PROBLEM FACED BY GIRL STUDENTS IN LEARNING ALGEBRA

A

THESIS

BY

NAR BAHADUR PAKHRIN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER'S IN MATHEMATICS EDUCATION

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LETTER OF CERTIFICATE

This us to certify that Mr. Nar Bahadur Pakhrin, a student of academic year 2070/071 with Exam Roll No. 280459, Thesis No. 1618 and T.U. Registration No. 9-2-631-114-2009 has completed his thesis under supervision of Mr. Arjun Neupane for the period prescribed by the rules and regulation of Tribhuvan University, Nepal. The thesis entitled **"Problem Faced by Girl Students in Learning Algebra."** has prepared based on the results of investigation conducted during the period of 2077 BS under the Department of Mathematics Education, Tribhuvan University, Kritipur, Kathmandu. I recommend and forward that this thesis be submitted for the evaluation to award the Degree of Master of Education.

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Prof. Dr. Bed Raj Acharya

(Head)

Date: 3 May, 2021

Letter of Approval

A

Thesis

By

Nar Bahadur Pakhrin

Entitled

Problem Faced by Girl Students in Learning Algebra

Has been Approved in Partial Fulfillment of the Requirements for the

Degree of Master of Education

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Recommendation for Acceptance

This is to certify that Mr. Nar Bahadur Pakhrin has completed his M. Ed. Thesis entitled **"Problem faced by Girl Students in Learning Algebra."** under my supervision during the described the rules and regulation of Tribhuvan University, Kritipur, Kathmandu, Nepal. I recommend and forward that this thesis be submitted for the evaluation to award the degree of master of education.

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Mr. Arjun Neupane

(Supervisor)

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Abstract

This study related to explore the girl students' difficulties and to find out the major causes that effect the girl students in learning algebra at Grade VIII. Five public schools were selected from Bhangaha municipality of Mahottari district by using nonrandom sampling method which were Shree Janata Basic Level School, Shree Ma.Vi. Bhangaha, Shree Rastriya Basic Level School, Shree Sarbajanik Ma.Vi. and Shree Kishori Janata Ma.Vi.. Achievement test, face to face interview schedule and classroom observation was used as tools to collect the data. Achievement test was conducted within 50 girl students. And ten girl students, five mathematics teachers and five parents were selected for face to face interview. The classroom was observed for 5 days with observation tool in the role of participation and non-participation. The obtained data from achievement test was analyzed using simple mathematical tools mean same as data obtained from interview and classroom observation were analyzed using thematic method. The researcher analyzed the obtained data with help of conceptual understanding on the basis of difficulties on comprehending variable, algebraic expression, solving equation and word problem.

The results indicated number of difficulties categories under each area. Under variables, girl students were unable to differentiate like and unlike term and their simplification. The abstract structure of algebraic expressions posed many problems to girl students such as distributive error in bracket expansion, difficulty in operating with the negative integers. Inadequate understanding of the uses of equal sign and its properties were major difficulties in solving equation. Girl students were confused not only lack of technical words vocabulary but also translating algebraic form with proper sign. The causes of difficulties in algebra are due to the lack of prerequisite knowledge, solving ways and rules, traditional teaching methods and did not use of teaching materials. Similarly, poor economical status of parents, household work,

parents' educational status, occupation, traditional views towards girl's education, girl's interest, lack of motivation to learn mathematics.

Dedication

This dissertation is to my parents who taught and inspired me to walk on the path of educational journey.

Declaration

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

…..……………….....

(Nar Bahadur Pakhrin)

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List of Acronyms

HCF	:	Highest Common Factors
LCM	:	Lowest Common Multiple
TU	:	Tribhuvan University
NCTM	:	National Council of Teacher of Mathematics

Chapter I

Introduction

Background of the Study

Mathematics is an important part of the human society. Mathematics came into practice with the beginning of the human Civilization. It is the backbone of our Civilization. A person may be mere housewife, farmer, shopkeeper, tailor, salesman, accountant, carpenter, booking clerk etc. Some knowledge of mathematics is necessary for them. An understanding of mathematics is essential for every human being.

A famous mathematician John Kuck defines the mathematics as, "Mathematics is a way to settle in the mind a habit of reasoning." It is the way of thinking, way of organizing, way of analyzing and synthesizing a body of data

Algebra is the part of mathematics in which letters and other general symbols are used to represent numbers and quantities in formulae and equations. In other words Algebra is separate area of mathematics which belong the study of relation, quantity and structure.

Algebra for everyone is buzz word in the land mark of mathematics education. Mathematics is recognized as that "Science of patterns" and patterns is the heart of algebra it shows that the unparalleled role of algebra in mathematics. Algebra is method of thinking and presented the position that thought, thinking processes and the ability to appreciate mental a spiritual accomplishments are looked upon today as the rightful possession of every individual. Algebra is critical discriminator of student future.

The National Council of Teacher of Mathematics (NCTM) states that knowing algebra opens doors and expands opportunities, instilling a broad range of mathematical ideas that are useful in many professions and careers. All students should have access to algebra and support for learning it (NCTM, 2008). The national survey of algebra teacher identified of one of the reasons for failure in algebra to be the lack of basic mathematical concept and skills (Hoffer Ventkataraman, Hedberg and Shagle, 2007).

Algebra is more than memorizing ruled for manipulating symbols and solving prescribed types of problems, it is the part of reasoning process and a key to thinking mathematically and to communications with mathematics. Algebra can be conceived differently algebra as generalized arithmetic as a study of producers for solving of relationships among quantities as the study of structures.

Algebra is a core subject within mathematics and school mathematics in particular. It is instrumental for achievements in other mathematical domains 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 (Katz 2007; Kendal and Stacey 2004). Therefore, successful algebra education is for achievements 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).

Explanations for the gender gap between boys and girls have focused on different factor. Traditionally, girls' lower performance in mathematics was explained as relating to both internal

and external contextual factors for example, lower perceived support for learning mathematics (Ecles, 2011). Other studies attributed the girls' drop in performance to their mathematics feelings that their classrooms were unattractive, uncomfortable and hostile. Factors of importance for girls' performance in mathematics were teacher and peer support (Riegle-Crumb, Farkas, and Muller, 2006).

In Nepal men tends to the owners of property and the decision maker in the families. one of the biggest problems in Nepal's education system is female education. In our traditional society, cultural restrictions for the education of women confine then to the domestic and limit their participation in educational activities. In 1969 government of Nepal lunched, "the equal access for women to education program." to increase the girls' enrollment in primary school.

There are many girls students special in community based school number of girl's students more than boy's students. There are various problems in learning algebra at lower secondary level. Until we cannot identify the problems of girl's student to learn algebra at lower secondary level and cannot solve it. The solution to address the problems of girls' students is to learn algebra. Many problems are occurring frequently. So researcher decided to conduct a systematic study on the topic, "Problem faced by girls students in learning algebra ".

Statement of the Problem

Problems relating to algebra learning might have affected the achievement in teaching mathematics. Various researches 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 meaning of the equal sign and understanding variables (All Jupri etual, 2014).

Similarly have trouble ordering the steps used to solve a problem (Nathan V, 2002). Students are able to only add, subtract and multiplying of simple algebraic terms but unable to divide and they have limited knowledge about factorization, HCF and LCM (Ghimire, 2005).

School mathematics curricula of Nepal have given emphasis on algebra from the beginning of school level. Algebra is one of the contents standards of school mathematics, which aims at developing special reasoning, problems solving skill and communicating. In school algebra students faces difficulties related to comprehending variables, in dealing with algebraic equations, in solving equation and in solving word problem (Egodawatte 2011, pp.82-128)

In the context of Nepal, there is not equal access for women to education programmed due to cultural concept. Beside this classroom dominated or cultural minority group face many problems, which directly affect the education system (Acharya, 2011). In the sexually divers classroom, what types of problem are faced by girls students in learning algebra at basic level. Questions like these occurred in my mind; hence I am motivated to conduct the research on the topic" Problem Faced by Girls Students in Learning Algebra."

Objectives of the Study

The objectives of this study are as follows.

- To explore girl' students' difficulties in learning algebra at Grade VIII.

- To find out the major causes that affect girl' students in learning algebra at Grade VIII.

Signification of the Study

Algebra has been given an important place in the mathematics curriculum at all level of school education. Algebra plays vital role in mathematics, but it is believed that most of the girls students are weak, dislike and afraid of learning algebra. So it is too vague to choose appropriate teaching method according to girl's students need, interest, pre knowledge and capacity.

Every researcher has its own importance and significance. The present study entitled as "Problem faced by girls students in learning algebra at Grade VIII" has the following significances:

- This would study helps to explore girl's students' difficulties in learning algebra at Grade VIII.

- This study would help to find out major causes that affect girl's students in learning algebra at Grade VIII.

- It would help to provide appropriate guidelines for girl's student in learning algebra.

- It would be helpful to the teachers to prepare and implement instructional strategies to find out the problem faced by girl's students in learning algebra at Grade VIII.

- It would be beneficial to the policy makers, Educationists and mathematics educators to make further curriculum policies.

Delimitation of the Study

The study was limited in the following ways.

- The study was delimited to Bhangaha municipality of Mahottari District only.

- This study was based on Grade VIII girl's students who are studying in public school.

- This study was included only 5 public schools of Bhangaha municipality of Mahottari District.

- The data of this study were gathered through the achievement test, classroom observation and interview schedule.

- This result cannot be generalized by students of other school because different context affected the result.

Definition of Related Terms

Here some terms are given which are more significant for this research work. These terms are those words which reflect the whole research and give particular meaning aspect. 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.

Algebra. Algebra is the part of mathematics curriculum in which letters and other general symbols are used to represent numbers and quantities in formulae and equations.

Problems. In this study significant problems are the difficulties faced by girl's student in learning algebra.

Learning. Learning is the act of acquiring new or modifying and reinforcing, existing knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information.

Achievement Test. In this study, achievement test means a test conducted at grade VIII's girl students. This will be administrated to observe students achievement.

Students' perception: Student' perception will symbolize students' attitude, thinking, ideas, pre knowledge, fear, feelings, threats and conviction about algebra

Variables. A letter which represents more than one number or value is known variable in this research. Here variable is letter like x, y, z which is come on solving algebraic problems.

Verbal Problem. In this research verbal problem means the question of lower secondary level textbook which are described in words to represent the mathematical relations.

Students' perception. Here students' perception symbolized students' attitude, thinking, ideas, fear, felling, threats and conviction about algebra.

Teaching learning strategies. Teaching strategies refer to methods used to help students solve the problem and be able to develop achievable goals in the content. Teaching strategies identify different available learning methods to enable them to develop the right strategy to deal target identified.

CHAPTER II

Review of Related Literature and Conceptual Framework

This chapter presents the literature related to these two types of review, 'empirical and theoretical'. I will get ideas and guidelines for this research. Some reviews literature related to my study are as described bellows.

Empirical Review

The review of the Empirical literatures pertains the systematic summary of scientific researches and true investigations including their topics, the reasons why this study has to have conducted, methods of the study, data collection tools and methods of ensuring their validity and reliability, and key findings in the related field.

Bohora (2009) studies on "Factor Affecting on Achievement of Dalit Students in Mathematics at lower secondary level (A case study) in Daijee VDC, Kanchanpur District". The main objective of his study is to find the factors affections on achievement of Dalit girls in mathematics.

He had used semi structured face to face interview with mathematics teacher, case respondents with their guardians and classroom observation to collect primary data for only one case school of Kanchanpur District. This study concluded that illiteracy, ignorance poverty, prior knowledge, parental support, quality of teacher, class size, student teacher interaction, social belief, social tradition, family occupation, childhood marriage, working in upper cast family were that major affecting factors the Dalit students.

Limbu (2018) did a research on the topic "Students' Difficulties in Learning Algebra at Grade VIII". The main objective of this study is to find out major difficulties in learning algebra at Grade VIII. The study used both quantitative and qualitative research methods. He had used achievement test, classroom observation and interview. Achievement test was conducted within 100 students same as 10 students and two mathematics teachers were selected for face to face interview. The classes were observed for ten days with observation tools.

This study concluded that students were unable to differentiate like and unlike tern and their simplification, distributive error in bracket expansion, difficulty in operating with the negative integers, difficulties in solving equation. The causes of difficulties in algebra are due to the lake of prerequisite knowledge, solving ways and rules, traditional use teaching materials.

Shrestha (2018) studied on "To explore the development level of Algebraic Skills and the Causes of Low Skills in Basic Level Students". The main objectives of his study were to find out of the development level of algebraic skill of basic level students and to explore the cause of low algebraic skills in basic level students. Through this research he wanted to know develop and cause of low students. Researcher used the theory of knowledge of objectification and Vygotsky's social Constructivist Theory.

His research design was mixed method design with qualitative and quantitative data. The main tools for the data collection in his research were algebraic assessment, interview and FGDS. He has selected two school of Gorkha district convenience sampling methods. Data were collected through written test, observation and interview as primary and various educational data bases, previously conducted research and government's papers as secondary data. He has maintained his research validity and reliability through split half method and by subject export. Data were analyzed and interpreted by using simple satirical tools and mean.

His study suggested that lack of the study, pedagogical barriers, students personal perception of algebraic and succession, personal barriers, lack of the undefined mathematics teaching strategy, unbraiding algebra to real life situation, disconnected transition from arithmetic to algebra are the main causes of low algebraic skills.

Tahir (2011) studied on "Teaching and Learning Algebra in the Junior Secondary Years". The main aim of the study was the Multifaceted Variable Approach (MVA) leads a deeper conception of variable by student than the traditional approach to teaching algebra in years 7-8. The design of the study was quasi-experimental nature and seven metropolitan higher schools in experimental group and teacher. Interview and questionnaire were the main instruments.

The finding was on average students who were taught via the MVA acquired a deeper concept of "variable" and greater algebraic competency that the comparison group. On average, they demonstrated fewer misconceptions and were more successful in interpreting algebraic expressions, representing word problems in an algebraic form, solving linear equations, and in general algebraic reasoning. The study also confirmed the strong influence of teachers' concepts of algebra on the quality of student learning. More sustained teacher professional development may be necessary to ensure the change in teaching practice that is necessary to important the MVA effectively.

Khanal (2018) studied on "Difficulties in solving word problem in algebra content at Grade IX". The objectives of this research was to explore the difficulties in solving word problems of learning algebra at secondary level and to analyzed the major cause of difficulties in word problem of learning algebra. His research design was qualitative design. Data were collected through written test, interview schedule.

The researcher find five level of difficulties they are reading and language difficulties, conceptual difficulties, comprehension difficulties, transformation difficulties and solving process difficulties.

Kafle (2019) studied on "Students' Difficulties in Solving Algebraic Word Problem". The main objective of this study was to identify students' difficulties and to analyze the major causes of difficulties in solving algebraic word problems. The research design was mixed method with qualitative and quantitative elements.

The study was based on students' difficulties in reading and language, comprehension, conceptual, transformation, solving process. While doing achievement test most of the students raise their voice and question about understanding question and its translation to mathematical term. Lack of prior knowledge was mostly notable things. And conceptual and comprehension difficulties were mostly noticeable difficulties. Also students make mistake to translate work to symbol and mathematical term. The major causes of difficulties in solving algebraic word problems were caused by lack of pre-knowledge, less practice of algebraic problems, teaching strategies methods and less and lack of interaction between students and teacher.

Jnawaly (2007) did a research on the topic "Causes that affect mathematics achievements of girls" with two objectives to determine the correlation between affection factors and mathematics achievements of girls students in terms of school related factors and out of school related factor. For this research researcher has be selected 50 girls students from 10 public schools of sampled students students was obtained through the students questionnaire from and achievement from school record. Various statistical techniques such as mean, correlation coefficient and regression analysis were used to analyzed the collected data

Jupri, (2016) studied on "Students' difficulties in mathematics word problem in algebra". This study carried out a teaching experiment involving 51 Indonesian students (12/13 years-old) by using a digital mathematics environment. The findings were backed up by an interview study, in which eighteen students (12/13 year-old) were involved. The learning arrangement that the std designed consisted of students activates including digital tasks within applets embedded in a digital environment, intermediate formative paper and pencil assessment tasks, a final written test and a teacher guided.

This study suggested that the main difficulties in students' written work after the algebra lesson concern the solution processes and to a lesser extent, checking solutions. These finding of study that the main obstacle concerns vertical mathematization and the mathematical problem solving and reflection subcategories in particular and students' written work at the end of the cover-up strategy lesson concern understanding words, phrases or sentences and formulating equations, schemas or diagrams, lack of ability in horizontal mathematization and understanding problems and formulating mathematical models in particular.

Cruz & Rose, (2014) studied on "Students' difficulties in translating word problems into mathematical symbols". This study sought to identify the difficulties encountered by students in translating worded problems into mathematical equations in a private sectarian school in Manila. It examined the students' difficulties and level of performance in translating worded problems into mathematical symbols.

The study used both quantitative and qualitative methods. The Data of the study was obtained through a research made test. In this study, the students' ability in solving word problems depended on how they translate phrases in to mathematical symbols. Problem solving was a difficult task as it involves a lot of steps. Students hurdle the challenge from one step to

another although the steps might not necessarily have to be taken in sequential manner. Some of the processes in solving word problems involve reading comprehension and how students make a plan. This study found that the students' difficulties to translate word problem in the mathematical concept were due to misinterpretation, unable to visualization of problems, lack of the comprehension of the problem posed, incorrect use of operation, carelessness of the problem, interchanging the value and unfamiliar words.

Review of the Theoretical Literature

Each and every study are based on or carried on the basis of any related area. The theoretical framework guides and integrates the research study. It is the platform of research programmed. My concern of the study was "Problem faced by Girl's students in learning algebra at Grade VIII".

Constructivist Learning Theory. Social constructivism strongly influenced by Vygotsky's (1978) work, suggests that knowledge is first constructed in a social context and is then appropriated by individuals Vygotsky's (1978) states every function in the child cultural developments appears twice first on the social level and later on the individual level. First between people intra psychology. This applies equally to voluntary attention to logical memory and to the formation of concepts. The objectives of Vygotsky theory are as follows:

- To motivate learner to learn.

- To emphasize on previous knowledge capacity for learning.

- To emphasize on co-operative learning.

According to social constructivists the process of sharing individual perspectives called collaborative elaboration (Meter and Stevens, 2000). Social constructivist scholar view learning

is an active process where learners should learn to discover principle concepts and facts for themselves, hence the importance of encouraging guesswork and intuitive thinking in learners (Brown et al. 1989; Ackerman 1996). Other constructivist scholars agree with this and emphasize that individuals make meaning through the interaction with each other and with environment they live in. Knowledge is thus a product of human and is socially and culturally constructed (Ernest, 1991).

Social constructivism aligned with Vygotskian theory, views mathematics as a social construction and a culture product and directs their criticism at radical constructivism pointing out the fact it does not entail a theory of learning at along being the theory of discovery problem solving and investigation learning.

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 (Psychology tody.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 Teannes, 2017). A learning disability can cause a person to have trouble learning and using certain skills. The skills most often affected are reading, writing, listing, 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. There are different types of learning disability they are (Learning Disabilities Association of America) i. Language based learning disability, ii. Dyskexua: A specific learning disability that affects reading and related language based processing skills. iii. Nonverbal learning disability and iv. Memory: Three types of

memory are important to learning. Working memory, short tem memory and long term memory are used in the processing of both verbal and non-verbal information.

Conceptual Framework

Conceptual framework refers to the mental picture of the things in consideration. When we think of something an image is created on our mind. The type of mental structure is known as conceptual framework. This study attempted to explore the girl's students' difficulties in learning algebra. The things which are describe in different empirical reviews and theoretical review, the purpose of the conceptual conceptual framework is to explore the girl's students' difficulties in learning algebra. In order to move ahead of my study, I have use Egodawatte (2011) conceptual framework.
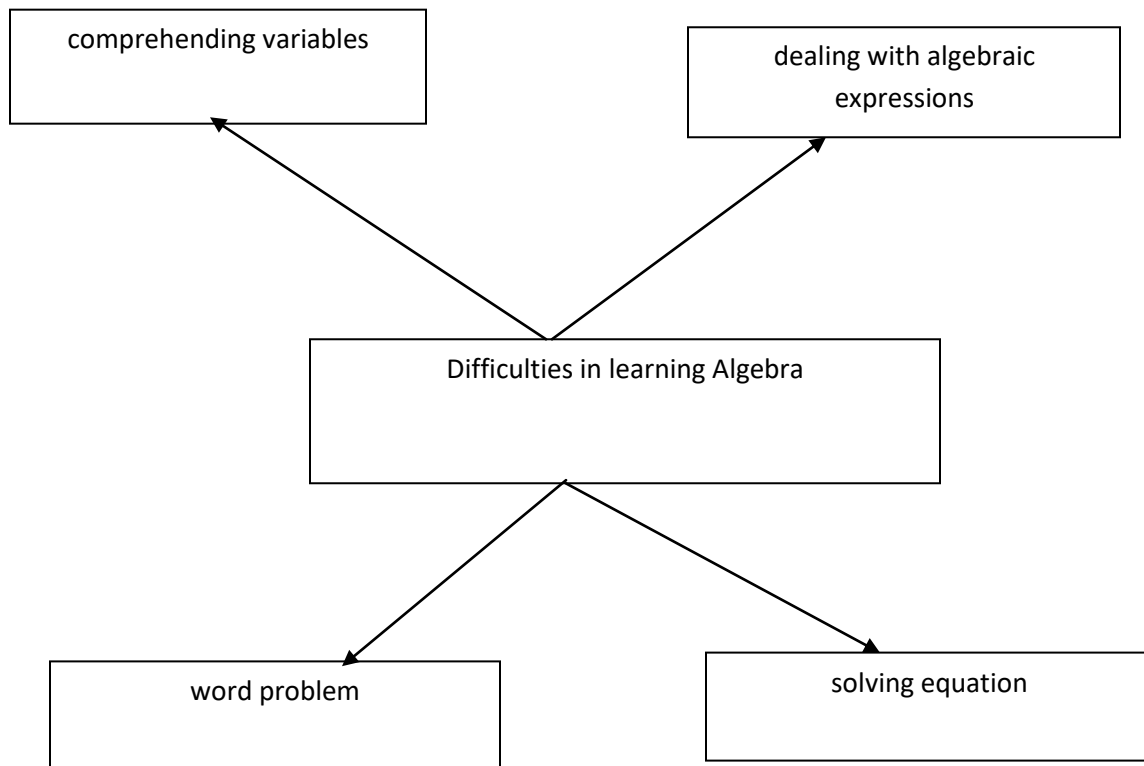

Figure 1: Problem Faced by Girl Students in Learning Algebra.

The above chart shows the area of difficulties in learning school algebra which are explained below:

Difficulties in comprehending variable. Letters represent different meanings in different context. When letters are present in algebra entitles, this seems difficult for students. A letter that represents more than one number or value is called variable. The understanding of letters in different context is more difficult to understand.

Difficulties in dealing with algebraic expression. Letters are used to build up an algebraic expression. Either one letter or combination of letters could be used in an expression. Therefore, there is a close relationship of understanding the meaning of letters in the context of algebraic expression. There are many difficulties in an expressions like: addition, subtraction, closure and distributive property, change verbal problem into mathematical algebraic statement and so on.

Difficulties in solving equation. When two algebraic expressions combine together with an equal sign, it is called an equation. To solve an equation, one most kbown difficulty was the application of rules of simplifying equation on the basis of given equation. Also use of equal to signs and understanding of equation solving method were difficult.

Difficulties in word problem. Students in solving algebraic word problem, translating the mathematical statement into appropriate algebraic expressions was more difficulty for students within assigning variable, nothing constant and representing relationships among variables. Word problems were related to language, vocabulary, mathematical terminology and mathematical rules.

Difficulties in transition from arithmetic to algebra. Transition from arithmetic to algebra means the transition from about a known quantity to thinking about an unknown quantity as the transition from arithmetic thinking to algebraic thinking. So moving from arithmetic to algebraic problem solving is difficult for students. They cannot clear about an arithmetic strategy to solve algebraic problem.

Above conceptual framework describes different areas of student's difficulties in learning algebra at school level. On the basis of above framework mainly content of school algebra like comprehending variable, algebraic expression, solving equation, word problems and transition from arithmetic to algebra are areas of difficulties in learning algebra at basic level.

Similarly, to find out major causes that affect girl's student in learning algebra is another objective of this study. For this researcher used another conceptual framework which is presented below.
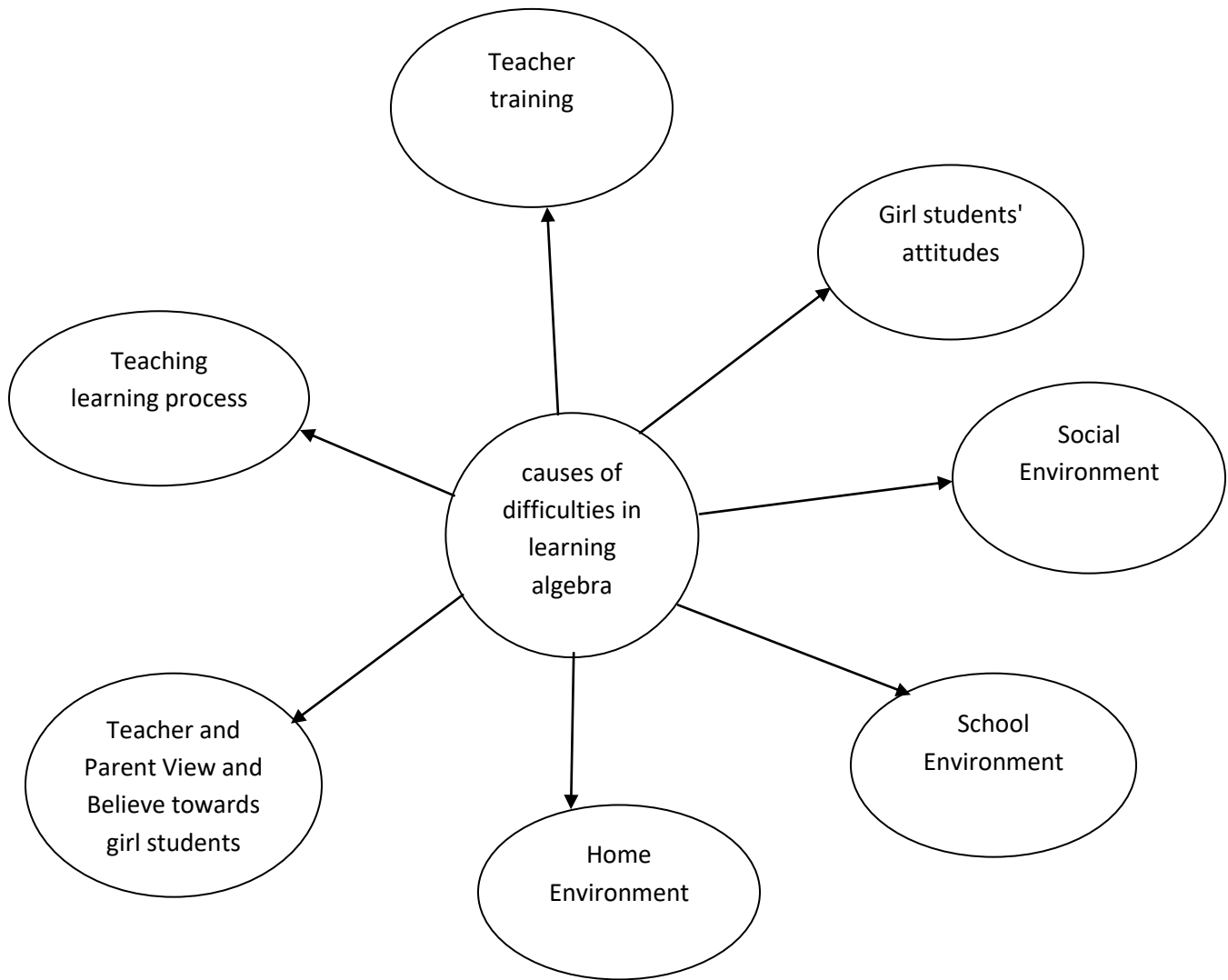
Figure 2: Problem Faced by Girl Students in Learning Algebra.

No matter what type of class a student is in class, if the student's attitude is poor toward math, then the student tends not to try as hard. Parents and teachers also play an important role in a students' attitude toward mathematics. "Parents and teachers attitude towards their children are as learner of mathematics that affects the children's own perception of their competence and the value they ascribe to the domain"(Chouinard, 2008, p. 130).

Teaching method and use of teaching materials, curriculum, students' background, school management and environment, parent's involvement are cause of difficulties in learning algebra. The girl's students may be affected by different variables such as the teaching learning process, home environment, school environment, social environment, thought of girl's students, pre knowledge, attitude towards algebra, teacher qualification, interest of the learner, capacity of learner, exception of teacher.

These difficulties were faced by girl's students at basic level whose impact is directly related to the girl's students' achievement in learning algebra. To find areas of difficulties and cause of difficulties researcher made achievement test, in-depth interview and class observation. Similarly, field note was also used for data collection. In such way this research is fully guided by above conceptual framework. In the basis of above conceptual framework the whole research tries to find areas of difficulties in learning algebra and causes of difficulties in learning algebra.

Chapter III

Methods and Procedures

The researcher has to determine the appropriate method and procedures of this research. In this chapter design of the study, population and sample research tools, data collection procedure and data analysis procedure are in data.

Research Design

A mixed method with qualitative and quantitative is used for data collecting and analyzing process of this study. In the quantitative phase, I used a test instrument to expos students' reasoning for their difficulties and errors in the qualitative phase to the study. There are four main stages in the sequential explanatory study. The following diagram indicates these stages.

Quantitative data collection	→	Quantitative data analysis	→	Qualitative data collection	→	Qualitative data analysis
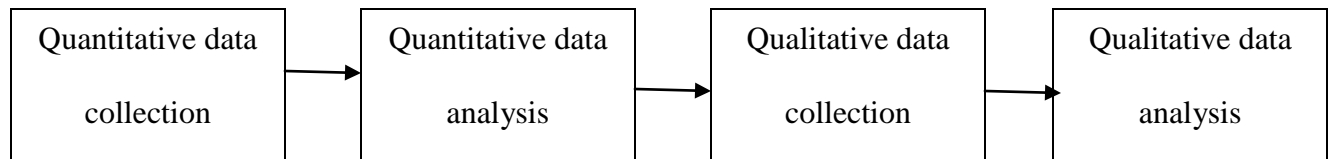
Research Site

The students of grade VIII of 5 public schools in Bhangaha municipality of Mahottari District were research site of my study.

Selection of Respondents

To fulfill the objectives of this study I selected five public schools by random sampling method which is located at Bangaha Municipality of Mahottari District. From schools I selected

five mathematics teachers and fifty girls students of grade VIII by non-random and random sampling method respectively. Then I selected five parents by non-random sampling method for interview.

Data Collection Tools

Since study was based on explanatory sequential design. Researcher collected the data using primary sources on the basis of quantitative and qualitative. The main tools for data collection were Achievement Test, Interview Schedule, and Observation form and field note.

Achievement Test. To explore girls students' difficulties in learning algebra researcher used written test tools. the paper test was set of questions made by researcher purposively on the basis of bloom's taxonomy of objectives. It was an important tool n this study to collect the data and measure the knowledge, skill and mathematical ability of girl students. Written test was conducted in fifty girl students. In test question contained 12 questions with 36 mark and time duration was given one hours thirty minutes.

Interview Schedule. The researcher tool the interview to fulfill the objective of study i.e. to find out major causes that affect girl students in learning algebra. Interview was for girl students, teachers and parents. Only ten girl students were included for interview among them. Interview was taken on the basis of girl students' attitude towards algebra, students' pre knowledge, family environment, school environment and home environment. And researcher also took interview with mathematics teachers related with their teaching methods, relationship between teacher and girl students, girl students' participants in mathematics class. At last researcher took interview with five parents related with attitude towards their home environment and their daughter math practice in home.

Observation. In this study, researcher observed the students behavior and participation while teaching in classroom, teaching methods, use of teaching materials and relationship between teacher and students. Researcher observed classes with observation tools. Researcher recorded daily activities in dairy for analysis and interpretation of data.

Reliability and Validity of Tools

The reliability refers to the consistency of the results and validity is described as the degree to which a researcher study measure what it intends to measure. From written test researcher analyzed the reliability of test by using split half method and found reliability coefficient. It shows that test questions are reliable. For the validity of tool questions organized simple to complex form and consulted with subject export, specialist and educators to judge the validation.

Data Collection Procedure

The researcher visited the selected schools with above tools and got permission from the schools to consult the girl students' difficulties in learning algebra. Researcher visited 5 public schools of Bhangaha municipality of Mahottari district at 27 Magh, 2077 to get permission for administrative achievement test, class observation and interview and got permission from the school's Head Masters. In the same day mathematics teachers noticed the girl students for exam which was taken by researcher. Researcher took test for 1 hour 15 minutes to 50 girl students (10 girl students from each school) in Shree Janata Basic Level School, Shree Ma.Vi. Bhangaha, Rastiya Basic Level School, Shree Sarbajanik Ma.Vi and Shree Kishori Janata Ma.Vi. at 28 Magh, 29 Magh, 2 Falgun, 3 Falgun and 4 Falgun respectively. At last students and mathematics teachers were informed about taking interview and students were requested to call selected

parents. After taking test, researcher checked copy and recorded girl students' difficulties, errors and mistakes.

Similarly, researcher visited Shree Janata Basic Level School, Shree Ma.Vi. Bhangaha, Shree Rastriya Basic Level School, Shree Sarbajanik Ma.Vi and Shree Kishori Janata Ma.Vi at 5 Falgun, 6 Falgun, 7 Falgun, 9 Falgun and 10 Falgun for class observation and interview respectively. Before entered the schools researcher confirmed respondents to take interview. From each school, researcher selected 5 students (total 25) and grade VIII mathematics teacher for interview. Researcher took face to face interview within 5 minutes for each and every girl students. In same time researcher observed the teaching classroom. At last researcher took interview with teacher about responds for detail and to get reliable information with the help of teacher's interview guidelines schedule. Finally, researcher took interview with parents.

Data Analysis Procedure

In this study the data obtained from achievement test was analyzed using simple statistical tool mean. The data collected from interview and class observation were transcribed verbally. The method of data analysis was general inductive approach. The general inductive approach provides systematic set of procedures for analyzing qualitative data that can produce reliable and valid findings (Thomos, R.David, 2006). For, this different theme was developed on the basis of research objectives and constant comparison method was used. Triangulation was used for the validity of the data.

Chapter IV

Analysis of Data and Interpretation of Result

This is a mixed method research related to problem faced by Girl Students in Learning Algebra at Basic Level School. The objectives of this study are to explore the girl students' difficulties in learning algebra and to find out major causes that affect the girl students in learning algebra. Written test, interview schedule and class observation were used as data collection tools. Data obtained from achievement test was analyzed using simple statistical tools mean. Similarly, the collected data from interview and class observation were analyzed on the based on those themes which are presented in the chapter. Many girl students could not understand the conceptual meaning of the problem. Some girl students were careless in their study and examination. Thus, overall obtained data were analyzed and interpreted difficulties in comprehending variables, in dealing with algebraic expressions, in solving equations and word problems.

The data were collected from fifty girl students of grade VIII, mathematics teachers and students' parents by achievement test, interview schedule and class observation. After carefully checking the answers sheets and calculate their obtained marks and determinant the mean mark of the students is almost out of fifty. This average marks shows the difficulties level of girl students are high to very high. The obtained data were calculated and analyzed according to the objectives of this study. To analyze and interpret the data using statistical tool correlation coefficient show the split half of the reliability of test item. Thus, the obtained data were analyzed and interpreted under the following headings.

Difficulties in Comprehending Variables

Difficulties in comprehending variable means problem to know the meaning of variable and constant, problem to differentiate between variable and constant, problem in the solution of constant and variable. Researcher constructed two questions for written test in order to find out the girl students' difficulties in comprehending variable. This questionnaire set is categorized in two parts, short question carried two marks and long question carried four marks.

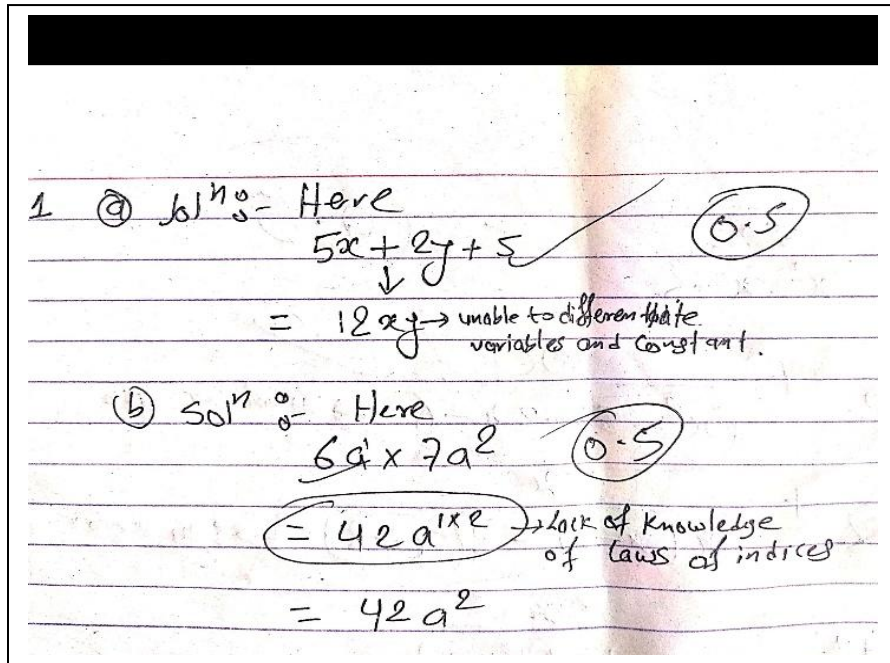The problem presented of this level is mentioned as

Figure 3: Difficulties in comprehending variables.

In solving this problem many girl students faced such type of difficulties. The answer sheet of a student is given above for example. The solution shows that she could not solve it correctly. So, she obtained 1 mark out of 2. The questions were given related to addition and subtraction of like and dislike terms as well as degree of variable. Above solution shows that girl students could not differentiate between variable and constant. So used only simple addition and

subtraction rule thus, she write 5x + 2y + 5 = 12xy. In this way multiplication and division of variable was challenging for students. Another question's answer sheet shows that girl students are not familiar about law of indices. These problems are related to mathematical disability theory and this theory indicated the problem in learning math concepts, difficulty memorizing math facts, difficulty organizing number and understanding how problems are organized.

Researcher also involved in class observation. From all class observation researcher found some teacher did not review the previous classes and some teacher used to review the previous classes. There were good interaction between teacher and students while solving problem. Most of the girl students were familiar with the word variable and constant but could not define it. Students committed two variables or multiplied a variable and a number which are (i) Students applied the rules of addition or multiplication in simplifying and they either multiplied or added the coefficients and copied the variables without change, and (ii) Students made multiplication of variables error in items, involving numbers and variables,

In order to conform, the difficulties were seen in this level, researcher took the interview with girl students. In this matter another students opined. For this purpose researcher asked the question to girl students such as what is variable? Can you differentiate variable and constant? Can you give examples of variable and constant? Can you solve the problem of variable and constant? What are the causes of difficulties in variables?

Yes, I think variable is symbols of English letter like a, b, c and constant is digit like 1, 2, 3 etc. I can differentiate between the variable and constant, but I can't identify the like

and unlike terms. So, I can't do addition, subtraction, multiplication and division of variable. (Girl Students A)

While analyzing above girl students' response students were feeling uneasy and confused in comprehending variable. They were faced difficulties in addition, subtraction, multiplication and division of variable due to the basic concept of index, incomplete perception of like and unlike term and lack of understanding of variable.

Again, researcher took the interview with mathematics teachers about girl students' difficulties in comprehending variables and their operation.

Some girl students made mistake in addition and subtraction of like and unlike terms such as $2x + 3y + 2 = 7xy$. Most of girl students made mistake due to the misinterpreting the product of two variables like, $3a.5a^2 = 15a^2$. In this way the girl students confused in invisible numerical coefficient of 1 in a and b, led to its interpretation as '0'a and '0'b. Lack of girl students' pre-knowledge and their careless behavior, algebra was made difficulty. Some girl students do not want to come over from the difficulties of algebra. (Teacher A)

According to mathematics teacher, students are confused in product of two variables and invisible numerical coefficients of variables. Irregular in class attendance, low interest in algebra learning, inactive in mathematics class are major causes in difficulties of comprehending variable. Students' pre-knowledge, careless behavior, less practice of algebraic problems is major causes in difficulties of comprehending variable.

Difficulties in Dealing with Algebraic Expressions

Difficulties in dealing with algebraic expression means problems related to define algebraic expression, providing the example of algebraic expression, simplification of algebraic expression and basic mathematical skills in solving algebraic expression. There were two short questions carried four marks and one long question carried four marks.

The problem presented of this level is mentioned as

Figure 4: Difficulties in Dealing with Algebraic expressions

In solving this problem many girl students faced such type of difficulties. The answer sheet of a girl student is given above for example. The solution shows she could not solve it correctly. So, she obtained 2.5 mark out of 4 mark. Above solution show that she had less knowledge about the law of three terms simplification. She did not care about sign and made negative sign error in simplifying algebraic expression. Students performed the operations of addition without considering the negative sign attached to its integer then they put the negative sign back in their solutions. Students were familiar with factorization but result made incomplete.

From the classroom observation researcher found some result, girl students made two types of subtraction errors which are (i) A student simplified $2a - 6a = 4a$ and (ii) Students misapplied the rule "negative times negative is positive". Students made two types of error such as (i) Students simplified $3(2a + 4) = 6a + 4$ and (ii) Students made errors in bracket expanding with sign such as $-2(2x + 3) = 4x + 3$. Similarly, girl students were made this kind of mistake when solving $2(x + 3)^2 = (3x + 15)^2$.

At last researcher took interview with girl students and mathematics teachers to make conclusion in more reliable. For this purpose researcher asked the question to the students such as, Can you define the term algebraic expression? Can you solve algebraic expression properly? What was the cause of difficulties in algebraic expression? What are you confused about the operation in algebraic expression?

> *I don't know about the meaning of algebraic expression. In fact I can't solve the problem related to algebraic expression with basic operations. I do not know the rule of factorization and simplification. Low interest in algebra and difficult solving technique are cause of difficulties in algebraic expression.* (Girl Student B)

Girl students are poor in pre-knowledge. They learned about rule of factorization, H.C.F. and L.C.M. in class six and seven although they don't know. Most of the girl students are unable to solve problem related to addition and subtraction of rational expression having same denominator and different denominator. Girl students made negative sign error. For example, -5x + 2x could be solving as -(5x + 2x) and obtained the incorrect answer -7x. They did not understand the function of bracket in algebraic expression. (Math Teacher)

Thus, from above responses indicated that girl students faced difficulties in algebraic expression. Students were confused addition and subtraction of rational expression having same denominator and different denominator. Most of students made Negative sign error, misapplied the rule "negative times negative is positive", made bracket expanding errors etc.

In algebraic expressions, students' problem increased due to their lack of understanding of basic concept of the variable. These problems are related to mathematical disability theory which includes difficulties as learning mathematics concepts, difficulties organizing number and understanding how problem are organized.

Difficulties in Solving Equations

Difficulties in solving equation refer to the problem in solving equation with proper rules and methods. Similarly, in complete solution and over simplification are also included. Researcher constructed two questions for written test in order to find out the students difficulties in solving equations.

The problem presented of this level is mentioned as

Figure 5 A: Difficulties in Solving Equations.

Figure 5 B: Difficulties in Solving Equations.

In solving this problem many girl students faced such type of difficulties. The answer sheet of girl students is given above for example. The solution shows she couldn't solve it

correctly. So, she obtained 0.5 marks out of 2 marks. Above solution shows that she couldn't differentiate between variable and constant so, she used simple addition and subtraction rule. Thus, she write 7a + 3 = 10a. Another, she had lack of law of equality and closure property, thus she do 10a = 24 or a = 24 - 10.

Similarly, in second answer sheet of girl students is given above for example. The solution shows she couldn't solve it correctly. So, she obtained 0.5 mark out of 2 mark. She no table to know the rule of transposition, thus she do 7a - 3 = 3x + 5 or 7x + 3x = 5 - 3.

Researcher involved in class observation. While observing the class researcher found such results, students used equal sign incorrectly for example, 2 - x = 4 = -2. Students were confused in transposition rule and used mathematical operation about addition, subtraction, multiplication and division.

And researcher took interview with girl students and mathematics teachers to make conclusion is more reliable. For this purpose researcher asked the question to the girl students such as, what do you understand about linear equation of one variable? What are the problems you face to solve equation? Can you substitute the values and simplify properly? What was the cause of difficulties for solving equation?

> *In my view equation means mathematical relation with equality sign but I don't know the meaning of linear equation of one variable. I listen and learn about transposition rule but unable to use of mathematical operation. I have problem in substitution, simplify and graphical method. Lack of prerequisite knowledge of side change- sign change rule, unknown about substitution and graphical method are cause of difficulties in solving equation.* (Girl Student C)

While analyzing above response girl students were feeling uneasy and confused in solving equation. Students were unknown about meaning of linear equation of one variable, simple rule of simplification, change side change sign rule etc. Also students were confused in solved by substitution and graphical method.

> *Most of the girl students do not have prerequisite knowledge for grade VIII algebra learning. In solving equation students are confused in substitution of the value. Similarly, most of the girl students are unable to addition, subtraction, multiplication and division property in solving equation i.e. girl students faced difficulties in transposition rule.* (Mathematics teacher C)

The above view of mathematics teacher indicated that girl students are unable to addition, subtraction, and multiplication and division property in solving equation.

Difficulties in Word Problems

The word problem in Algebra has been an obstacle and challenges for many students. Difficulties in word problems meant that students are confused about terminology, difficulties in comprehension, difficulty with verbal explanation transformation and weak process skills for calculation. The process of solving algebra word problem beings with reading and students make attempts to make coherent sense out of the several sentences word problem indicate the problem of misunderstanding of given statement. Similarly, also deals with difficulties related to the mathematical vocabulary and translating word problem into mathematical form using proper sign and symbol. Researcher constructed four questions for written test in order to find out the students difficulties in word problems. There were two short question cored four mark and two long questions carried also eight mark.

The problem presented of this level is mention as
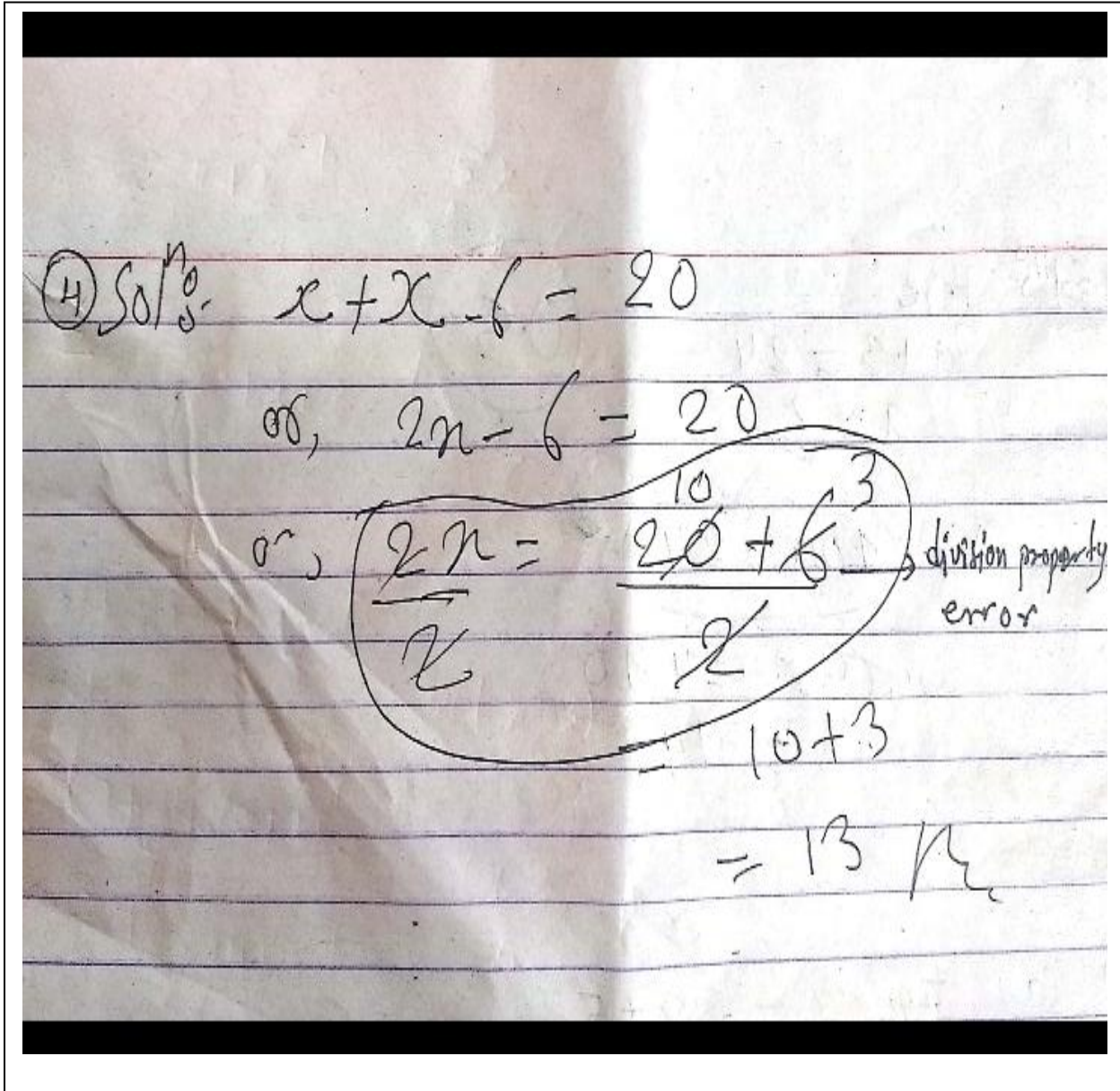
Figure 6 A: Difficulties in Word Problem

नोट

chicken = x
mutton = y
पहिलो स्थिति
$2x + y = 1500$ —— ①
दोस्रो स्थिति
$2x + y = 1950$ —— (ii) → Could not understanding statement

स॰ ① बाट र (ii) × 2 ले गुणन गरी घटाउँदा

$2x + y = 1500$
$2x + 9y = 3900$
$-2y --- 450$

$3y - 2400$
$y = \dfrac{2400}{3}$
∴ $y = 800$
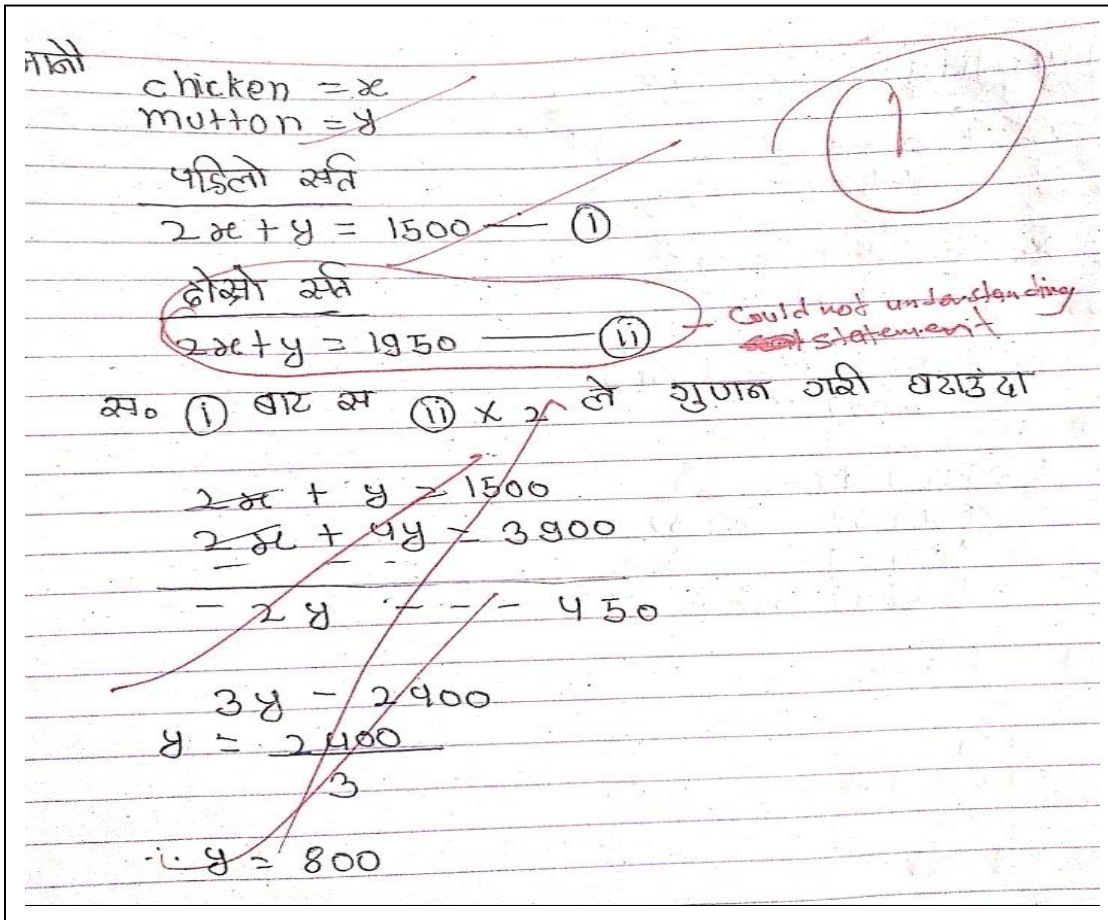
Figure 6 B: Difficulties in Word Problem.

In solving this problem many girl students faced such type of difficulties. The answer sheet of question 4 of a girl student is given above for example. The solution shows girl students couldn't solve it correctly. So, she obtained 0 mark out of 2 mark and 1 mark out of 4 mark. Above solution shows that girl students are unable for word problem to convert into mathematical form with proper sign and symbols. They don't understand the sense of the problem. Girl students made mistakes related to process skill while solving the word problem. In word problem terminology, vocabulary and translate the word problem into mathematical form with proper sign and symbol were major difficulties of these problem are related to language based learning disability theory.

While observing the class researcher found such results: students were participating in class work but not on discussion and teacher not used extra teaching materials except daily use materials. Students made more error in transformation phase than process skill, comprehension, and reading in word problem. Students could not translate unknown into mathematical expression and formulate mathematical equation that expresses the relation of the variables in the problem.

At last researcher took interview with students and math teacher to make conclusion is more reliable. For this purpose researcher asked the question to the girl students such as, can you translate the word problem into mathematical form with proper sign and symbol? Do you have any problem in language, vocabulary or terminology in algebra? What was the cause of difficulty to word problem? What was the problem in solving word problems?

> *I have no idea to translate the word problem into mathematical form with proper sign and symbol. In word problem I confused on langrage, terminology, symbols, relation etc. My vocabulary is weak so I have problem into solving word problems by using proper sign and symbols. Lack of prerequisite knowledge and no encourage and clarify by teacher on terminology, relation are cause of difficulties in word problem.* (Girl Students D)

The above views of girl students' shows students faced difficulties in word problem. Which are related to vocabulary, terminology, symbols, relation etc. Similarly, translated the word problem into mathematical form with proper sign and symbol is also one the major problem. Comprehension and process skills are also problem for students. The problems are related to the language based learning disability.

I tried to clarify every vocabulary terms and terminology with proper example. Although girl students have problem related to translate the word problem into mathematical form with proper sign and symbol. (Mathematics teacher D)

In word problems students were unable to translate the word problem into mathematical form with proper sign. Similarly, lack of reasoning skills and methods arriving at an incorrect answer and students faced problems on terminology, symbol, vocabulary and relation.

Parents' Response

Researcher asked some question to parents on the basis of interview schedule and recorded their responses are as follows.

I am a farmer. I don't have time to children for study. Due to lake of money I could not manage pen, copy, book and other learning materials. At home my children use to work in field with us. (Respondent A)

I am a shopkeeper. I spend most of the time in my shop. I could not get any time in my children education. But I am trying to fulfill all their learning materials such as pen, copy, book etc. At night, I use to say my children for study but can't gibe time for them. My daughter gives time for household work. (Respondent B)

I am not much poor, but we can't help our children to study because of illiteracy and also we could not provide necessary things needed in their studies. In our village most of the children don't use to go school on wedding party and any occasions. (Respondent C)

I am a farmer. In our Dum community, it is not   necessary to send our daughter in school. We are poor, so we send our daughter in other household work, wedding party for washing and field work for earning money. Education is less priority in our community. (Respondent D)

According to above parents' responses, researcher found girl students are facing many problems in learning algebra. Their interest, home environment, cultural views, parents' economic status, educational status, parents' occupation are major factor that affect them in learning algebra.

Chapter V

Findings, conclusions and Implications

This section deals with the summary, findings, conclusions and implication concerning the girl students' difficulties in learning algebra at grade VIII and major causes that effect girl students in learning algebra.

Findings

The main concern of this study were to explore the girl students' difficulties in learning algebra and to find out major causes that affect girl students in learning algebra. On the basis of achievement test, classroom observation and interview of students, mathematics teachers and parents collect the data. After the analysis and interpretation of the obtained data, the following findings were obtained.

- Lack of knowledge to difference variable and constant was major problem in comprehending variables. Girl students were confused to differentiate between like and unlike terms. They were not able to addition, subtraction, multiplication and division of variable.

- Maximum girl students felt difficulty to understanding the verbal problems due to that they took the meaning of the mathematical words misleadingly. So, they were unable to deal with the question. For example to generalize mathematical rules, to remove an unrequited term from the equation and mathematical operation.

- Girl students made subtraction errors and misapplied the rule of "negative times negative is positive". Similarly, girl students made mistake in bracket expansion. In addition understanding the expression, simplify the expression with appropriate mathematical

operation and incomplete simplification were difficulties in dealing with algebraic expression.

- Girl students were unable to do choice of correct language to represent their mathematical ideas.

- Misunderstanding of equation solving methods, rule and procedures, incomplete and oversimplification were the most familiar difficulties in solving equation. Also they confused in understanding of the uses of the equal sign and its properties. Similarly, they did over simplification.

- Girl students were confused due to the technical words, language, and vocabulary. Translating in mathematical form with proper sign is difficulties in word problem. Similarly, not know when irrelevant information is included or when information is given out of sequence and have trouble learning or recalling abstract term. And students faced problem in understanding of the word problem and translating in mathematical form.

- It was found that most of the learners felt difficulties in solving the algebraic word problem due to their less participation in the classroom activities.

- Girl students experience was failure to apply the correct formula and mathematical procedures. This was because they could not transform verbal language into mathematical forms and term.

- Girl students did not internally participate in learning algebra because they were no motivated by teachers and parents. Girl students do not have sufficient materials for learning algebra.

- There was lack of interpersonal relation between weak students and teachers as well as other friends. Similarly there was no proper interaction between students and mathematics teachers.

- Girl students did not have sufficient practice of mathematics at home because they were forgetting complex terms and formulas very fast.

- Lack of prior knowledge of the students, poor economic status of parents, household work, parents' educational status, occupation, lack of motivation to learn mathematics, girl students' interest in algebra, less practice in solving algebraic problems are major factors that affect learning algebra.

Conclusion

In course of analysis and interpretation of data it is found that student are confused to differentiate variable and constant, so they are unable to addition and unlike term. Also students are not familiar with rule of multiplication and division. Most of the girl students commit their mistakes at reading level. The difficulties are also found in giving meaning of mathematical term properly due to the lack of pre-required background knowledge about directed numbers, fraction, use of signs, identifying the variables and their relationship. Similarly, students do either incomplete solution or oversimplification. Girl students are not familiar with transpose rule. So they commit mistake in addition, subtraction, and multiplication and division property while solving equation. Students misuse the symbols, language and vocabulary. So, girl students are unable to translate the word problem into the mathematical form with proper sign and symbol.

In this study the researcher has also found that due to the lack of proper interaction between teacher and students, the problem has arisen moreover the major cause is also found that

of students less practice in mathematics teacher does not implement the modern teaching techniques, method and materials for algebraic teaching and learning. So, Students assume that algebra as an abstract chapter. Due to the parents' occupation, girl students are not regular in their study. They are busy in their household work. Parents are not able to provide times and learning materials to their children because as their poor economic status. Other thing, lack of additional classes, passiveness of students in learning is main causes of difficulties in learning algebra.

Implications

The study was about the problem faced by girl students in learning algebra at basic level school. The finding and conclusion of this study were based on only five schools of Bhangaha municipality of Mahottari district. This study may not be completed for all situations, but can bring new avenue to diagnosis the same kinds of problems. Researcher has presented the following educational implications.

- This study is useful for the researcher for further study.

- This study affords new researcher to conduct new researcher to conduct new researcher which can be used a secondary source level.

- The government of Nepal should supply the essential teaching materials and should encourage school administration to purchase such teaching materials.

- A similar study can be done for basic level school.

- The teacher should try to find out the reason about committing the difficulties.

- Recommends for researcher as "Algebraic errors done by school level students".

- This research is applicable for curriculum planner's text book written policy makers and also myself to improve my professional development.

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Achievement Test

Student's Demographic Information

Student Name: Roll Na.:

School Name: Age:

Questions

Group 'A'

1. a) Find the sum of 5x, 2y and 5.

   b) Find the multiplication of 6a and $7a^2$.

2. When 7a+3 = 24, then find the value of a.

3. If x = 5 and y = 2, find the value of 2x+3y.

4. The sum of two number is 20 and their difference is 6. Write a linear equation to represent the given statement and solve it to find the numbers.

5. The age of father is double than his son. The difference of their ages is 21 years. Find their ages.

6. Find LCM of

   a) 4a and $6a^2$ b) $x^2 - 4$ and 2x - 8

Group 'B'

7. Solve it

   a) 7x - 3 = 3x + 5   b) $\dfrac{3x + 2}{5x + 7} = \dfrac{2}{3}$

8. Simplify $\dfrac{x^2 + 5x + 6}{(x + 3)^2}$

9. The cost of 2kg chicken and 1kg mutton is 1500. If 1kg chicken and 2kg mutton cost is Rs.1950. What are the cost of per kg chicken and mutton? Solve it by making the pair of linear equations.

10. Simplify $\dfrac{2}{x^2 + 3x + 2}$ + $\dfrac{5x}{x^2 - x - 6}$

11. The ratio of two number is 4 : 5. If the sum of these two number is 981, then find out two given number.

12. Solve it $x^2 + 7x - 8 = 0$

The End

Appendix-B

Class Observation Guidelines

a) Classroom physical structure

b) Girl students' behavior in classroom

c) Interaction between teacher and girl students

d) Participation of girl students on mathematics task, home assignment and discussion

e) Teacher's behavior in classroom with girl students

f) Teaching strategies and opportunity of response

g) Coordination of teacher with girl students to problem solving

h) Teaching with materials

Appendix- C

Interview Schedule with Mathematics Teacher

Name: Age: Gender:

Address: Qualification:

Teacher's Experience: Trained/untrained:

The interview with mathematics teacher will be taken in the basis of following topics:

a) Teaching methods in algebra

- Using teaching materials

- Different teaching strategies

b) Relation between teacher and students

- Students are openly talking with teachers

- Students opportunity for learning with teacher

- Ask any problems by students

c) Participation of students in the class room

- Students are regular or irregular in school

- Students interest in mathematics

d) Encouragement of the students in learning algebra

- Reinforcement, feedback provided by mathematics teacher

e) School environment in learning algebra

- Physical facilities available in school

- Students demography

f) Students pre-knowledge in algebra

- Students have prerequisite knowledge for Grade VII

g) Practice of algebra at home

- Students are taken to the homework

- Learning opportunity at home

Interview Schedule with Girl Students:

Name: Age:

Roll No.:   Cast/ Ethnicity:

Religious: Most interesting subject:

The interview with girl students was taken on the basis of following topics:

a) Difficulties in comprehending variables

- What is variable?

- Differentiate between variable and constant

- Do you know about operation of variable and constant?

- Causes of difficulty in variable

b) Difficulties in dealing with algebraic expression

- Can you solve algebraic properly?

- What are you confused about the operation in algebraic expression?

c) Difficulties in language problem

- Can you translate the word problem into mathematical statement with proper sign and symbol?

- Do you have any problem in language and terminology in algebra?

- What are the problems in solving word problem?

d) Difficulties in Equation

- Can you solve the linear equation?

- What are problem you faced to solve equation?

- Can you substitute the values and simplify properly?

e) Expectation about algebra learning

- Use in daily life

Interview Schedule with Parents

Name: Cast/Ethnicity:

Address: Religious:

Occupation: Education:

The interview with parents was taken on the basis of following topics:

a) Parents' education

- Parents are educated or uneducated

- Educational qualification of parents

b) Home environment

- Parents' view in education

- Giving time for their children's study

- Net-internet access at home

c) Girl Students' interest

- Interest in game

- interest in study

- Interest in Mathematics

d) Social environments

- Students' peer group

- Social thought about education

- Social view towards girl

Appendix-F

Reliability of the Test by Using Split-Half Method

S.N.	Score on odd number (X)	Score on Even number (Y)	X^2	Y^2	XY
1	15	14	225	196	210
2	7	8	49	64	56
3	11	7	121	49	77
4	9	11	81	121	99
5	10	13	100	169	130
6	12	15	144	225	180
7	8	9	64	81	72
8	6	7	36	49	42
9	10	11	100	121	110
10	10	8	100	64	80
11	16	14	256	196	224
12	5	7	25	49	35
13	9	8	81	64	72
14	13	10	169	100	130
15	13	11	169	121	143
16	14	12	196	144	168
17	12	10	144	100	120
18	4	7	16	49	28
19	7	11	49	121	77
20	9	10	81	100	90
Total	200	203	2206	2183	2143

Correlation $r_{12} = \dfrac{\sum XY - \dfrac{\sum X \sum Y}{N}}{\sqrt{\sum X^2 - \dfrac{(\sum X)^2}{N}}\sqrt{\sum Y^2 - \dfrac{(\sum Y)^2}{N}}}$

$$= \frac{2143 - 2030}{(14.35)\,(11.07)}$$

$$= \frac{113}{158.85}$$

$$r_{tt} = 0.71$$

Where r_{tt} = Reliability of queations.