- It is found that, there was a lack of peer interaction between student-student and student-teacher in the mathematics classroom.

- It is found that, students did not have time for learning mathematics at home because they were doing a job at another time. They want to pass the exam without doing hard labor and practices in mathematics, which is cause of students' difficulties in learning mathematics
- This study found that, only the traditional type of lecture method and problem-solving method should be used in the mathematics classroom is one of the cause of students' difficulties in learning mathematics.
- It is found that, there was discrimination in the mathematics classroom. Teachers did not give the opportunities to weak students and they gave only more opportunities to talented students rather than weak students in the classroom.
- It is found that, students were not active in the classroom for mathematics learning due to their own interest, lack of prior knowledge, lack of anxiety and misconception about mathematics subject, which are the causes of students' difficulties in learning mathematics.
- It is found that, students were tired from the teacher's behaviors and they were not active and enthusiastic about learning mathematics in the classroom because teachers did not motivate the students for mathematics learning, which is the cause of students' difficulties in learning mathematics.
- This study found that, discrimination problems in the classroom, language problems in the classroom, different cultural background problems, lack of physical facilities on campus are some causes of students' difficulties in learning mathematics.
- It is found that, lack of parent's education, lack of parent's economic condition, and student's workload at home/room are some causes that influence the students' mathematics learning.
- It is found that, teachers sometimes used Projector, PowerPoint, and other mathematics-related software. But many other times teachers used the problem-solving method and lecture method in the classroom which is a cause of students' difficulties in learning mathematics.
- In overall, this study found that, causes of students' difficulties in learning mathematics are misconception about mathematics subject, not being able to spend enough time for learning mathematics at home, lack of students

previous knowledge in subject matter, the learner does not have his interest, lack of teachers teaching technique, teachers use the traditional type of teaching method in the classroom, teachers should not teach the mathematical problems in connection with students' daily life, teachers should not motivate the students to learn mathematics and also teachers should always give priority only to the good students and not give opportunities to the weak students in the mathematics classroom.

As reflected in the above causes of students' difficulties in learning mathematics, I would like to list out the ways to improve the interest of students in learning mathematics by conducted in-depth interview and classroom observation with two mathematics teachers and six mathematics students. From these tools and overall study of dissertation, I have carried out the ways to improve the interest of students in learning mathematics as follows;

- To teach the mathematical problems by connection with students' daily life.
- To teach the mathematical problems in a practical way rather than the theoretical way.
- Use digital technology in the mathematics classroom.
- Use cooperative learning method in the mathematics classroom.
- Provide an opportunity for students in learning mathematics at home & school.
- To motivate the students for learning mathematics in the classroom.
- To conduct the national/school level awareness program about mathematics subject.
- To create the student-student and student-teacher interaction environment in the mathematics classroom.
- Mathematics teachers need to use student-centered teaching method in the classroom.
- To provide scholarships for those students whose family economic condition is really weak.
- To make mathematics learning effective, teachers need to teach mathematical problems in connection with students' daily life and also teachers need to use appropriate teaching methods and materials for effective mathematics teaching/learning in the classroom.

Conclusion

If we look at the number of students enrolled in mathematics subject in the last few years, there we can see that the number of students studying mathematics is continuously decreasing. Why the number of students studying mathematics is constantly decreasing? Is the reason for the decrease in the curiosity of the students towards the mathematics subject being a difficult subject? Mathematics is really a difficult subject or we have made it difficult? Why the interest of students in studying mathematics is decreasing? I was curious as to study why so many students have taken mathematics as a difficult subject compared to other subjects. Then I had started to study to explore the causes of difficulties faced by the students in learning mathematics and also to explore the way to improve the interest of students in learning mathematics.

From the overall study, I concluded that there are different causes of students' difficulties in learning mathematics such as student-related factors, teacher-related factors, pedagogy-related factors, and environment-related factors. In these factors I have found that pupil's weak perception on mathematics subject, not being able to spend enough time for learning mathematics at home, lack of students previous knowledge in subject matter, the learner does not have his interest, lack of teachers technique, teachers use the traditional type of teaching method and materials in the classroom, teachers should not teach the mathematical problems in connection with our daily life, teachers should not motivate the students to learn mathematics, teachers should always give priority only to the good students and not give opportunities to the weak students and misconception about mathematics subject are the main causes of students difficulties in learning mathematics. On the other hand, due to the student's family's low economic condition, lack of parent's educational conditional, students' passivity in the mathematics classroom, and lack of students' motivation at school/home are other causes of students' difficulties in learning mathematics.

Also, I concluded that all the teachers were to be qualified, efficient, and trained in MRC and SMC who were teaching mathematics but mathematics teaching and learning ways in the colleges were good but not excellent. Teachers sometimes used Projector, PowerPoint, and other mathematics-related software but many other

times teachers used only problem-solving method and lecture method. Also, I concluded that most of the teachers were taught mathematics only based on exam-oriented that may be because of obligation to finish the course in the required time, some content can be naturally abstract or complex, etc. Some contents were taught based on rote learning and lecture methods. The teaching-learning process failed to connect the problems between students' daily life and mathematics.

I have also concluded that teachers need to use cooperative learning method in the mathematics classroom, to teach mathematical problems in a practical way rather than the theoretical way, to motivate the students for learning mathematics in the classroom, to use digital technology in the mathematics classroom, to create the student-student and student-teacher interaction environment in the classroom, to teach the mathematical problems in connection with students' daily life for improving the interest of students in learning mathematics. On the other hands, it is also necessary, to conduct the national/school level awareness program about mathematics subject, to decrease the misconception of students about mathematics subject, to provide scholarship for those students whose family economic condition is really weak and also mathematics teachers need to teach on student-centered method in the classroom then we can improve the interest of students in learning mathematics.

Implications of the Study

Every research has implications in different sectors (Shrestha, 2016). The study entitled "Students' difficulties in learning mathematics" has also implications in different sectors. Major focuses of this study were to analyze the causes of difficulties faced by students in learning mathematics and to find out the ways to improve the interest of students in learning mathematics. The major implication filed of this study concerns with educational and policy fields. Therefore, the main implication of this study can be listed as follows;

Educational implications

- It is helpful for the teachers to select effective teaching strategies to motivate the students in learning mathematics.
- It is useful for those teachers who are a beginner in teaching career they may take benefit from this research.
- It helps to identify the students' difficulties in learning mathematics.

- It helps to improve the interest of students in learning mathematics by eliminating the factors that affect students' mathematics learning.
- It helps to improve the performance and participation of the students in the mathematics classroom.
- It helps to promote the cooperative learning method and students-centered method in mathematics classrooms at colleges.
- It is helpful for mathematics teachers, students, researchers, curriculum planners, textbook writers, educationists, and students themselves.

Policy implications

- It is helpful for the author who will write the textbook of mathematics about which type of problems to include in the mathematics textbook.
- It is useful for the government to adopt globally for the education level.
- It is beneficial for the curriculum planner about which type of area/topic to include in the curriculum.
- It is useful for form a data bank reference and helps us an area for further educational researcher.

Recommendation for Further Researcher

This study of mine may not be complete in the field of why students are taking mathematics as a complex subject, it can still be studied concerning its various aspects. This study was based only on undergraduate level students of Kathmandu and the Bhaktapur district. This study can also be done concerning more graduate-level subjects. Because at undergraduate level real analysis, geometry, algebra as well as graduate level measure theory, complex and numeral analysis, topology students can also feel complex and abstract subject. This study was limited to only the opinions of six students, only their parents, and only two mathematics teachers towards difficulties faced by students in learning mathematics. It did not tell anything about the opinion of school administration and government towards difficulties faced by students in learning mathematics. Thus, further research is needed in this direction. Thus, at last, those who want to study further in this field/area can be studied in more depth by relating to the following questions;

- Why the number of students studying mathematics is constantly decreasing?

- Why the interest of students in studying mathematics is decreasing?
- Mathematics is only for talented and competitive students? Other general intellectual abilities students can study?
- Mathematics is really a difficult subject or we have made it difficult?
- Why many people feel mathematics as bit difficulty subject rather than other subject?
- This study was based on a case study approach under the qualitative research method. Also, again this study can be done based on the survey design under quantitative research in another field/area.

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Appendix - I

Classroom Observation Format/Area

Name of school:

Students' participation:

Date of observation:

Topic:

Teacher Activities

- Teacher's teaching style, method, and materials.
- Interaction between students-students and teacher-students in the classroom.
- Collaboration and discussion in subject matter with students.
- Classroom environment and management.
- Classwork and Homework

Students Activities

- Participation of students in classroom activities
- Students' interest in related topic/content
- Relation between to each other students

Appendix - II

Interview Format for Subject Teacher

Name of Teacher: Date:

Qualification: Experience:

Address: Gender:

Name of School:

The interview with the mathematics teacher was taken in terms of the following main points;

- Use of technology in the mathematics classroom (PowerPoint, projector, mathematical software)
- Impact of motivation in learning mathematics.
- Learning opportunities for the students.
- Reward and punishment
- Effective teaching methods and materials
- Students learning habit
- Classroom management
- Motivation/Encourage for the students
- Relation between teacher and student in the classroom
- Status of teaching-learning materials and multimedia
- causes of difficulties in learning mathematics
- Way to improve the interest of students in learning mathematics.

Appendix - III

Interview Format for Respondents

Name of Students: Date:

Class: Roll No:

Age: Gender:

Permanent Address: Temporary Address:

Position in the Class:

Name of School:

The interview with the key respondents was taken in terms of the following main points;

- Personal history (birthplace, previous school, habit, etc.).
- Family background (members, education, economic status, occupation, etc.)
- Learning opportunity at home and school.
- Opinion about mathematics subject.
- Views about the school environment and teacher's behaviors.
- Parent support in learning.
- View about teacher's teaching technique, materials, and method.
- Participation in extracurricular activities.
- Difficulties in learning mathematics.
- Improve students' interest in learning mathematics.
- Expectations from school, teacher, and parents.

Appendix - IV

Interview Format for Students' Parents

Name: Date:

Gender: Age:

Relation with student:

The interview with the students' parent was taken in terms of the following main points;

- Economic condition
- Parent's occupation and education
- Family environment of students for learning
- Child's interest
- The physical facility at home

Appendix - V

Model Question Set

Name of Campus: ..... Level: .....

Name of Teacher/Student: ……..... Gender: …….....

The interview with mathematics teacher, mathematics students and students' parents were conducted on the basis of following structure & semi-structure questions format.

Questions

In the below questions, present your freely opinion/reflection. You can write Nepali, English or both medium languages. Please, do not copy exactly through internet or any other mediums. I will check the plagiarism of the responses you wrote.

Name: .....*(if you want to write)*

1. Mathematics is really difficult subject or we have made it difficult? Critically explain.

   .....

2. Why is it necessary to teach mathematics in connect with our daily life problems?

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3. Why did you choose mathematics subject rather than another subject?

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4. How is your view/perception in learning mathematics subject?

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5. How to affect the home environment in your learning mathematics?

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6. How does the use of ICT affect in your mathematics learning?

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7. How does the student's labor affect in learning mathematics?

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8. How does the teacher's teaching techniques that use in the classroom affect in your mathematics learning?

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9. How does the teacher's motivation factors affect in your learning mathematics?

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10. How much time do you spend in daily learning mathematics? Analytically explain.

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11. Why do you feel mathematics as difficulty subject rather than another subject?

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12. When a teacher teaches without using any materials in the classroom, how does it affect in your learning mathematics?

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13. How does pre-knowledge affect in your mathematics learning?

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14. How do you feel about peer interaction learning and single learning in the mathematics classroom? Which is suitable for mathematics learning? Critically explain.

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15. How to improve the interest of students in learning mathematics?

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16. How does teacher's self-confidence affect in your learning mathematics?

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17. How does the teacher's teaching method that use in the classroom affect in your mathematics learning?

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18. How to influence the school related factors in your mathematics learning?

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19. Why many people feel mathematics as bit difficulty subject rather than other subject?

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20. What strategies/pedagogy do teachers should adopt to improve the interest of students in learning mathematics?

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