

**STUDENTS DIFFICULTIES IN LEARNING SCHOOL ALGEBRA**

**A**

**THESIS**

**BY**

**OM PRAKASH YADAV**

**FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE  
DEGREE OF MASTER EDUCATION**

**SUBMITTED**

**TO**

**DEPARTMENT OF MATHEMATICS EDUCATION**

**CENTRAL DEPARTMENT OF EDUCATION**

**UNIVERSITY CAMPUS**

**KIRTIPUR, KATHMANDU**

**2022**



त्रिभुवन विश्वविद्यालय  
शिक्षा शास्त्र केन्द्रीय विभाग  
**गणित शिक्षा विभाग**

विश्वविद्यालय क्याम्पस  
कीर्तिपुर, काठमाडौं, नेपाल

UNIVERSITY CAMPUS  
Kirtipur, Kathmandu, Nepal

TRIBHUVAN UNIVERSITY  
CENTRAL DEPARTMENT OF EDUCATION  
**DEPARTMENT OF MATHEMATICS EDUCATION**

पत्र संख्या:-  
Ref.

मिति:  
Date: .....

**LETTER OF CERTIFICATE**

This is to certify that Mr. Om Prakash Yadav a student of academic year 2072/73 with Campus Roll No. 26/2072, Thesis No. 1511, Exam Roll No. 7228341 (2072) and TU Registration No. 9-2-306-81-2010 has completed this thesis under my supervision during the period prescribed by the rules and regulations of Tribhuvan University, Nepal. The thesis entitled, "Students Difficulties in Learning School Algebra" has been prepared based on the results of his investigation during the period of 2021-2022, I hereby recommended and forward that this thesis be submitted for the evaluation as the partial requirement to award the degree of Master Education.

.....

Prof. Bed Raj Acharya

(Head)

Date: 03 Feb. 2022



त्रिभुवन विश्वविद्यालय  
शिक्षा शास्त्र केन्द्रीय विभाग

**गणित शिक्षा विभाग**

TRIBHUVAN UNIVERSITY

CENTRAL DEPARTMENT OF EDUCATION

**DEPARTMENT OF MATHEMATICS EDUCATION**

विश्वविद्यालय क्याम्पस  
कीर्तिपुर, काठमाडौं, नेपाल

UNIVERSITY CAMPUS  
Kirtipur, Kathmandu, Nepal

पत्र संख्या:-  
Ref.

मिति:  
Date: .....

**EVALUATION AND APPROVAL**

This thesis entitled “**Students Difficulties in Learning School Algebra**” submitted by Mr. Om Prakash Yadav in Partial Fulfillment of the Requirement for the Master's Degree in Education has been approved.

**Viva Voce Committee**

**Signature**

Prof. Dr. Bed Raj Acharya

.....

(Head)

Assoc. Prof. Rajendra Kunwar

.....

(External)

Mr. Krishna Prashad Bhatt

.....

(Supervisor)

Date: 13 Feb. 2022



त्रिभुवन विश्वविद्यालय  
शिक्षा शास्त्र केन्द्रीय विभाग

**गणित शिक्षा विभाग**

TRIBHUVAN UNIVERSITY

CENTRAL DEPARTMENT OF EDUCATION

**DEPARTMENT OF MATHEMATICS EDUCATION**

विश्वविद्यालय क्याम्पस  
कीर्तिपुर, काठमाडौं, नेपाल

UNIVERSITY CAMPUS  
Kirtipur, Kathmandu, Nepal

पत्र संख्या:-  
Ref.

मिति:  
Date: .....

### RECOMMENDATION FOR ACCEPTANCE

This is to certify that **Mr. Om Prakash Yadav** has completed his M. Ed. thesis entitled “**Students Difficulties in Learning School Algebra**” 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.

.....  
**Mr. Krishna Prashad Bhatt**

(Supervisor)

Date: 03 Feb. 2022

**COPYRIGHT**

©2022

Copyright by Mr. Om Prakash Yadav

This document is copyright material. Under law, no parts of this document may be reproduced without the expressed permission of the researcher.

Defense Date: 13 Feb. 2022

All Right Reserved

**DEDICATION**

*Honestly dedicated*

*to*

*My Late Grand Father*

*Jhinku Yadav*

**DECLARATION**

This thesis contains no material which has been submitted for the award of other degree in any institution to the best of my knowledge and belief this thesis contains no material previously published by any authors except due acknowledgement has been made.

Date : 03 Feb. 2022

.....

Om Prakash Yadav

## ACKNOWLEDGEMENT

There were so many people who contributed towards achieving my goal during this study which is one of the best experiences that I have received in my life. All of them have special place in my heart who have supported and assisted me throughout this journey.

Special thank goes to my supervisor Mr. Krishna Prashad Bhatt, Lecturer, Department of Mathematics Education, Tribhuvan University, Kirtipur, Kathmandu for his guidance creative suggestions and regular encouragement throughout the research period.

My sincere gratitude is expressed to Prof. Dr. Bed Raj Acharya, Head Department of Mathematics Education, T.U., Kirtipur, for his suggestion to complete this study. At the some time, my sincere thanks are also intended to Mr. Abatar Subedi, Mr. Loknath Bhattraai, Dr. Eka Ratna Acharya, and all the respected Faculties of the Department of Mathematics Education, T.U.

I also want to extend my appreciation to Head teacher, staff members and all students of school who helped me in various ways and who choosens to take part in this study.

Finally, I am also thankful to my colleagues for their cooperation and help to collect the data for the study.

.....

Om Prakash Yadav



## ABSTRACT

The main aim of this study entitled "Students Difficulties in Learning School Algebra" is to analyze the causes of difficulties faced by students in learning school algebra at grade VIII. In particular, the study attempts to explore these difficulties through the analysis of the causes. This research is qualitative in design with case study approach. For the analysis of this study the researcher selected one of the school of Rupandehi district from where 4 students were sampled, written exam, classroom observation form and interview guideline to students subject teacher and parents were used to collect data. In addition to this unstructured interview of selected students teachers and parents was also taken to analyze difficulties. Based on review literature and different concept of theories data have been analyzed and interpreted to find out the causes of difficulties faced by students in learning algebra. It was found that learning environment at home and school teachers teaching strategy, students learning strategy, collaboration between teacher and students responsibility of parents during the learning, parents involvement in school, lack of belief and support, teaching method have emerged as the major causes behind the difficulties in learning school algebra. In conclusion the researcher finds that the guardian and parents of students have not regularly visit the school and kept in touch with their children in learning process. The environment of home and school has not improved for students to be motivated for learning mathematics.

## TABLE OF CONTENTS

	<i>Page No.</i>
<i>Letter of Certification</i>	<i>i</i>
<i>Evaluation and Approval</i>	<i>ii</i>
<i>Recommendation for Acceptance</i>	<i>iii</i>
<i>Copyright</i>	<i>iv</i>
<i>Declaration</i>	<i>v</i>
<i>Dedication</i>	<i>vi</i>
<i>Acknowledgement</i>	<i>vii</i>
<i>Abstract</i>	<i>viii</i>
<i>Table of Contents</i>	<i>ix</i>
 <b>Chapters</b>	
<b>I. INTRODUCTION</b>	<b>1-7</b>
Background of the Study	1
Statement of the Problem	3
Research Questions	4
Objective of the Study	4
Significance of the Study	4
Delimitation of the Study	5
Definition of Related Terms	6
<b>II. REVIEW OF RELATED LITERATURES</b>	<b>8-23</b>
Empirical Review of Literature	8
Theoretical Framework	17
Conceptual Framework of the Study	22

<b>III. METHODS AND PROCEDURES</b>	<b>24-30</b>
Design of the Study	24
Selection of School	24
Case Respondents	25
Source of Data	25
Data Collection Tools	25
Reliability and Validity	27
Data Collection Procedure	27
<b>IV. ANALYSIS AND INTERPRETATION</b>	<b>29-41</b>
Introduction of Case Study	31
Introduction of Case Study	32
Cause of Difficulties Faced by Dalit Students in Learning Mathematics	33
Learning Environment at Home and School	33
Teachers Teaching Strategy	36
Collaboration between Teacher and Students	38
Episode	38
Responsibility of Parents toward Learning	39
Students Learning Activities	40
<b>V. FINDINGS, CONCLUSION AND IMPLICATION</b>	<b>42-45</b>
Findings of the Study	42
Conclusion	43
Implication	44

## **REFERENCES**

## **APPENDICES**

## Chapter I

### INTRODUCTION

#### Background of the Study

The branch of mathematics that deals with general statement of relation, utilizing letters and symbols to represent specific set of numbers, values, vectors etc. is called algebra. Algebra is branch of mathematics that uses number and letters that represent numbers (Merriam- Webster's Learner's Dictionary, 2010). The history of algebra began in ancient Egypt and Babylon, where people learned to solve linear and quadratic equation as well as intermediate equations such as  $x^2 + y^2 = z^2$ , whereby several unknown are involved. A generalization of arithmetic in which letters representing numbers are combined according to the rules of arithmetic, Algebra is separate area of mathematics which belong the study of relation, quantity and structure. Within mathematics curricula, algebra has been widely recognized as one of the most difficult area, which leads to learning difficulties worldwide. Algebra has been recognized as a critical milestone in students' mathematics learning.

Algebra is core subject within the mathematics and school mathematics in particular. It is instrumental for achievement in other mathematical domain such as analytical geometry, calculus, and statistics. Algebra serves not only as a language for science, but also as a gateway to advance mathematics and higher education. Furthermore algebraic knowledge and skills are relevant in daily and professional life either directly or as a prerequisite (Stacy, 2004). Therefore successful algebra education is a precondition for achievement in mathematics education in general. However it has been noted that many students created a serious barrier in the algebraic problem solving and formal algebraic system (Kieran, 1992) algebra has

been increasingly recognized as a subject that is not only hard to learn but also hard to teach well (Stacey et al. 2004; Watson 2009).

Although these are difficulties in teaching and learning of algebra are worldwide phenomenon. Many algebraic problems are difficult for students, because solving them may require an understanding of the conceptual aspects of fraction, decimals, negative numbers, equivalence, ratios, percentage or rates (Stacey & Chick, 2004).

Problems relating to algebra learning might have affected the achievement in teaching mathematics. This is a great challenge to the students and teacher. Various researchers about difficulties in learning algebra indicate that there are problems in learning algebra. Students got difficulties concerned understanding algebraic expressions, applying arithmetic operations in numerical and algebraic expressions. In similar way they are confused in understanding the different meanings of the equal sign and understandings variables (Al Jupri et al, 2014) moreover students faced problem in learning algebra are confused by language in word problems, have trouble learning or recalling abstract terms and have difficulties explaining and communicating about math. Students are unable to recall basic math facts, procedures, rules or formula. Similarly have trouble ordering the steps used to solve a problem.

Mathematics curricula in Nepal have given emphasis on algebra from the beginning of school level. Though students of grade eight felt difficulties in problem solving of algebra. Students get difficulty operating with the negative integers, misapplied a wide variety of rules in the process of simplifying and did not apply the BODMAS rule correctly. Students misapplied the rule "negative times negative is positive" made distributive errors and inadequate understanding of the uses of the equal sign and its properties. Similarly students felt difficulties in word problems into

translating mathematical form and understanding the problem due to the technical mathematical word (Lim Kok, 2014).

Researchers have shown that changes in the syllabuses reflect changes of emphasis in mathematics as practiced by mathematicians, rather than changes in our understanding of students' thought processes or motivation (Upadhaya, 2010. p.48). That's why the researcher decided to make a systematic study on the topic "students difficulties in learning school algebra" at grade-VIII. From the above it is seen that students felt difficulties in solving/learning algebra in many steps or process. The main causes of difficulties in learning algebra are student's low interest in algebra learning, lack of good relation between teacher and students, teaching method and lack of sufficient materials and no extra activities related to the algebra for weak students (Sapkota, 2008).

### **Statement of the Problem**

Mathematics is everywhere and the ability to understand and interpret mathematical knowledge is an essential feature of life in the 21<sup>st</sup> century, vital for the economy, for our society and for us as individuals. In our context mathematics takes the central role in school level education. The importance of mathematics is increasing day by day from the early age to till now. There are so many misconception of mathematics like aptitude for mathematics inborn, to be good at math you have to be good at calculating, men are naturally better than woman at mathematical thinking etc. These promote negative think toward mathematics as well as algebra and these things also make more difficult psychologically or mentally to poor students in learning algebra.

In my experience of the school life my friends (who were weak in algebra) almost used to leave the math class. They didn't do homework by self- practice they

lost confidence by seeing problem of algebra, they followed talented friends for copying the mathematics notes and home-work. In mathematics class their heads gone to down instead of toward white board. They are insulted by teacher many times due to incomplete homework; it made them shy and frustrated on self but never improved their habit as result they failed at School Level Certificate Examination (S.L.C.) therefore I was excited to know the reason behind it.

Also in Rupandehi district, researcher heard that there are learning difficulties in algebra to some students in "Shree Piparahawa Secondary School Piparahawa". There was learning difficulties in that school to some of the students of grade-VIII and these difficulties made them weak in algebra. Researcher like to know about the difficulties and weakness of students in algebra. Thus researcher chose this topic for the research. This study will focus on identifying the student's difficulties in learning algebra and exploring the causes behind it.

### **Objective of the Study**

The objectives of the study are as follows:

1. To identify the student's difficulties in learning algebra of grade- VIII.
2. To explore the causes of student's difficulties in learning algebra of grade-VIII.

### **Research Questions**

This study was conducted to answer of the following questions:

1. What are the difficulties of students in learning school algebra ?
2. What are the causes of difficulties of student's in learning school a

### **Significance of the Study**

Mathematics is compulsory subject at basic level. Error in solving mathematical problems often occurs either in writing, or orally. During the process of

teaching and learning mathematics, students will face many obstacles because problem solving in mathematics is a skill that is very complex. Sometimes students know how to answer the question stated, but careless in computation (Zakaria, 2010). Mathematics has been accepted as an essential component of formal education from ancient period because understanding & skill in mathematics are fundamental qualification for literacy which is inevitable for the civilized society. The students have to apply mathematical concepts & skills in daily life, in their professional & vocational fields as well as in their higher study. But it is generally accepted that students are weak in day to day life application of mathematics.

The algebraic problems among mathematics problems mostly deal with relating the real world situations to mathematical concepts. In fact, such problems help students to use their mathematics knowledge in solving their daily life problems. It is important to analyze what causes and how to address these difficulties in learning algebra so that teachers can understand the difficulties of students to learn school algebra for better treatment to the students within the classroom.

The study has the following significance

- The study helps for the improvement in the day to day classroom.
- It helps the teacher to organize the experience and teaching strategies and adopt suitable method to teach.
- This study helps for students, parents, counselors, teachers, curriculum designer, textbooks writer, researcher, coordinator and administrators.
- It helps for action researcher in the field of teaching.

### **Delimitation of the Study**

The situation or condition which is out of control of researcher or he/she can't fulfill as mentioned in his/her thesis, which affects the result of study that is called



limitation of the study (Khanal, 2016). If the researcher determines the boundary of study as his/her wish/choice that boundary is called delimitation. (Khanal, 2016. p.29).The study had the following delimitations because of time, money and resources.

Every research has delimitation in terms of time, research, finance and others.

This study has following delimitations:

- The study has based on grade-VIII of basic level.
- The study has based on the only one school of Rupandehi district.
- The study had limited on qualitative research design
- The study had limited on in- depth interview and class observation only.
- The study has been conducted on "Shree Piparahawa Secondary School Piparahawa" only.
- The study had focused on identifying the difficulties of students in learning algebra and exploring the causes behind it.

### **Definition of Related Terms**

Here some terms are given which are more significant for this study. These words which reflect the whole study and give particular meaning. These terms should be defined clearly to make easy understanding of the problem and avoid ambiguous meaning of terms which can be otherwise interpreted in different ways.

**Learning difficulties.** In this study meaning of learning difficulties are student's problems related to various chapter of algebra in solving/learning them.

**Problem solving.** It refers students' skill in the use of symbol, property, ideas, fear, felling, processing in solving algebra.

**Variables.** A letter which represents more than one number of value is known as variable in this study.

**Word problems.** It means the questions of grade eight textbooks which are described in words represent the mathematical relations.

**Written test.** In this study written test means a test conducted at grade VIII. This was administrated to observe difficulties of students in learning algebra.

## **Chapter II**

### **REVIEW OF THE RELATED LITERATURE**

A review of the related literature is the source for the further study. It provides the strong knowledge about the related topic. Research is the orderly investigation of a subject matter for the purpose of adding knowledge (Khanal, 2016, p. 3). The review of related literature involves the systematic identification, location and analysis of documents containing information related to the research problem (Khanal, 2016).

The main purpose of the study was to find out the learning difficulties of students in algebra and to explore the causes of learning difficulties in learning algebra for this some national and international theses and articles are reviewed. On the basis of learning disability theory and constructivist theory the data will be analyzed by using interview schedule and class observation as tools of the study.

#### **Empirical Review**

Empirical review deals with the review of the books, theses, journals, articles and internet and so on. This topic deals about the research carried out in related field. There are some national as well as international theses and articles are included in this chapter.

In 1971 David Kolb developed the Learning Style Inventory (LSI) to assess individual learning styles. While individuals tested on the LSI show many different patterns of scores, research on the instrument has identified four statistically prevalent learning styles are: Diverging, Assimilating, Converging and Accommodating which are described below.

Diverging (feeling and watching CE/RO): - The diverging style's dominant learning abilities are concrete experience (CE) and reflective observation (RO).

People with this learning style are best at viewing concrete situations from many different points of view. It is labeled “Diverging” because a person with it performs better in situations that call for generation of ideas, such as a “brainstorming” session. People with a Diverging learning style have broad cultural interests and like to gather information.

Assimilating (watching and thinking AC/RO): - The Assimilating style’s dominant learning abilities are abstract conceptualization (AC) and reflective observation (RO). People with this learning style are best at understanding a wide range of information and putting into concise, logical form. Individuals with an Assimilating style are less focused on people and more interested in ideas and abstract concepts. Generally, people with this style find it more important that a theory have logical soundness than practical value. The Assimilating learning style is important for effectiveness in information and science careers. In formal learning situations, people with this style prefer readings, lectures, exploring analytical models, and having time to think things through.

Converging (doing and thinking AC/AE): - The Converging style’s dominant learning abilities are Abstract Conceptualization (AC) and Active Experimentation (AE). People with this learning style are best at finding practical uses for ideas and theories. They have the ability to solve problems and make decisions based on finding solutions to questions or problems. Individuals with a Converging learning style prefer to deal with technical tasks and problems rather than with social issues and interpersonal issues. These learning skills are important for effectiveness in specialist and technology careers. In formal learning situations, people with this style prefer to experiment with new ideas, simulations, laboratory assignments, and practical applications.

Accommodating (doing and feeling CE/AE): - The Accommodating style's dominant learning abilities are Concrete Experience (CE) and Active Experimentation (AE). People with this learning style have the ability to learn from primarily "hand-on" experience. They enjoy carrying out plans and involving themselves in new and challenging experiences. Their tendency may be to act on "gut" feelings rather than on logical analysis. In solving problems, individuals with an Accommodating learning style rely more heavily on people for information than on their own technical analysis. This learning style is important for effectiveness in action-oriented careers such as marketing or sales. In formal learning situations, people with the Accommodating learning style prefer to work with others to get assignments done, to set goals, to do field work, and to test out different approaches to completing a project.

Witzel, Mercer and Miller (2003) studied on "Teaching Algebra to Students with Learning Difficulties"; An Investigation of an Explicit Instruction Model. The purpose of this research was to test the effectiveness of a new explicit concrete to-representational-to-abstract (CRA) algebra model that was designed to represent more complex equations. In research thirty- four matched pairs of sixth and seventh grade students were selected from 358 participants in a comparison of an explicit concrete to representational to abstract (CRA) sequence of instruction with traditional instruction for teaching algebraic transformation equations. Each pair of students had been previously labeled with a specific learning disability or as at risk for difficulties in algebra. Students were matched according to achievement score, age, pretest score, and class performance.

The same math teacher taught both members of each matched pair, but in different classes. Twelve classrooms and ten teachers in a southeast United States urban country participated in this research. Four teachers individually taught a total of

eight mathematics classes for sixth graders and two sets of teachers team taught four mathematics classes for seventh graders. Effectiveness of the CRA model for students with learning disabilities and students who were at risk for failure in secondary mathematics was evaluated according to a posttest and a three- week follow- up measure. Comparatively the students who were taught in CRA instruction do well than traditional method.

Adhikari (2006), Conducted a research on cultural discontinuity and learning difficulties in Mathematics: A case study of primary Dalit school children: The main objectives of this study was to identify the cause of difficulties in learning Mathematics of Dalit children of school and to identify the influencing factor in learning Mathematics for the Dalit children at school. This study was focus on all the grade five students of Banibilas secondary school of Chapagaun V.D.C. in Lalitpur district. He used in-depth interview, observation for the data collection procedures. This study found that there is discontinuity between silence culture and forwarded culture. He also found that Dalit children have poor language ability and they cannot concentrate in their study due to their involvement in household works.

Zakaria (2010) studied on “Error analysis of student’s error in learning of quadratic equations”. The main objective of this study was to determine the students’ errors in learning quadratic equation. This is a case study and he used survey method. He used the tools questionnaire, interview schedule and diagnosis method for data collection. This study is based on Newman’s error analysis theory. He selected three students from a secondary school in Jambi, Indonesia. He prepared written test paper from quadratic equation having three subtopics of 16 questions where he selected 6 questions from factorization, 5 from completing square and 5 from using quadratic formula. He conducted in-depth interview with those three students and analyzed their

answer by coding method and categorized the errors made by students on the basis of Newman's procedure.

He used the descriptive statistics percentage and frequency for analyzing the data by scoring the test paper and identified the errors by using Newman's hierarchical model. He found that many students made transformation errors and process-skill errors in solving quadratic equation by factorization method but mostly students made process-skill errors in solving quadratic equation by both complete square method and using quadratic formula method. He found no errors in reading error. The number of students who made encoding error and carelessness was small.

He concluded that the most errors are made by students are transformation errors and process-skill errors in solving quadratic equations. The errors made by students due to their weakness in mastering topics such as algebra, functions, negative numbers and algebraic expressions.

Mahmoud (2013) studied on "The relationship between the learning styles of students in grades five and six and their held misconceptions about dividing fractions based on Kolb's model". The objective of this study was to examine the relationship between two grade five and six students' learning styles according to the Kolb's Learning Style Inventory, and their misconceptions in dividing fractions. This study is both quantitative and qualitative nature and the design was descriptive design. He used questionnaire and interview for data collection. He selected 1864 students from grades five and six randomly from 15 public schools in Abu Dhabi as sample of this study where 978 was girls and 886 was boys.

The sample consists 925 students in grade five (49.62 %) and 939 students in grade six (50.38 %). He used Kolb's Learning Style Inventory and mathematics diagnostic test for gathering the data. The first section contains fifteen multiple-choice

conceptual questions and section two contains five fractions division problems. The students used paper and pencil and they didn't use calculators. He conducted interview to know the reasons for misconception. He defined misconception if students do error more than 25%. For analyzing the data he scored the answer sheet of written test and categorized on the basis of Kolb's Learning Style Inventory. He analyzed data by simplifying the answer to the lowest term, comparing fractions, changing mixed numbers into improper fractions, equivalent fractions and fractions' representations.

He also analyzed the data by using descriptive statistics specifically proportion tests, and the Chi-Square Independence Test. He found that the dominant learning style of both grades is convergent with students (38.84%) where 34.70% for grade five and 42.92% for grade six. The dominant learning styles were assimilating with 23.35%, accommodation with 21.73% with grade six. The dominant learning style was diverging with 17.08%. He also found the type of misconceptions the two grades students hold, the study reveals that 31.81% of the sample holds flipping the dividend misconception, 28.97% of them hold lack of fraction concepts misconception, and 28.7% of the two grades hold multiplying without flipping misconception.

He concluded that the highest value for both grades is for convergent learners with 724 students (38.84%); 34.7% for grade five and 42.92% for grade six. The students' learning styles varied from grade to grade. The students' learning styles need to be checked at the beginning of each academic year. The two grades hold the same misconceptions. There is a lack of fraction concepts, and how to use them in different situations.

Shrestha (2016) studied on "cultural diversity and difficulty in learning mathematics" the main objective of this study was to identify the causes of difficulties



in learning mathematics of culturally diverse students at school and to explore the relation between culture and learning mathematics. It concentrates on the specific themes of emerging main research questions based on difficulties in learning mathematics of culturally diverse students at school, relation between culture and learning mathematics, and effective teaching learning approach for culturally diverse classroom. In dealing with research questions based on the above themes, I used qualitative research design and ethnography approach to explore the multiple realities through the methods of observation, in-depth interview and documents analysis.

One government school (i.e. Shree Shanti Vidhyagriha Higher Secondary School) was selected from Kathmandu district and eight students from grade VII and IX were selected on the basis of purposive sampling. Head teacher and two mathematics teacher were also selected as a sample of this study. The collected data were analyzed with the help of theories and related literatures. Cross match or triangulation was adopted to maintain the validity and reliability of the results of the study.

The study found that there is a cultural diversity in classroom. The culturally diverse students have many difficulties in learning mathematics. Pupil's weak perception on mathematics, lack of culture friendly curricular materials, mathematics anxiety, and traditional teaching learning activities, family's socioeconomic status, discrimination in classroom and home-school mismatch were the difficulties in learning mathematics of culturally diverse students at school. There is mutual relation between culture and learning mathematics. Integrate culturally relevant content and social issues, utilize culturally responsive instructional strategies and use cooperative learning in mathematics are the effective teaching approaches for the culturally diverse classroom at school. It has also concluded that mathematics teaching and

learning ways from the schooling is not good. Existing school mathematics teaching learning practices seem failing to address social and cultural needs of the students.

Karki (2017) studied on "Students difficulties in learning algebra at secondary level". The main objective of this study was to find out the students difficulties in learning algebra at secondary level. For the fulfillment of the objective of this study he had used learning disability theory as theoretical base for the study. The study was based on mixed method approach using concurrent design with 'quan- qual' form. He selected one school in Nuwakot district purposively as sample school of the study and 150 students of grade 6, 7 and 8 were selected for sample of the study in which 47 students of grade 6, 53 students of grade 7 and 50 students of grade 8 had been selected for this study. He chose ten students for interview from sample students. The main tools of the study was interview schedule and achievement test. He found 22% students gave incorrect answers, difficulties in word problem, difficulties in comprehending variables, difficulties in dealing with algebraic expression, difficulties in solving equation and difficulties in transition from arithmetic to algebra.

On the basis of the analyzing and interpreting data he concluded that there were many difficulties in learning algebra faced by student at lower secondary level. The main reason of these difficulties were misunderstanding of variable so the teacher should clear the misunderstanding and give clear concepts, there was need of clear concept, good thinking towards algebra, their structure and relation of algebraic expression. There was need to apply and write appropriate sign and symbols, understanding and translating of word problems, complete solution follow the rule, structure and formula related to algebra.

Mahato ( 2018) studied on "Student's difficulties in learning school geometry". the main objective of the study was to find the difficulties and causes of difficulties in

learning geometry. He has used Van- Haile's theory of learning geometry and constructivism as theoretical base of his study. The qualitative method and case study was used as design of the study. This is the descriptive nature rather than numerical or inferential. Classroom observation and in-depth interview was the tools of the study. One school was chosen purposively as sample school of the study in Kathmandu district. One head teacher, two mathematics teachers, five parents and eight students were chosen purposively for interview. Interview scheduled and observation was prepared by him for collecting the data for the study. He took face to face interview and used diary to note the data. By analyzing and interpreting the data he found that there were lack of physically well equipment class, modern technological materials and continuous system in teaching geometry.

The students neglected the daily assignments and the teacher didn't check homework properly. Lack of motivation, lack of knowledge about geometry and theory related to the geometry to the teacher, lack of pre knowledge, lack of new effective teaching materials and method, huge course duration of curriculum and lack of interaction between teacher and students as well as students to students. The conclusion of this study was: teacher should be active and make their students active as well toward teaching and learning geometry, need of appropriate teaching skill, training, teaching materials and instructional methods. There was need of interaction between students to students and students to teacher as well manner.

Limbu (2018) conducted a study on "student's difficulties in learning algebra at grade VIII" the objective of this study was to explore the student's difficulties in learning and to find the causes behind it. He had used the constructivist learning theory to achieve the aim of this study. The mixed method that is both quantitative and qualitative method was used for this study and the mixed method was sequential

explanatory design which is characterized by the collection and analysis of quantitative data followed by the collection and analysis of qualitative data. He selected two schools in Kathmandu district by using convenience sampling method for the study. He used the case study method to collect the data for this he selected ten students having low and high performance who had achieved below the 20% marks were low performance and above the 60% were high performance in this way the students were categorized in low and high performance, two math teachers were selected for the sample of the study as respondent as interviewee by simple random method. The main tools of this study were achievement test, interview and class observation.

By analyzing and interpreting the data he found that there was lack of knowledge to differentiate variable and constant which was major problem in comprehending variables low performer students were confused to differentiate variable and constant and high performance students were able to addition and subtraction but confused in simplification of variables like, multiplication and division. Misunderstanding in equation solving, students were confused due to the technical words, language and vocabulary, students did not have sufficient practice of algebra. He concluded that students are unable to translate the word problem into the mathematical form with proper sign and symbols therefore teachers need to implement the modern technique of teaching and learning method as well as appropriate use of mathematical materials. Difficulties in learning algebra play the vital role to obtain the low achievement in algebra.

### **Theoretical Review**

The theoretical review of literatures guides and integrates the research study. It is the plate form of the research program. The conceptual and theoretical literature is

reported on in order to demonstrate our understanding of the evolution and state of the field (Khanal, 2016).

Learning Disability Theory. Learning disabilities are disorders that affect one's ability to understand or use spoken or written language, do mathematical calculations, coordinate movements, or direct attention (Psychologytoday.com). Learning disabilities look very different from one child to another. One child may struggle with reading and spelling, while another loves books but can't understand math. Still another child may have difficulty understanding what others are saying or communicating out loud (Gina K; Melinda, and Jeanne S; 2017). Learning disability is general term that describes specific kinds of learning problem.

A learning disability can cause a person to have trouble learning and using certain skills. The skill most often affected are reading, writing, listening, speaking, reasoning and doing mathematics. Learning disability is classification including several areas of functioning in which a person has difficulty learning in typical manner, usually case by unknown factors. Given the "difficulty learning in typical manner" this does not exclude the ability to learn in different manner. Therefore, some people can be more accurately described as having a "Learning difficulties", thus avoiding any misconception of being disabled with a lack of ability to learn and possible negative stereotyping. While learning disability, learning disorder and learning difficulty are often used interchangeably, they differ in ways. Disorder refers to significant learning problems in an academic area.

These problems however are not enough to warrant an official diagnosis. There are different types of learning disability they are (Learning Disabilities Association of America) i. Language based learning disability: A specific type of Auditory Processing Disorder (APD) in which there is difficulty attaching meaning to

sound groups that from words, sentences and stories. It is heterogeneous disorder associated with their academic skills as listening, reasoning, speaking, writing, and math calculation. ii. Dyslexia: A specific learning disability that affects reading and related language- based processing skills. The severity can differ in each individual but can affect reading fluency, decoding, reading comprehension, recall, writing, spelling, and sometimes speech and can exist along with other related disorders. iii. Nonverbal learning disability: This denotes disorder which is usually characterized by a significant discrepancy between higher verbal skills and weaker motor, visual-spatial and social skills. Similarly deals with difficulty with mathematics and poor organization skills. iv. Memory: Three types of memory are important to learning. Working memory, short- term memory and long-term memory are used in the processing of both verbal and non- verbal information. If there are deficits in any or all of these types of memory, the ability to store and retrieve information required to carry out tasks can be improved.

Mathematical Learning Disability. This disability involves learning math concepts, difficulty memorizing math facts, difficulty organizing number and understanding how problem are organized ([en.wikipedia.org/wiki/Learning disability](http://en.wikipedia.org/wiki/Learning_disability)). Learning disability means a disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, which disorder may manifest itself in the important ability to listen, think, read, write, spell or do mathematical calculation (The Individuals with Disabilities Improvement act (IDEA 2004).

Mathematics learning disability not often occurs with clarity and simplicity rather they can be combinations of difficulties which may include language processing problems, visual spatial confusion, memory and sequence difficulties and

usually high anxiety. With the awareness that math understanding is actively constructed by each learner, we can intervene in this process to advocate for or provide experience with manipulative, time for accurate language, access to helpful technologies, understanding and support.

Vygotsky's Constructivist Theory. The constructivism of Vygotsky emphasizes the real culture background of the learners which he terms as 'experience'. The radical constructions are noted as. It is an unconventional approach to the problems of knowledge and knowing It stands from the assumption that knowledge no matter how it is defined, is in the heads of persons that the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience. This view of Vygotsky's radical constructions prioritizes the role of collaborative background in the process of learning. This view also develops the role of objective in front of subjectivity. The view of Vygotsky is also described as.

Vygotsky (1978) 'also highlighted the convergence of social and practical elements in learning by saying that the most significant moment in the course of intellectual development occurs when speech and practical activity, to previously completed occurs when speech and practical activity, to previously completely independent lines of development, converge, thought practical activity a child constructs meaning on an intrapersonal level, while speech connects this meaning with the interpersonal world shared by the child and her/his culture. Through the process of scaffolding a learner can be extended beyond the limitations of physical maturation to the extent that the development process lags behind the learning process.

(1) A child's speech is as important as the role of action in attaining the goal. Children not only speak about what they are doing; their speech and action are part of

one and the same complex psychological function, directed toward the solution of the problem at hand. (2) The more complex the action demanded by the situation and the less direct its solution, the greater the importance played by speech in the operation as a whole. Sometimes speech becomes of such, vital importance that, if not permitted to use it, young children cannot accomplish the given task.

The theme of Vygotsky's work is that learner's cognitive development takes place in a social context. Throughout their learners are surrounded by the parent's siblings, relatives, friends, teachers and fellow students they communicate with one another and stimulate one another. Parents and teachers, in particular are more knowledgeable and skilled than learners and learners acquire knowledge about their culture and culture and history from their encounters with adults, peers and the media. This cultural knowledge in clouds shared believes, ways of viewing the world patterns of interacting with people and language.



## Conceptual Framework

Conceptual framework refers to the mental picture of the things in consideration. When we think of something an image is created in our mind. The type of mental structure is known as conceptual framework.

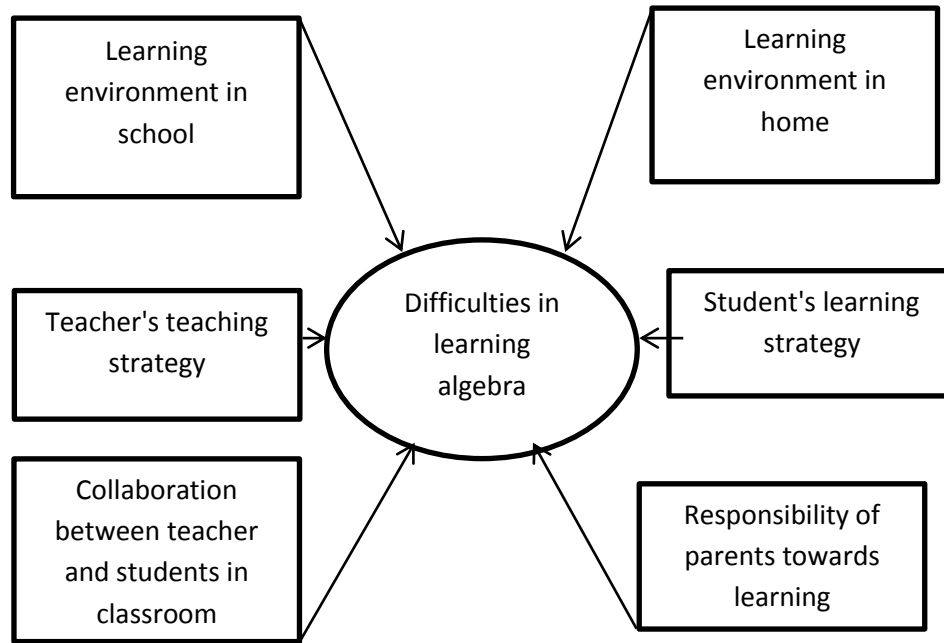


Fig. 1: Conceptual Framework

This study has been based on the above conceptual framework where the related area is mentioned above. Researcher has analyze the data comes from the above six areas which determine the difficulties of students in learning algebra and the six are of difficulties are: learning environment in school, learning environment in home, teacher's teaching strategy, students' learning strategy, collaboration between teacher and students in classroom and responsibility of parents towards learning.

Researcher has taken interview to respondent with the help of interview schedule and observe the class of grade VIII by taking permission from principal of the sample school on the basis of disability theory and social constructivism theory. Every area of difficulties among six areas which are mentioned above has analyzed again and again on the basis of disability theory and social constructivism theory. The

interview schedule has been both open and closed types. The interview had been taken by the help of interview guidelines and the class of grade VIII will be observed by the help of observation form. The diary and short notes has been prepared as natural setting as in qualitative research. The written test paper had been used to identify the difficulties of students in learning algebra and this written test paper also had used for the cross checking the view of students as taken in interview in this case.

## **Chapter III**

### **METHODS AND PROCEDURES**

This chapter explains design of the study, population of the study, sample of the study, tools of the study, written test, and interview schedule, reliability and validity of tools, data collection procedure and data analysis procedure.

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

Case studies are a design of inquiry found in many fields, especially evaluation, in which the researcher develops an in-depth analysis of a case, often a program, event, activity, process, or one or more individuals. Cases are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time (Stake, 1995; Yin, 2009, 2012 as cited in Creswell, 2014). Disability inquiry addresses understanding this population's sociocultural perspectives allowing them to take control over their lives rather than a biological understanding of disability (Mertens, 2009 as cited in Creswell, 2014).

The purpose of my study is to identify difficulties of students in learning school algebra and the causes of difficulties in in learning school algebra. I have use case study which is a type of qualitative method. In this study the all instruction was followed by qualitative method on the basis of rule and procedure of case study. In this case the disability theory and social constructivist will be used as theoretical base for the study.

#### **Selection of the School**

There were many types of schools in Rupandehi district such as Governmental, Private and community base schools. The objective of the study is to explore the difficulties of students so the only one school of Rupandehi district was selected by convenience sampling method where students are very weak in algebra.

The sample school was "Shree Piparahawa Secondary School Piparahawa" for this case.

### **Case Respondents**

The respondents of this case study was students, mathematics teachers and parents. The four students and one mathematics teacher will be selected purposively from two sample schools as sample for the case study. Those students had been selected for the study who are very weak in algebra or who feels very difficult in learning algebra. The case respondents real name are given as pseudo names.

### **Source of Data**

Primary data had collected from written test, fields notes form diary, observation and interview and secondary data had collected through visiting principal for anecdotal record of those students (case respondents) which was kept for educational purpose for school and which was essential for identifying the character and behavior of students.

### **Data Collection Tools**

The case study was the design of this study so in- depth interview and observation was the main tools of this study but written test will also be the tools for this study to verify the validity of the statement of respondents.

**Written Test.** Test is an instrument or systematic procedure for measuring a sample of behavior by posing a set of questions in a uniform manner (Linn and Gronlund in Khanal et. al, 2014). The written test is widely used test to evaluate the students' achievement; formally it helps to examine the knowledge of students acquired from the certain content. Written test is a set of questions which are prepared by researcher from the related content in which the students had given the responses.

First of all twenty questions had selected then by piloting the twenty questions only ten question had been selected for written test and that written test item was checked for its reliability and validity then after will be applied for the case. The questions of test paper was selected form the text book of government school related to algebra part only.

**In- Depth Interview.** The purpose of interviewing is to find out what is in or on someone else's mind (Best J. W. & Kahn J. V., 2012).

In this study, the researcher used in- depth interview with the respondents. The researcher had taken the interview on the basis of the objectives i.e. finding out the difficulties of students in learning school algebra. The interview was designed on the bases of pedagogical methodology, language difficulties, school environment, learning and teaching environment in school and collaborative environment in classroom as well as out of class attention difficulties, infrastructure challenges etc. the interview will be conducted two three times to the case respondent which will be selected purposively and who are weak in learning algebra. The interview guidelines will be prepared to conduct the interview with case respondents. Four students, one teacher and parents of students will be selected purposively from the sample school.

**Observation Form.** In this study, researcher will observe the students behavior and participation of students while teaching in the classroom of Grade-8. Researcher had observe activities of students and teachers in running classroom. Researcher was observe teaching method and teaching material used by teacher in the classroom. Researcher was observe the learning style of students in the classroom. Researcher had observe the learning environment of classroom whether it is collaborative way of teaching of traditional teaching and Researcher was observe the each and every activities of students who are case respondent as weak in algebra in classroom as well

as out of classroom. The collaborative behavior of students to other students and then Researcher had observe the interaction environment between sample students and other students. Researcher has record the daily activities in dairy for analysis and interpretation of data.

### **Reliability and Validity**

The consistency of scores obtained by the same individuals on different occasions or with different sets of equivalent items (Anastasi, 1976 as cited in Khanal & et al, 2014). The greater the error of measurement the smaller the reliability of measure (Khanal & et al, 2014). There are four methods of estimating reliability which are: Test retest method, Parallel forms method, Split- half method and Kuder-Richardson method (Khanal & et al, 2014, p. 84).

Among the above method the researcher has analyze the reliability of test (test items) by using Split half method. A test is valid to the extent that inferences made from it are appropriate, purposeful, meaningful and useful (Gregory, 2004,p.121 as cited in Khanal & et al, 2014). There are mainly two types of consideration in validation which are: content consideration and construct consideration (Khanal & et al, 2014, p. 49). The researcher was use construct consideration for validity of test. The validity for the whole research the researcher has analyze and cross check by triangulation of theme of interviewee, literature, answer sheets of written test paper and statements of teacher and parents.

### **Data Collection Procedure**

For the fulfillment of the study the researcher had collect the data by using the tools on the basis of learning disability and constructivist theory to the selected sample. First of all the researcher was visit the selected or sample school and get permission from the school to consult the student's' difficulties in learning school

algebra. Written test had been taken students with eight students to identify the difficulties related to learning in algebra. Interview was taken with those students about learning difficulties in algebra. The interview had taken two or more than two times for identifying the difficulties clearly and for the reliability and validity for the tools of the study.

After the taking interview to the sample students the next interview had conducted to the mathematics teacher belongs to the sample school. Similarly the interview will be conducted to the parents of those students who are case for the study. The interview schedule and interview guidelines was used for taking interview. There was different guidelines has been used for students, mathematics teacher and parents which has been mentioned in Appendices.

Then by the help of class observation form the data was collected form class observation. The both interview guideline and observation form had been prepared on the basis of learning disability theory and social constructivist theory. Also the data had collected form the observation of learning environment which had noted in field diary. At last the data was also be collected by anecdotal record of students which is kept safely in administration of the related school.

### **Data Analysis Procedure**

In this study the data had been collected from written test paper, in-depth interview, class observation and anecdotal record of the students as mentioned above. For the fulfillment of the objective of this study data came from primary and secondary source was analyzed on the basis of the literature and theory. First of all the data form written test had checked. By checking the test paper of sample students by using marking scheme researcher had given score for each test of each student.

Researcher had found the learning difficulties of students in solving problem the test paper then by using the learning disability theory and constructivist theory the data had been analyzed. The answers of case respondents as students, mathematics teacher and parents had been recorded in the mobile as natural setting and the recorded answer of interviewee had been listened again and again. Researcher had written the theme of the statements or answers of respondents by using coding and decoding method then researcher was collect the different theme and researcher had analyzed them for the fulfillment of the objectives of this study.

The every theme of analyzed answers of the respondent has help to identify the difficulties in learning algebra and the causes behind it as well. The data form class observation will help the clear reason for leaning difficulties in algebra. Researcher was observe the classroom in teaching period and researcher was also observe the environment of classroom as well as out of classroom. Researcher was analyze the answers or statements of parents by recording and writing the theme of it to know the learning environment of students in home as well as the responsibility of parents towards their children and student's learning. By the help of anecdotal record of the students researcher will analyze the character and behavior towards learning algebra.

By analyzing the class observation researcher was found the learning ability and learning strategy of students and learning strategy, using teaching materials while teaching algebra and teaching environment mentioned by teacher in the classroom as well. Researcher had analyzed the data by triangulation of students, teachers, parents and theory as well as literature. In this way researcher has analyze the data and find the learning difficulties as well as causes behind the learning difficulties in algebra. This triangulation will also help for validity of this case study.



## **Chapter IV**

### **ANALYSIS AND INTERPRETATION**

This is a case study related to causes of students learning difficulties in school algebra at Grade VIII students in Rupandehi district. The main objective of this study was to analyze the causes of learning difficulties faced by students in learning mathematics. The main tools of this study were interview schedules, class observation forms and related published and unpublished school documents. The main respondent of this study were focused on children parents and mathematics teacher of grade VIII of the school. Only one schools were c hosen for this study purposively.

This chapter includes the analysis and interpretation of the study. The data obtained of the study were presented in terms of the following topics: Learning environment of home and school, teacher teaching strategy students learning strategies, collaboration with students and teachers in classroom responsibility of parents towards learning. The collected information at first was categorized according to the category of the respondent and different themes were given in the text of interview or the observation notes. These themes were considered as code of the similar code. Version of respondents were collected together and explained in their respective. The school environment and other details were obtained by observing school environment and anecdotal records as well as analysis of the schools. The home environment and other details were obtained by taking interview with parents. The researcher had noted the case students pre-class document, their regularity in class their behaviour, etc. from the school documents.

The descriptive method were used mainly in this research because this is qualitative study. The researcher had as attempted to calculate the describing and

analyzing the information acquired in the research process. The collected information were analyzed and described in the following headings:

### **Introduction of Case Study**

Causes of difficulties in learning school algebra.

- Learning environment in school
- Learning environment at home
- Teacher's teaching strategy
- Students learning strategy
- Collaboration between teacher and students in classroom.
- Responsibility of parents towards learning.

Now, here researcher described about the given above headings according to collected data which are collected by head teacher, mathematics teacher, parents and students using interview and class observation form.

### **Deelip Harijan**

Deelip Harijan was fourteen years old boys and he studies in class 8. He was born in Rohini Rural municipality in Rupandehi district. He belongs to dalit family and his father is illiterate and out of country for labour work in Malaysia. His mother has put a shop in home so he also take care of his shop. She earns money from the shop to support their family because of they have no other economic support unless his father had sent some money from Malaysia.

From this research it seemed that his family was backward in economic condition as well as in education. Before the school he was belly at shop and after the school he had run to take goods and material for shop. His guardians was careless about his study. He felt algebra is so hard comparing to other part of mathematics. He did not complete his homework regularly because of he was unable to take regular

class he said he has not enough time in home due to take much time in shop. He didn't solve the questions of algebra. Saeed when he saw the problem of algebra due weak background in primary level. He had faced language problem in algebraic equations. Formula learning, factorization, simplification etc. are major problems at -him.

### **Laxmi Pasi**

Laxmi Pasi was fifteen years old boy in class 8. He was born in Rohini Rural Municipality Wrd No. 6 of Rupandehi. He has six family in his family. The researcher observed his house and family he found that he has elder child of his parent. He belongs to 'chamar' dalit caste his economic condition is very poor. His father is 'pollodar' to load sack of rice in mill. He has less time. After the school due to some household work such as take cares of goat, buffalos and his elder brother and sister. So he didn't enough time to do mathematics practice at home.

His family main source of income is his father's salary. He is interested and curious about study but due to his regularly at school he could not learn algebra properly. When the researcher asked the time given in mathematics he told 20 min. He said "I feel difficulty while teacher teach algebra at school."

### **Krishna Harijan**

Krishna Harijan was fourteen years old. Her father was farmer and mother was household. When the researcher asked her whether she liked to study algebra she said "yes I like algebra but couldn't remember algebraic term such as fractions, equation etc. Being a first child of her parents some time her mother went to jungle to collect wood. She also her parents to take care of goats and buffalos. So she had not enough time to study but she is laborious students. Her favourite subject was mathematics but she did not do much practice due to lack of time. Her parents did not have any awareness to teach the children because of they were illiterate. She did not make

friendship with these boys and girls who did not serious about study. According to the school register she was often being absent. She said "A teacher behaviour towards me is equally with other students, I study only half an hour in mathematics at evening. So that she had not enough time to study due to household work.

### **Rajesh Gharti**

Rajesh Gharti fifteen years old boy. His father was tailor (sewing clothes) and mother was house wife. According to class attendance register he was not regular in school. He was very weak in mathematics. Speciall6y in algebra. Respondent said 'I have no enough time for practice in mathematics because of household work'. His father forced him to house work rather than going to school. He had only 20-30 min time given to mathematics subject. He had ignore practice whenever he hadn't solve a single problem. Respondent told that he had faced so many problem when the teacher had taught. Respondent said "I am not regular in the class at school. Household work I can't understand some lessons of missed classes. Other causes behind not understanding the lesson is language.

### **Cause of Difficulties faced by Students in Learning Mathematics**

There are so many cause faced by students in learning school algebra. These difficulties have been collected with the help of related literature theory. Interview with students, their parent's and guardians, mathematics teacher and related document of school. Such variables are described separately as follows:

#### **Learning Environment at Home and School**

Environment is the totality of educational atmosphere in home and school. Home is regarded as the first school to all individual. They learn how to behave, how to respect elder, how to cooperate each other. Home environment play a vital role in learning. Home environment play a vital role in learning. Home environment refers

the occupation economic condition and learning opportunity if the student at home. School is the second home of any child. The teachers, students and parents are the components of the school. School environment reflects believe and tradition of the school community delineating the relation among parents students and teachers. Scholarship to the students extra classes provided, dominance of language and cultural are the major respect of the school environment.

Students use informal language in his/her family, low word (i.e. not standard vocabulary) but in school informal language is not suitable. But in schools standard vocabulary are used in every household there is micro cultural which is discontinued in school culture. There is gap between silence culture and forward culture. Home environment is affected by everyday life of all individuals.

Culture is as the totality of socially transmitted behaviours, patterns art beliefs institutions, and other products of human work and thought as well as the total of inherited ideas beliefs values and knowledge which constitute the shared based of social action. En absence culture is related to development of the mentality, which people fallow during their life in their learning activities. There are many culture issues in teaching learning mathematics in the context of Nepal.

("we don't have basic things in our house how long we go on this way. We are difficult situation to survive. How can we send the children to school ?" (parents views)

From the above view, it indicates that the economic status of family influence to the achievement of the student. The high economic can get better chances to buy books copies and take tuition and coaching classes. Mathematics need more labor and effort than other subjects. Students have not obtained such facility at home one of the respondents expressed as

"Our parents forced us to stay in the house and, take cares of goat and buffaloes. They said takes care of goats and buffalos is our main occupation.

Parents said "Your engage in take care of goats and buffalos rather than going to school."

The above view indicates that children of Dalit community had no sufficient time at home for practice. They have to "engage to solve their economic problems. Mathematics need more practice to acheve the good marks. That children had not obtained such facilities.

Students did not get support to learn mathematics. The researcher found that respondents A, B, C and D had to be engaged in household works. They did not have time to study at home. Due to these responses, they were always absent in school. Teacher did not ask this type of student about their home environment. At home, they learned by observing and doing things side by side. But they didn't get chances as such in school. The every day lives of Dalit student in home and school. Practice have been different. In school they get theoretical knowledge like they have to use theorem to solve problems. But they work in farm and take care of goats and buffalos.

The students leave their own family culture outside the school and enter the school that is different from their home culture. Because of this difference in the home and school culture, many students struggle to learn mathematics that is even more decontextual from their community and social. In Nepalese classrooms these issues are the issue of inequality gender issue and the issue of native language issues ethnicity and the issues of traditional curriculum. So, they are all cultural matters that are more or less linked with social and political aspect too.

Finally, researcher found that culture of respondents at home and schools were unmatched. So these students failed in mathematics. The home and school environment of students was not favourable for learning mathematics.

### **Teachers teaching strategy**

Teaching learning process is the major factor in learning mathematics. Teacher's education, experience and expertise determine the teacher's qualification mathematics is a practical subject. It can be solved by different process and techniques. The way the teacher directly makes effort on the mathematical teaching the students and teacher's behaviours teaching methods, practical application of the subject of teaching learning methods are various forms of teaching learning process.

The experienced teacher makes him/her student to understand things in simple and clear way. A trained teacher can attract and motivate the students toward the mathematics with the help of different teaching skills regarding teaching learning process. A trained teacher can use rightly and appropriately the teaching materials and makes the teaching learning easy and interesting. As mathematics is practical subject, its use of teaching material is necessary in the study of this subject. If we can't use appropriate method, then the teaching learning material is necessary in the study of this subject. If we can't use appropriate method, then the teaching learning process can't be effective in mathematics teaching. There are so many methods being used such as discovery problem solving discussion experiment etc.

When the researcher visited in the field, he found that the mathematics teacher has experienced for six years. There was no problem on the part of mathematics teacher. But there was problem of teaching material because this school is situated in rural place.

*"I often used student centred method as well as explained the problems steps by steps. But school has problems of availability of teaching materials. We have not sufficient teaching materials as we need. But our school usually promotes the students participation for teaching in the classroom."* (Mathematics teacher)

This statement shows that there are some problems regarding the use of appropriate methods lack of teaching materials and teachers knowledge of teaching methods.

Interest of learner influences the teaching strategies and achievement of students. When man grows up and develops, the area of interest is being increasing. Interest depends upon the individual some are interested in gains some are in study, music, arts literature etc. 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 they can't solve the problem and they don't take more times for this subject.

*"I feel mathematics is a hard subject because of lack practice. I mostly do household works at least 5-6 hours per day"* (students view)

*"They believed that mathematics is a difficult subject. This belief prevented them from taking a general concept on the mathematics as a subject."* (Mathematics teacher)

The interview with the students proves that even though poor economics students told that their poor performance in mathematics has resulted due to lack of practice at home it is psychological fear which has really made mathematics a difficult subject.



## Collaboration between Teacher and Students

Collaboration is a social activity. It may be with in person or a group. Within collaboration refers to mental activity with his/her mind and soul it depends upon the person intellectual capacity. Inter individual collaboration refers to sharing adjustment and cooperation. The way of teacher directly effect on the learning mathematics of the students teacher behaviour teaching method practical application of the subject of teaching learning methods.

In these study teacher, students interact means the relation of students with the teachers. Headmasters and otehr students of class. In observed class, researcher four respondent were silent in class ? They simultaneously said we like to be silent sir. In case respondent A is afraid of asking questions to teacher. He feels feels problems to ask question in the class due to his improper language that the teacher don't understand feel uneasy respondent students were afraid of asking questions in class. The teacher didn't make collaboration in class due to language problem. It made to silence either they understand or not understand.

### Episode

The teacher entered into the class with less teaching materials and researcher also entered in the class with him. He had started to teach. He wrote the topic factorization of polynomials process of finding the factors. It is like "spiriting" an expression into a multiplication of simpler expressions. He review the previous knowledge of expressions such as coefficient of variables. The teacher asked one of the respondent in the expression  $x^2$  tell me the coefficient of  $x^2$  then the respondent reply that their own language 'sir hurn nai bujhali'. The teacher said if you want to ask questions then ask in Nepali language. Do not use your language the student was quite serious. Then the teacher tell them the coefficient of  $x^2$  is 1, x is 4 and constant is 2 and the teacher had written then formula  $(a+b)^2 = a^2 + 2ab + b^2$  in white board and

after company it solve the given question. Then the teacher asked students did you solve the questions then student reply yes sir.

From the above classroom activities, the researcher found that students often remain silent frusted and hesitated to take part in learning activities because of the lack of perquisites knowledge of related chapter. The children generally were afraid of asking questions to the teacher. They felt problems to ask questions in the class due to his language that the teacher didn't understand and make uneasy.

### **Responsibility of Parents toward Learning**

Respondent's parents did not frequently visit the school. They did not visit school in any functions and any time with any comments on teacher's side and their children's side about the educational materials. In a study Keith and Keith (1993) they found that family from all socio-economic levels should be involved with the children's education at home. However, families with of higher socio economic status tended to be more involved at school.

An interview with head teacher revealed that respondent's parents rarely visited their children school not even once a year and never tried to know about their educational status. Parents one of the respondents spoke our right that the school should be responsible for their children and parents further expressed that they even don't know their teachers and even do not have enough time to allocate to visit the school due to socio-economic condition.

Name of respondent	Attendance in a month
Deelip Harijan	11
Laxmi Pasi	10
Krishna Harijan	9
Rajesh Gharti	8

The parental involvement in the life of school turned out to be positive influence upon people progress and development. Thesis included helps in the classroom and educational visit attendance at meeting to discuss children progress. The parental involvement in people's educational development within home is also clearly beneficial. Parents who motivated their children to read and learn and provided them with extra material and books at home had positive effects upon their children's learning parents and teachers meeting concluded that the school that lack of presence of students clearly signifies that teacher seemed less responsible towards students.

Studies have shown that parental involvement directly affects their children mathematics in algebra achievement (Sendor and Sheldon, 2009 Yan and Lin 2005). Students with parents involved in their education are more likely to perform better in mathematics and achieve more than other students. In this study parents are less involvement in students learning algebra.

### **Students Learning Activities**

Irregularly is the one of the main problems of students in learning mathematics. They are compelled to attend their school after the completion of their household work. The school is their second priority because their first priority is to manage food for survival. They have to be engaged in carrying their small brothers, sister and also engaged in their pet animals such as goats buffalos etc.

(Source: Robini R.M. Rupandehi.)

The above mention data present that their attendance in their school is measurable. It is concluded that their regularity in school is very high. Due to this, they feel difficulties in learning mathematics.

*"I am not regular in the class at school due to household work. I can't understand some lessons of the missed classes. Other causes behind not understanding the lesson is language. Due to these reasons, I can't solve and complete assignment given to me in the school. There are many members at home but a few member are capable of earning. It is very difficult to survive in life. We have to face difficulty in buying books and copies. Then, I am afraid of getting punishment and give up the desire of going to school." (Student)*

*"It is so difficult for each students to perform well due to their irregularity students should be engaged in exercise after the completion of basic knowledge. But due to their irregularity in the classes, we get confused whether to revise lesson or initiate new exercise. Therefore, irregularity of students has also created problems and they can't proceed forward in learning.*

## **Chapter V**

### **FINDINGS, CONCLUSION AND IMPLICATION**

This chapter deals with the summary, finding from the discussion of the chapter and conclusions and recommendation for further study, it includes the summary of the entire research work.

Algebra is related to arithmetic and geometry because the problem of algebra can be considered in the figure of geometry and any particular form of arithmetic can be considered in the general form of algebra and therefore algebra is very important for us in daily life as well as further study of mathematics and other subject. Most of the students can not solve the problem of algebra due to different difficulty but some students have succeed in it without well understanding of algebraic expression.

This is a case study related to the students difficulties in learning school algebra at Rupandehi district at Grade VIII students. The purpose of the study was to identify the causes of difficulties of students in learning school algebra. For this purpose, the specific objective is to analyze the background of causes of learning difficulties faced by students in learning difficulties faced by students in learning algebra. The major tools used for this study were interview schedule, class observation form and related published and unpublished documents. The respondents of this study were students of class VIII, mathematics teacher, head teacher and parents.

#### **Findings of the Study**

From this case study, the causes of difficulties faced by students in learning algebra were found in the following major points.

- Respondents financial condition is not strong to send their children school and afford them their further education.

- Most of the students were absent due to their household work.
- There is a discriminatory behaviour between son and daughter.
- There is language problem between teachers and students.
- There is discontinuity between practice of mathematical concept at home and school.
- The school has not provided scholarship and financial aid to the students who were economically background.
- Lack of parents teacher meeting is also another problem.
- Some parent's had negative concept toward teacher and school.
- Home environment language economic condition irregularity in the school and inter personal relations are the major difficulties in learning algebra of students.

### **Conclusion**

Regarding the conclusion, the researcher derived from the field works in Shree Piprahawa Secondary School, Rupandehi. That located in the boarder side of India. Most of the Dalit students were found in that area of school. Students were very high in numbers in the school but very low numbers of students passed in rural municipality level exam of grade VIII. Most of failed in Mathematics subject as they were mostly absent in the class. According to mathematics teacher. From the study, the researcher draws the following conclusions.

- Language plays the vital role in learning mathematics. Due to lack of proper understanding of the language. It has created the difficulties in learning mathematics.

- The culture also play vital role in learning mathematics. Due to unmatched culture at home and school, student's difficulty level has arisen in learning mathematics.
- The learning environment play vital role in better performance in learning mathematics. the lack of proper environment at school has cr4eated the difficulties in learning mathematics.
- The economic condition of the parents has been poor. In addition there has not been favourable learning environment for the students at home and there has been no awareness program of parents. Students have not been provided any extra classes in the school.

### **Implication**

Parents don't take much interest in how their children are learning. They should be aware about improving the education of their children. To arise the mathematics achievement of student's who were weak in algebra, different awareness and opportunity should be made available. This research is not complete research. There is a limitation of this research. However, after the analysis and conclusion of the study the researcher has made the following recommendations for the further study to validate the findings of the present study.

- This study was done only in Shree Piprahawa Secondary School, Rupandehi as a case. For the generalization of result of the study should be done in large complete.
- Similar study can be carried out in other parts of mathematics.
- The study of these kinds should be conducted at all levels of schools and other subject as well.
- Similar study can be carried out in private schools.

- Similar study can be done on the causes of school drop out problems by facing difficulties in mathematics.
- As this study has been conducted on learning difficulties in algebra. It can be helpful to explore learning difficulties in other parts of mathematics like arithmetic, geometry, mensuration etc.



## REFERENCES

- Adhikari, S. K. (2006). *A case study of primary dalit school children*. An unpublished master degree thesis, Central Department of Mathematics Education, T.U., Kirtipur.
- Best J. W. & Kahn J. V. (2012). *Research in education* (10<sup>th</sup>ed). New Delhi: Pearson Prentice Hall of India.
- Bruner, J. (1986, 1990, 1996). *Theoretical framework to encompass the social and cultural aspects of learning*.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3<sup>rd</sup> ed.) California: Sage Publications, Inc.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (3<sup>rd</sup> ed.) California: Sage Publications, Inc.
- Ernest, G. A. (1991). Chapter 2: An Exposition of Constructivism: Why Some Like It Radical. *Journal for Research in Mathematics Education. Monograph*, 19.
- Jupri, A. (2014). Difficulties in initial algebra learning in Indonesia. *Mathematics Education Research Journal*. Volume 26, pp 683- 710.
- Karki, D. K. (2017). Students difficulties in learning algebra at secondary level. An unpublished master degree thesis, Central Department of Mathematics Education, T.U., K irtipur.
- Kieran, C. (1992). The learning and teaching of school algebra. In D. A. Grouws. (Ed.), *Handbook of Research on Mathematics Teaching and Learning*. (pp.390- 419), NY: Macmillan Publishing Company.
- Lim K. S. (2014). An error Analysis of Form 2 (Grade 7) *Students in Simplifying Algebraic Expressions: A Descriptive Study*. Faculty of Science and Technology, Open University Malaysia, Kuala Lumpur.

- Khanal, P. & et al. (2014). *Measurement and evaluation in education*. Kirtipur: Sunlight publication.
- Khanal, P. (2016). *Research methodology in education*. Kirtipur: Sunlight publication.
- Kothari, C. R. 1990. *Research Methodology* (second revised edition). New Delhi: New age international (P) Limited, Copyright © 2004, 1990, 1985.
- Kolb, A. D., Boyatzis, R. E. & Mainemelis, C. (1999). *Experiential Learning Theory: Previous Research and New Directions*,  
[online].<http://www.d.umn.edu/~kgilbert/educ5165731/Readings/experiential-learning-theory.pdf>.
- Mahmoud, Y. (2013). *The relationship between the learning styles of students in grades five and six and their held misconceptions about dividing fractions based on Kolb's model*. Ph.D. thesis submitted to The British University in Dubai.
- Mahato, S. (2018). *Student's difficulties in learning school geometry*. An unpublished master degree thesis, Central Department of Mathematics Education, T.U., Kirtipur.
- Sapkota, P.P. (2008). Problems faced by students in Mathematics learning and its impact in the examination. An unpublished master degree thesis, Central Department of Mathematics Education, T.U., Kirtipur.
- Shah, B.C (2002). A comparative study of achievement in mathematics of lower secondary level students. . An unpublished master degree thesis, Central Department of Mathematics Education, T.U., K irtipur.
- Shrestha, P. (2016). *Cultural diversity and difficulty in learning mathematics*. An unpublished master degree thesis, Central Department of Mathematics Education, T.U., K irtipur.

- Stacey, K. & Chick, H. (2004). *Solving the problem with algebra*.
- Stacey, K., & Mac, G. M. (1999). *Taking the algebraic thinking out of algebra*.  
*Mathematics Education Research Journal*, 1, 24- 38.
- Upadhaya, H.P. (2010). *Trends in mathematics education*. Kathmandu: Balbalika  
Education Publication Pvt. Ltd.
- Vygotsky, L. S. (1980). *Mind in society*. Harvard University Press Cambridge,  
Massachusetts London, England.
- Witzel, B. S. Mercer, C. D. & Miller, M. D. (2003). *Teaching Algebra to Students  
with Learning Difficulties*. Aa investigation of an explicit instruction model.  
University of Florida.
- Zakaria, E. (2010). Analysis of students' error in learning of quadratic equations.  
*International education studies, faculty of education, Malaysia*. Vol. 3.  
Determining the sample size - UNC Chapel Hill,  
<https://www.unc.edu/~rls/s151-2010/class23.pdf>.

**Appendix A**  
**Written test paper**

Grade: VIII

F.M:

Subject: C. Math

Time: 45 min

Attempt all the questions

1. यदि  $a+b = 5$  र  $ab = -36$  भए  $a$  र  $b$  को मान पता लगाउनुहोस। Find the value of  $a$  and  $b$  if  $a+b = 5$  and  $ab = -36$ .
2. Define ratio and proportion with suitable example.
3. Define HCF and LCM with suitable example and justify your answer with appropriate example that the product of HCF and LCM is equal to the product of given numbers.
4. यदि  $x - \frac{1}{x} = 4$  भए  $x^2 + \frac{1}{x^2}$  को मान निकालनुहोस। If  $x - \frac{1}{x} = 4$  then find the value of  $x^2 + \frac{1}{x^2}$ .
5. पाँच वर्ष पहिला बाबुको उमेर छोराको उमेरको तीनगुना थियो। हाल बाबु र छोराको उमेरको योग ५८ वर्ष छ भने तिनीहरूको हालको उमेर पता लगाउनुहोस। 5 years ago, the age of the father is three times the age of his son. The sum of their present ages is 58 years, what are their present ages?
6. दुईओटा सङ्ख्या पता लगाउनुहोस जसको योग १२ र फरक ४ हुन्छ। The sum of two numbers is 12 and their difference is 4. Find the two numbers.
7. वर्ग समिकरण  $x^2 - x - 56 = 0$  वाट  $x$  को मान पता लगाउनुहोस। Find the value of  $x$  in the quadratic equation  $x^2 - x - 56 = 0$ .
8. Find the H.C.F and L.C.M of  $x^2 - y^2$ ,  $x^3 - y^3$ ,  $x^4 - y^4$ .
9. घटाङ्कको प्रयोग गरी प्रमानित गर्नुहोस। By using law of indices prove that  $\frac{x^{2a-b} x^{2b-c} x^{2c-a}}{x^a x^b x^c} = 1$ .
10. एउटा डोरलाई २ : ३ को अनुपातमा विभाजन गरिएको छ। यदि डोरको जम्मा लम्बाई ४५ मि.छ, भने प्रत्येक भागको लम्बाई निकाल्नुहोस। A rope is divided into two parts is in the ratio of 2 : 3. If the total length of the rope is 45m, find the length of each point?

**Best of Luck!**

## **Appendix -B**

### **Interview Guideline for Student**

1. What is your name?
2. Do you like to solve the problem of algebra?
3. Why are you weak in algebra?
4. How much time do you give for solving mathematics in your home?
5. Does your parent help in solving problem of algebra?
6. Do your parent support in learning?
7. What does your parent do?
8. What do you do if some problem can't be understood?
9. Are you distracted from studying, if yes then why?
10. Do you want to improve in your achievement?
11. What are your difficulties in learning algebra?
12. Why these difficulties are happened with you when you solve the problem of algebra?
13. How can you improve it?
14. Can you read the problem? If can't then why?
15. Do you understand the problem? If don't then why?
16. Why have you done such type of errors and how?
17. This type of error is happened accidently or regularly, what is to say about it?
18. This type of error is committed in this question or other questions also?
19. Have you realized about these types of error?
20. How did you solve this problem?
21. In how many methods you can solve this problem?

22. Can you solve the other problem by using same procedure? If can't then how did you understand this procedure?
23. How many methods/strategies are used by your compulsory math teacher while teaching in classroom?
24. If you do not understand then do you ask with your teacher again and again?
25. Is your teacher co-operative in classroom or out of class as well?
26. How much time have you given for solving the mathematical problem which is taught in your classroom?
27. How many times do you practice the single math problem?
28. Tell me your daily routine for studying or doing homework?
29. Do you learn from self-study? If do not then why?
30. How does your teacher teach you with respect to: method/strategy, teaching materials, demonstrative materials, manipulative materials, practical class, experiment, homework/classwork, extra class, tuition class?
31. Do you participate in mathematical program or in extra activities?

## **Appendix-C**

### **Interview Guideline for Parents**

32. How much time do you give your child for his/her studying?
33. Could you tell your education status?
34. Do you help your child in doing his/her homework?
35. How much time your child study at home?
36. Does your child get extra support in studying at home?
37. Have you made studying schedule in your home for your child?
38. Could you describe the learning environment of your home as well as your society?
39. Do you know your child is very weak in mathematics?
40. Could you tell me the causes of weakness of your child in learning algebra?
41. Do you want to say about the improvement in achievement of your child?

## Appendix-D

### Interview Guideline for Mathematics Teacher

Name:

School's name:

Education:

Specific Subject:

Experience:

Faculty:

1. How much experience do you have teaching math?
2. What do you think about the weakness of students' difficulties in learning algebra?
3. What types of difficulties are found in these students?
4. What are the causes of difficulties in solving problem of algebra?
5. Why did students feel algebra hard?
6. Did you think about the improvement in difficulties of students?
7. Why the students are so weak in algebra?
8. What are some effective teaching methods and strategies you implement in your math teaching?
9. Do students do homework regularly?
10. What do you want to say about classwork activities of students?
11. What type of mistake or error is done by students while solving algebraic problem?
12. Are they involved in extra activities of mathematics?
13. What type of behavior are shown by students in perspective of doing homework, classwork, in extra activities, attitude towards math, curiosity, creativity and being critique in learning mathematics?
14. Are their parents co-operative and positive towards math?
15. What do you think about homework? Is it burden or supporting activities for learning mathematics?



16. Could you tell the teaching environment of this school?
17. Are you using the teaching materials like manipulative, audio, audio visual and demonstrative materials?
18. What do you do if the students don't understand clearly?
19. Is there possible to provide extra time for those students who are slow learner or who can't understand clearly?
20. Do you know the different teaching learning theory for teaching mathematics?  
If yes then how is it used in your teaching?
21. Tell me the behavior of students towards mathematics learning?

**Appendix-E**  
**Class Observation Guidelines**

1. Classroom physical structure.
2. Student's behavior in classroom.
3. Interaction between teacher and students.
4. Collaboration between students and students.
5. Participation of students on mathematics task, home assignment and discussion.
6. Teacher's behaviors in classroom with students.
7. Teaching strategies and materials used by teachers in mathematics class.
8. Student's response in learning and opportunity of response for cross questions.
9. Coordination of teacher and students to solve the problem of algebra.
10. Overall teaching and learning environment of classroom as well as school.