LEARNING DIFFICULTIES IN VERBAL PROBLEMS OF ALGEBRA FOR GRADE EIGHT STUDENTS

A

THESIS

BY

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Letter of Certificate

This is to certify that Pooja Awasthi, a student of semester system 2073/74 with campus Roll Number 604, Exam Roll Number 7328414 and TU Registration Number 9-2-690-2013-2011 has completed this thesis during the period prescribed by the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. The thesis entitled "**Learning Difficulties In Verbal Problems Of Algebra For Grade Eight Students"** embodied the result of her investigation conducting the period 2020. I hereby, recommend and forward that her thesis be submitted for the evaluation as the partial requirement to award the Degree of Masters in Mathematics Education.

February 21, 2022 (2078 Falgun, 09)

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Prof. Dr. Bed Raj Acharya

(Head)

Letter of Approval

This thesis submitted by Mrs. Pooja Awasthi entitled on **Learning difficulties in verbal problem of algebra for grade eight students** has been approved as for the partial fulfillment for the requirement of Master's Degree in mathematics Education.

Committee fortheViva-Voce	**Signature**
Prof. Dr. BedRajAcharya (Chairman)	…………………………..
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Date: February 21, 2022

Recommendation for Acceptance

This is to certify that Mrs. Pooja Awasthi, has completed her thesis entitled **Learning Difficulties in verbal problem of algebra for grade eight students** under my supervision during the period prescribed by the rules and regulations of the Tribhuvan University, Nepal. The study embodies the result of investigation conducted during the period of 2019-2020 under the department of Mathematics Education, University Campus, Tribhuvan University, Kirtipur, Kathmandu. I recommend and forward this to the Department of Mathematics Education to organize finalviva-voce.

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Prof. Dr. Bed Raj Acharya

(Supervisor)

Date: February 21, 2022

Declaration

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

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Mrs. Pooja Awasthi

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Abstract

The main focus of the study was to explore learning difficulties in the verbal problem of algebra for grade eight students. The objectives of the study were to explore student's difficulties in learning algebra word problems and to find out learning strategies of teachers to teach algebraic equations of verbal problems. To fulfill these objectives the study has listed research questions: What are the difficulties in solving algebraic verbal problems in grade eight? What kind of difficulties students feel in solving algebraic verbal problems? And how do teachers teach algebraic equations of verbal problems? To investigate these research questions, I selected qualitative research design with a case study approach. The study sites of the research were darchula public school, Asian academy school, Mahendra higher secondary school and secondary school dhap of darchula district. The participants of the study were one mathematics teacher and two students from each school. I utilized a purposive sampling method to select participants and observe the classroom as well as conduct interviews with achievement test questions of students for data collection. The collected data were analyzed with help of Newman's Error theory and reviewed literature. The main finding of research was reasons for students to out week in algebra,they failed to understand. Students lack an appropriate choice of equation and incorrect use of sign symbols. Students made a lot of mistakes in arithmetic operations. Students have lack of pre knowledge and lack of interaction with math teachers because there were a large number of students in a single class. Students could not have interest in mathematics because they had no one to guide them at home. The teacher was known about lesson plan,use of materials and use of method but was unable to practice it in realenvironment.

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Abbreviations

T1 :   Teacher Participant One

T2 :   Teacher Participant Two

T3 :   Teacher Participant Three

T4 :   Teacher Participant Four

S1 :   School First

S2 :   School Second

S3 :   School Third

S4 :   School Fourth

St1:   Student First

St2:   Student second

Chapter -I

INTRODUCTION

Background of Study

Mathematics is the science that deals with the logic of shape quantity and arrangement. Mathematics is all around us in everything we do in daily life. China, India, Egypt, Central America and Mesopotamia Contributed to mathematics as we know it today. There are two main branches in mathematics which are pure mathematics and applied mathematics. In pure mathematics there are sub branches of mathematics like Arithmetic, Algebra, Geometry, Topology, Calculus andAnalysis.

Algebra is one of the oldest branches of mathematics. There is historical evidence that Babylonians were versed in its 4000 years ago. In 200 B.C the Babylonians used an algebraic method in solving Problems .However it introduces Symbols (x, y, z, etc) and a series of mathematical operations like factorization, expansions, etc. It can be studied from a very elementary level like addition and simplifications. Algebra is a division of mathematics which represents numbers with letters of the alphabet. School algebra focuses on manipulative skills of simplifying factoring, solving equation, function and graph variables word problem patterns. Algebra is related to arithmetic and geometry. Algebra is one of the major content domains covered to promote the acquisition of mathematical knowledge and skills in school mathematics. At the lower secondary school, algebra covers topics such as algebraic expressions, linear equations, relations, mapping and functions (Ministry of Education, 2007). At the secondary school algebra is taught to all students as core mathematics (Ministry of Education, 2010).

NCEE (2015). It has a number of very useful benefits, it develops our reasoning, helps us to have an analytical thinking, quickens our mind, generates practicality and also its use can be applied in the day to day life. Mathematics is part of our dailylives.

Mathematical language is challenging to all students. Mathematical vocabulary can be difficult to learn and remember because of how the words are used in everyday English, which often contrasts to how the words are used in mathematics. In the

present time it is an important issue of difficulties in learning different areas of mathematics. Among them this research will introduce learning difficulties about algebra in the content of algebraic verbal problems.

In algebra, basically solving algebraic word problems is boring, abstract, lacking in creativity, complex and very difficult to understand. So in present time most students tend to ignore because they feel it to be very hard and complicated content. It lost much of time to practices etc.

Word problem, this type of problem asks students to establish equivalences between the variables or no referents in the problems Nasser and carifro (1993). More over word problems also known as story problems, are an essential part of learning to use mathematics effectively. Word problems are often used in the mathematical problem solving curriculum and constitute an important part of mathematics from elementary school to secondary school level. Word problems are tasks which require the combination of reading, comprehension, representation and calculation in word problems. Situations are described in which there are some modifications, exchanges and combinations of saps or other mathematical applications. Greer and De Corte (2000) defined word problems as 'textual descriptions of situations assumed to be comprehensive to the reader, within which mathematical questions can be contextualized' (p. ix). Therefore understanding of algebra in school mathematics is one of the most important goals for mathematics education. On the other hand algebra has a challenged subject for many students in school who fail in algebra. In algebra solving world problems main difficulties in lower secondary students all over the word (see, for Instance, Bush & karp,2013). In Nepal , student difficulties with solving word problems or verbal problems were revealed in the trends in international mathematics study. So this research paper introduces learning difficulties in algebraic verbal or word problems.

Statement of Problem

The statement of the problem should be clearly mentioned in any kind of research so I have tried to state the statement of the problem related to this study in my own experience. In my experience of tuition class and my lower secondary learning period. I had some difficulties in teaching and learning algebraic verbal equation problems.Inmathematicsclassroomstudentswerenotabletoreadandunderstand

mathematical algebraic verbal problems and most students were not able to write the mathematical equation from the word problem or few students were not able to attempt linear equations of world problem (2007, 2011, 2012, the Basic Education Certificate Examination). students generally were unable to translate word problems into algebraic form or cannot express mathematical statements into symbolic or algebraic forms .

Most lower secondary students feel algebra is a more difficult topic than others. The study is concerned about the study of the problem faced by students in algebraic verbal problems in class eight and teaching strategies of teachers. Therefore I selected this research problem "Learning difficulties in verbal problems of algebra for grade eight students".

Objectives of the Study

The objective of the research are as follows;

1. To explore student's difficulties in learning algebraic word problems at grade VIII.

2. To find out the learning strategies for teachers teaching algebraic equations of verbalproblems.

Research Questions

A research question is an answerable inquiry into a specific issue. It is an active step in the research project or thesis writing. It facilitates the research to define and delimit the research. It also determines the objectives as an essential component of research. To achieve the proposed objectives of my study. I had raised the following research questions:

1. What are the difficulties in solving algebraic verbal problems in grade VIII ?
2. Why do students feel difficulties in solving algebraic verbalproblems?
3. How do teachers teach algebraic equations of verbalproblems?

Significance of the Study

Significance of the study means the rationale of the study. This study was concerned

on the learning difficulties in verbal problems of algebra for grade eight students. Most of the students were weak in algebraic equations of word problem because they have not expressed the algebraic equation of verbal or word problem in symbols. This study is asfollows:

- It will only be fixed in Darchula district.
- It will only restrict eight class students and math teachers of classVIII.
- It will be limited to both private and government schools of Darchula district.
- It will be limited to two government schools and two privateschools.

Delimitation of the Study

Delimitation of study determines the boundary of the study area. In this study the major delimitations were as follows:

- This study is based on class eight students only government school of Darchula (mahendra higher secondary school and secondary school dhap)district.

- This study is based on class eight students only in private school (Asian academy school and darchula public school) of darchula district.

- This study carried only learning difficulties in verbal problems of algebraic verbal problems at classeight.

- This study carried only the teaching strategies of class eight math teachers in Darchula district.

- This study was completed on the basis of interviews and class observation.

- This result cannot be generalized to other schoolstudents

Operational Definition of key Terms

Grade Eight. In this study, student means those who are reading at grade eight. In Nepal those students who read in grade eight are called lower secondary level.

Learning Difficulties. Learning difficulties, known as learning problems faced by students in the classroom. It can also be considered as a condition that impacts an

individual's ability to gain knowledge and skills at the same rate as his or her peers.

Verbal Word problem. A mathematics question that states verbally what is usually written using symbols (or, for geometry, in a picture).(Wiktionary)

A question of whether an element of a certain group (or monoid or the like) is the identity, given an obscure representation of that element.(Wiktionary)

In mathematics education, the term word problem is often used to refer to any mathematical exercise where significant background information on the problem is presented as text rather than in mathematical notation. As word problems often involve a narrative of some sort, they are occasionally also referred to as story problems and may vary in the amount of language used (Freebase).

Algebra. Algebra is one of oldest branches of mathematics that substitutes letters for numbers (Deb Russell). A generalization of arithmetic in which letters representing numbers are combined according to the rules of arithmetic. Any of various systems or branches of mathematics or logic concerned with the properties and relationships of abstract entities (such as complex numbers, matrices, sets, vectors, groups, rings, or fields) manipulated in symbolic form under operations often analogous to those of arithmetic (merriamwebster since 1828 algebra dictionary).

Chapter –II

REVIEW OF RELATED LITERATURE

Literature review s is a tool which enables researchers to position the research in the broader academic community, synthesis existing ideas and arguments without adding your own, and identify any gaps in the literature which your research is attempting to address (NTU Library, n.d). Hence, literature reviews provide a framework and focus for the research study.

The literature reviewed for this study is presented in the following way: difficulties of mathematical word problem solving, algebraic word problems solving strategies, challenges of learning strategies of solving word problem, effective ways of learning algebraic word problem solving strategies and theoretical framework for understanding the phenomenon on learners' skills on solving mathematicalproblems.

Empirical Literature

An empirical review in research methodology is when the writer reviews the information and theories currently available concerning the topic and historical background of the topic. In the empirical literature there are two things, first is to demonstrate through understanding of the field in which she/he is conducting research and second is to show that the problem being studied has not been done before in the way proposed by the writer. It provides the psychological, contextual, historical knowledge, concept and traditional way of study. The literature of research gains pre-knowledge of study, pre-analysis methods so researchers review the following literatures.

Poudel (2008) Studied on "Difficulties in learning mathematics" The main objective were to identify the difficulties in learning mathematics of stone quarries students at school and to find out the cause of difficulties in learning mathematics of stone carries students at lower secondary level .were selected from four public school in Kathmandu district at near to chovar V.D.C . The instruments of this study were interviewandobservation.Majorfindingwasthereisnosufficienttimefor

mathematics learning at home for stone quarries students and there is discontinuity between practices of mathematical concepts in school and home.it concludes that the learning environment of at home and school. That creates the difficulties in mathematics learning.

Ferryansyah et al. (2010) Studies on "The analysis of students' difficulty in learning algebra" . This study based on mixed method design and conducted the essay test, questionnaires and interview to strengthen the analysis of learning difficulty in learner algebra that obtained from instrument essay test of linear algebra for the purpose of this to analyze the difficulties in learning linear algebra. For the study 85 students were chosen to data collection from mathematics education department and this study showed that 88.63% students were not able to represent the symbol or notation or ideas of mathematics and logical reasoning, 88.38% students had difficulty in comprehending the symbol or notation used by using logical reasoning 91.77% students were difficult to check whether the symbol or notation or ideas of mathematics used has been applied correctly or not and use logical reasoning so that student difficulties in learning linear algebra was very high. The above review of literature shows that students' understanding of materials and solving linear algebraic problems is quite slow compared to other materials. Lectures are also not optimal enough in the use of media and learning methods in learning algebra in theclassroom.

Chaudhary (2013) Studies on "Teachers belief on teaching algebra and their classroom practices" with the main objectives was to investigate teacher belief on teaching algebra, to compare the beliefs of rural and urban teachers, to compare the beliefs of experienced and inexperienced teachers about teaching algebra. This study was survey design as well as quantitative in nature and the sample of this study was 25 public lower secondary secondary and higher secondary school of Bara district from 13 were rural and 12 were urban area by quota sampling. Oplonnaire collection was data collection procedure and likert scale was analysis procedure. The major finding was 55% of the statements were agreed by the teacher 35% were disagreed and 10% were undecided and the beliefs of the teacher in rural versus urban shows no statistically difference. The study concludes that it was important for the mathematics teachers to attain a proper understanding ofalgebra.

Poudel (2014) Studies on "Difficulties in learning trigonometry" The objective of the

study was to find the causes of difficulties in learning trigonometry and minimize the difficulties in learning trigonometry at secondary level. One public and one private school were selected for the sample and the design was qualitative in nature. The data collection tools were interview and classroom observation. The study concluded that there were not sufficient materials for learning trigonometry and due to the lack of interactive classroom students felt difficulties in learning trigonometry. The above review of related literature show that an error in solving algebraic problems poor performance of simplification equation and problem solving teacher beliefs on teaching algebra were important for the mathematics teacher to attain a poor understanding of algebra and there were not sufficient materials for learning Trigonometry and lack of interactive classroom.

Dhital (2016) Did study on "Learning difficulties of students in secondary school mathematics" The objectives of this study were to identify topics perceived difficulty by students in secondary school mathematics. To determine if there exists any significant relationship between perceived and actual learning difficulties in secondary school mathematics and to determine if there exist any difference in students' actual learning difference across gender. This study was quantitative in nature and 240 secondary students (120 boys and 120 girls) were selected from rautahat district by stratified random sampling. Questionnaire was the major tool for the study and survey form was data collection procedure , Data analysis procedure were mean, percentage, standard deviation and two tail t-test at 0.05 level of significance. There was a negative significant relationship between the perceived and actual learning difficulties of students. The major finding and it concludes that the achievement of boys students is better than that of girlsstudents.

Karki (2016) Studies on "Students difficulties in learning Algebra at lower secondary level" The main objective was to identify the students difficulties in learning algebra at lower secondary school level. Were selected from two government schools of Nuwakot district at Sundarikearin Secondary School and Prithvi Secondary School. The instruments of this study were an interview and achievement test. After analysis of this study he found as following results:

- The study shows comprehending variables was the most difficult area for studentsinwhich22%respondedtoallincorrectedanswersandonly7.33%

responded to all correct answers in overall and others responded either one or two correct answers. Which lack of understanding of variables was a major problem in comprehending variables.

- Thestudyshowedthattheseconddifficultareawaswordproblembecause 10% students responded to all incorrect answers, 14% responded to correct answer misunderstanding of equation solving method, rules and procedures, guessing reasoning incomplete and over simple fractions were the most familiar difficulties in solving equations.

- The study showed that algebraic expression was fourth difficulty becauseonly 12.67% students responded to all correct answers, 10.66% responded to all incorrect answers and others responded to one or more than one correct answer. Understanding the expressions, simplify the expression with appropriate mathematical operation and incomplete simplification. Were the main difficulties in dealing with the algebra equation.

- The study show that fifth difficulty was transition from arithmetic to algebra in which highest percentage of students(16.67%) responded to all correct answer, 10% responded all incorrect and other responded one or more than one correct answer, lack of knowledge about arithmetic rule in algebraic property.

The major difficulties are generalization of arithmetic rule in algebra problem in meaning from arithmetic to algebraic strategy for solving algebraic problem, problem substituted the given value in corresponding problem and translation from arithmetic thinking to algebra .the study concludes that difficulties were developed students misunderstanding of variables, bad algebraic thinking and misuse of algebraic procedure.

The review of the above literature researcher found that teaching and learning there were not sufficient time for stone quarries students and achievement of boys students were better than that of girls students in mathematics and difficulty were developed students. Misunderstanding of variables, bad thinking and misuse of algebra and students' understanding of materials and solving linear algebraic problems is quite slow compared to other materials.

Theoretical Literature

The purpose of thisform is toconcretelyexaminethe corpus of theorythat has

accumulated in regard to an issue, concept, theory, phenomena. The theoretical literature review helps establish what theories already exist the relationships between them to what degree the existing theories have been investigated and develop new hypotheses to be tested often. The literature about the educational or psychological learning theory which provided the theoretical foundation .This form is used to help establish a lack of appropriate theories for research problems. This study on students learning difficulty in the verbal problem of algebra. The theoretical framework supported to fulfill the research question and significance of the study. There were many learning theories related to mathematics. They are behaviorist, constructivist, cognitive, structural functionalist, learning disability theory and so on. Among them the researcher used Newman's error theory, learning disability theory, constructivist theory and discussed below.

Newman Error Theory

The Australian educator Anne Newman (1977) suggested five significant prompts to help determine where errors may occur in student 's attempts to solve written problems. Newman identified that students may have in

Reading the words   [Reading error]

Understanding what they have read   [comprehension]

Transforming what they have read so as to be able to form a course of action   [Transformation]

Following through on procedures   [Process skills]

Encoding the result of a procedure to answer the question [Encoding]

Newman found that Reading error, comprehension error, transformation error, process error and encoding error. The five questions the teacher asks clearly link to the five processes involved in solving a written mathematics problem. If when reworking a question using the Newman analysis the students are able to correctly answer the question. The original error is classified as carelessness errors.

Learning Disability Theory

Learning disability theory is directly related to the learning difficulties. Learning disabilities such as learning math concepts, difficulty memorizing math facts, difficulty organizing numbers and understanding how problems are organized .(on Wikipedia org.w.k /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. A learning disability can cause a person to have trouble learning and using certain skills. The skills most often affected are reading, writing, listening, speaking, reasoning and doing mathematical calculation. Learning in a typical manner is usually caused by unknown factors given the "Difficulty learning in typical number". Mathematics learning disability not often occurs with clarity and language processing problems visual, spatial, confusion, memory and sequence difficulties and unusually high anxiety with the awareness that math understanding is actively constructed by each learner. Learning disability is a binary challenge of learning mathematics at present in every level. Therefore those people can be more accurately described as having learning difficulties. Thus avoiding   any misconception of being disability, learning disorder and learning difficulty are often used interchangeably, they differ in ways. Disorder refers to significant learning problems in the mathematics area. There are different type of disabilitytheory.

Arithmetic learning disabilities

The study provides students computation ability in addition, subtraction, multiplication, and division.

Understanding Equation Disabilities

The disability of the structure of the equation and its relationship of algebraic variables.

Intellectual Disabilities

Disabilities of functional skills, basic number of identification, Problem solving, reasoning and proof, about mathematics representation.

Language Based Disabilities

LBD are heterogeneous disorders associated with young children that affect their academic skills such as listing, writing, speaking, reading, reasoning and math calculation.

Constructivism

Constructivist approach of teaching and learning has been broadly addressed in a number of researches in mathematics education. According to this theory, students do not just passively receive information but constantly create new knowledge based on prior knowledge in conjunction with newexperiences.

Piaget's theory influences creative curriculum because teachers must create curriculum planning that enhances their students logical and conceptual growth.The teacher needs to emphasize the important role that is associated with the experience or the environment playing in the students'learning.

According to Elliott (2000) "constructivism is a learning approach in which a person actively builds or builds his own knowledge and that reality is determined by the learner's experience".

The ideas of constructivists are elaborated by Arendz (1998) that constructivism believes in the personal construction of learners' meaning through experience and that meaning is influenced by the interaction of previous knowledge and new events.

According to Phillips (1995) Constructivism's central idea is that human learning is constructed,that learners build new knowledge upon the foundation of previous learning.This prior knowledge influences what new or modified knowledge an individual will construct from new learning experiences.

In this study to find out the constructivist approach in solving problems,found out that,constructivist is a view of learning in which learners use their experience to create understanding.There were studies that described constructivism as a process in which the learner explores and develop meanings and also described the interchange between the learner and his environment .It is the authors' belief that these are feasible guidelines to be implemented among students to assess whether constructivist activities will improve performance and enhance students' problem solving skills in relation to wordproblems.

Conceptual Framework

A conceptual framework represents the researcher synthesis of literature on how to

explain a phenomenon. It maps out the actions required in the course of the study given his previous knowledge of other researchers 'point of view and his observations on the subject of research. Its conceptual framework devised the literature studies facilitated to attain research objectives, get the answer of research questions and carry out the research work as a whole smoothly. This study is based on the difficulties of the verbal problem of algebra. Conceptual framework of this present study shows the way and direction of this study can be shown with the following figure.
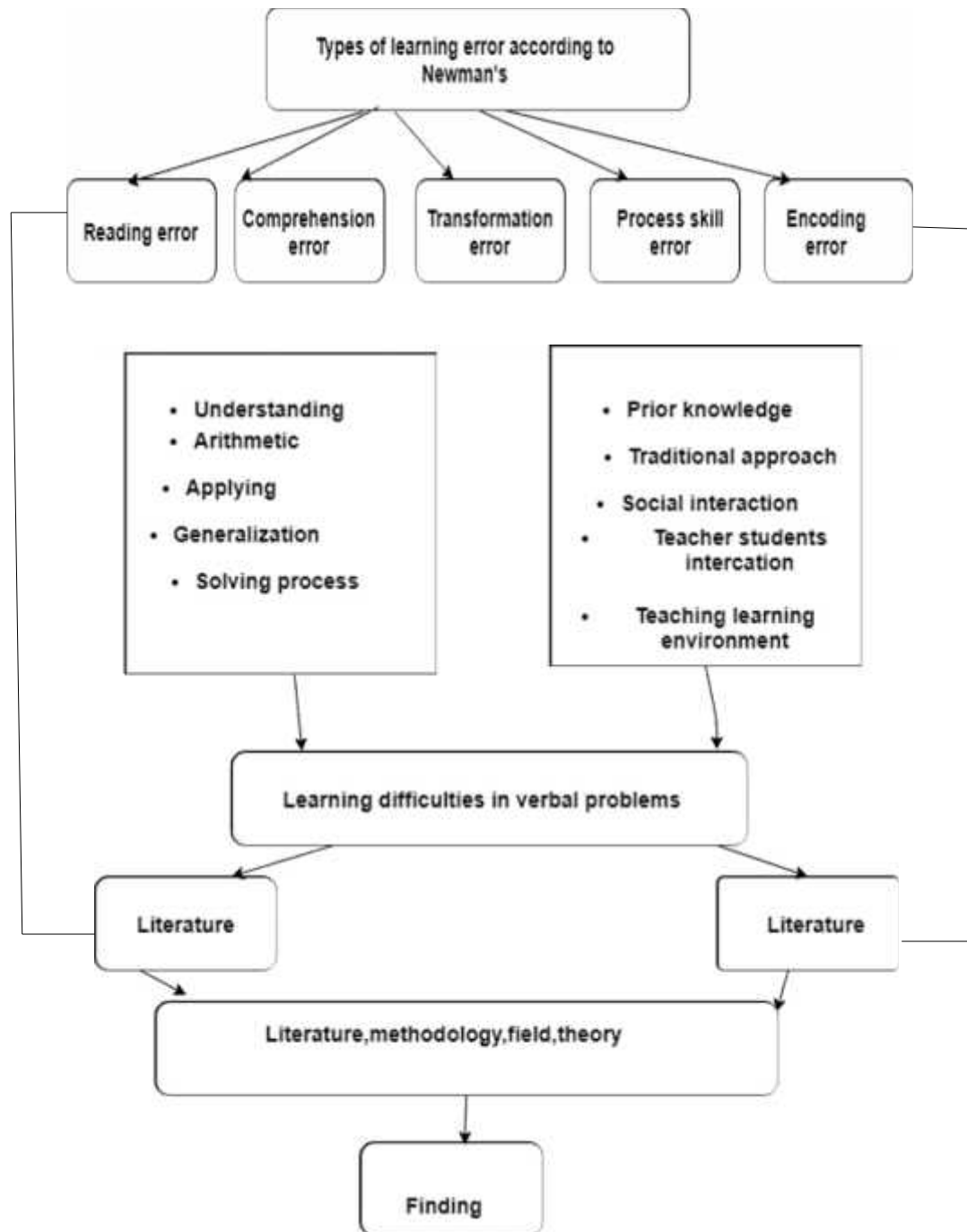
Neuman's Error Theory

Reading error

An error is classified as a reading error if a student can not read a key word,symbol in the written problem to the extent that this prevents him/her from proceeding further along an appropriate problem solving path.

Comprehension error

An error is classified as a comprehension error if the student is able to read all the words and therefore unable to proceed further along an appropriate problem solving path.

Transformation error

An error is classified as a transformation error if the students understanding what the questions wanted his/her to find out but become unable to identify the operation,or sequence of operation,needed to solve the problem.

Process skills error

An error is classified as a process skill error if the students identify an appropriate operation of sequence but do not know the procedure necessary to carry out these operations accurately.

Encoding error

An error is classified as an encoding error if the students correctly work out the solution to the problem, but could not express the answer in an acceptable written form.

Learning Disability Theory

Generalization.

A generalization is a form of abstraction whereby common properties of specific instances are formulated as general concepts. The study focused on how to change word problems to general equations.

Arithmetic

Arithmetic is a branch of mathematics that consists of the study of numbers, especially the properties of traditional operations on them – addition, subtraction, multiplication and division. Arithmetic is an elementary part of number theory, and number theory is considered to be one of the top level divisions of modern mathematics, along with algebra, geometry and analysis. The study focused on how students used arithmetic operations(adding, multiplication, division, subtraction) are translated in the algebraic equation of word problem and solving the equation of verbal problem.

Understanding

The difficulties are related to understanding the problem. Understanding is construct meaning from instructional messages including oral, written, and graphic communication, changing form of representation. The study focused on understanding the given algebraic word problem translate to mathematical structure or symbol.

Solving process

Solving is finding an answer to a given problem. A difficulty in solving a process is another obstacle that abstract algebra students encounter. There is a relationship between understanding and solving processes. Students should use different methods of solving the process. These are numbers, symbols, graphs, words, and pictures. There were mistakes in many steps in arithmetic operation and translating the word in symbol or mathematical structure. So these are problems related to the solving process.

Applying

It is the third level of bloom taxonomy. The application category follows this rule in that applying something requires. In word problem students are unable to apply refers to using a learned procedure either in a familiar or new situation. It means students are applying the difficulty tools.

Causes of Difficulties

Prior knowledge

Prior knowledge is previous experience. Prior knowledge is the knowledge the learner

already has before they meet new information. Prior knowledge is the main thing in teaching and learning activities because it supports mathematics teachers to teach algebraic verbal problems and to identify the student's knowledge and skills which is the end of the course or program and also need to find out what they knew coming in.

Traditional approach

Traditional approach has been taught in a teacher centered environment. With this traditional approach students give all their attention to the teacher and his or her work. Students depend on teachers in class. So the traditional approach is cause of algebraic verbal problems because students are not active in classroom teaching.

Social Interaction

A social interaction is a dynamic changing sequence of social actions between individuals or groups. Mathematics learning achievement is influenced by the internal and external factors of the student one of the influencing external factors is social interaction with friends in learning activities. In modern learning, the learning is student centered, so the student interaction is needed to learn about certain basic competence. Potential and motivation of students in learning are expected to develop with good social intersection in order to get maximum results. Social interaction is an important aspect of learning mathematics because students get the opportunity to express their own thoughts in order to encourage a reflection on the knowledge they have. Thus the social interaction is an affected factor of teaching.

Teacher Student Interaction

Interaction is a social process that helps to develop different knowledge in different situations. Teacher is the main person in teaching learning activities. We learned a lot of subject matter from this teacher and this teacher was likely very knowledgeable, but chances are that this teacher's exceptionality lies with how he or she interacted with students. Teachers generally enter the classroom with comparable training in content and pedagogy. The way that teachers interact with their students is a prominent factor in differentiating one from the next in terms of impact. Thus the interaction between teacher and student is an affected factor ofteaching.

Teaching learning environment

Teaching and learning environment is the most important aspect in positive learning.
It is important to create an effective classroom atmosphere in which learners feel safe and motivated to collaborate, cooperate and engage in the pursuit of mathematical understanding.
Thus the teaching and learning environment is an affecting factor of teaching.

Chapter –III

METHODOLOGY

This chapter describes the various methodologies which the researcher used to collect, organizing and analysis the data for this study. The research design, population and the sample with sampling techniques, research instruments, pilot study, data collection procedures, and data analysis are also described in thissection.

Research design

Research design is the way or path of the research that guides the researcher to reach the goal of research or thesis. It is the set of methods and procedures used in collecting and analyzing measures of variables specified in the problem research. We should apply appropriate research design regarding our thesis topic so as a research design. I followed qualitative research design with a ethnography approach. Qualitative research accepts that people know themselves best and describe, interpret and share about their own experience (Pattonal,1990 as cited in mahatara;2019).

The study used the algebraic word problem exercises, focus class observation and interview as data for to collected and processed to understand the view of learners and teacher on what might be the effective ways of learning algebraic word problem and establish the algebraic word problems solving strategies used by Grade VIII learners in their classrooms. In order to answer all the research questions of the study, a qualitative method of enquiry was employed. The qualitative method design involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring tothem.

Study site

My study is related to learning difficulties in the verbal problem of algebra of grade eight students. This is qualitative research with a ethnography approach. The study site of this study was two private schools (Asian academy and darchula public school) and two government schools (Shree mahendra higher secondary and secondary school dhap) of darchula district.

Respondents of the study

Respondents are related with selection of subjects of individuals from within a population. The main advantage of sampling is faster data collection and low cost. By sample, we understand a group of objects that is selected from the general population and is considered a representative of the true population for that specific study.

The sample size is an important feature of any empirical study of research or thesis in which the goal is to make inferences about a population from a sample reason to accurately calculate the required sample size. Include achieving both clinically and significant results.

The respondents of my study were small and specified. The participants were one mathematics teacher and two students each of the schools.As a whole, the total sample size was 12 people who participated in my research study. I used a purposive sampling method to select sample size or participants for my study. Purposive sampling is a method of selecting the specified character for study. The main goal of a purposive sample is to focus on particular characteristics of the population that are interest.

Sampling procedures

To obtain participants for this study, the researcher used criterion purposive sampling because random sampling was not possible due to the study design. Criterion purposive sampling, involves the researcher in making a conscious decision about which members of the population would best provide the desired information for phenomena under study (DeVaus, 2002). This type of sampling was chosen in order to provide the researcher with the most useful data to understand the current situation of the learning of algebraic word problem solving strategies used by the Grade8

learners and teachers in darchula district. The criterion purposive sampling technique was appropriate.

The goal of using the criterion purposive sampling in this study was to provide relatively equal numbers of different learners and teachers from selected schools to enable the researcher to explore and identify the difficulty of grade 8 learners and teaching strategies of Grade 8 teachers used to solve algebraic word problems. In research I preferred to select two types of participants: teacher and students. The participants will be selected from the school of darchula district. The school names are two government schools (mahendra higher secondary school and higher secondary school dhap) and two private schools (darchula public school and Asian academy school darchula). I will choose two students and a mathematics teacher of grade eight of all four schools. In the selection of my participation I will try to make it more inclusive as far as possible. The real name of all participants will be changed for ethical concern.

Selection of participation

In my research I preferred to select two types of participants: mathematics teachers and students. The participants were selected from four schools of Darchula district. The names of schools are Darchula public school, Asian academy,Mahendra higher secondary and secondary school dhap. I chose one teacher and two students from each school. Overall, I selected 12 participants by using a sampling method.

Data Collection Tool

The tools used in the study were: a mathematics activity with the algebraic word problems are class observation, and an interview. Since the design of this study was qualitative. In this study the tools are as interview and class observation for student and teacher as fulfill by themselves.

The researcher used a class observation guide during the algebraic word or verbal problem exercises and interview of teachers. The interview with students includes an achievement test question of word problem of students of class eight. Which contain the student capacity or ability of solving algebraic verbal problems. The teacher's interview includes materials and strategies of teaching and learning of algebraic

equations of verbal problem or word problem.

Achievement Test.

An achievement test is an assessment of developed knowledge or skill. Achievement tests are developed to measure skills and knowledge learned in a given grade level. The main purpose of this test paper is to know what a students present level of performance in algebraic verbal problem and to know student error of algebraic word problem solving.

Classroom Observation

A classroom observation is the purposeful examination of teaching and/or learning events through the systematic processes of data collection and analysis (Bailey, 2001). Classroom observation was also defined as a process by which the observer sits in on one or more classroom sessions, records the instructor's teaching practices and student actions, and then meets with the instructor to discuss the observations. Therefore, it is a collaborative process. Both the teacher being observed and the observer having significant roles before, during, and after the observation process. Collaborating at each phase of the process can help place both participants at ease so that each benefits from the experience. The main purpose behind the classroom observation is to allow a teacher to get feedback from an objective, experienced observer and to involve in context-specific discussions about teaching with an adviser. Moreover, data will be collected on what the teacher is doing and what they should probably be doing; the classroom learning environment will be assessed and reported to the stakeholders. Additionally, the teacher's capability to demonstrate various teaching methods is also observed (Wragg,1999).

The observation should not be an endorsement for promotion and tenure, a judgment of the teacher's teaching methods, styles and skills, or an assessment of the teacher's knowledge of disciplinary content. It is purely developmental rather than intimidation and making decisions.

The researcher took classroom observation to fulfil the objective of study. The classroom observation about teachers and students class presentation and participants during the class or exercise of algebraic verbal problem of grade eight.

Interview

An interview is a conversation for gathering information. A research interview involves an interviewer who coordinates the process of conversation and asks questions, and an interviewee who responds to those questions. Interview conducted face-to-face or over the telephone. Interview is an appropriate method when there is a need to collect in-depth information on people's opinions, thoughts, experiences, and feelings. There are three types of interview which are structured interview, semi-structured interview and unstructured interview. In this study used semi structured interviews. A semi structured interview uses a set of predetermined questions and respondents answer in their own words. The researcher takes the interview to fulfil the objective of study. The interviewer asks questions to the teacher about strategies of teaching algebraic equation of verbal problem and word problems and students about difficulties of solving equation of verbal word problems.

Quality Standards

Validity is one of the strengths of qualitative research, and it is based on determining whether the findings are accurate from the perspective of the researcher, the participants or the readers of an account (Creswell & Miller, 2000). If the research is not reliable and valid, it is worthless. The most important instrument in qualitative research is the researcher, rather than research tools (Cohen, Manion and Morrison, 2000). I took care of the validity and reliability right from the development of the study.

Data Collection Procedure

I contacted the principal of the schools where the study took place, told them about the study and asked for permission to collect the data. After getting permission from the school principal I met the student of class eight and mathematics teacher to clarify the things that were observed in the mathematics class. Also I requested the principal, students and math teacher to help conduct the interview of two students of grade eight and related mathematics teachers for next day, after I went to the schools then conducted an interview with the teacher. The interview includes an achievement test question of a verbal problem with students.

Data Analysis Procedure

Data analysis is the process of inspecting, cleaning, transforming, interpreting and modeling collected data with the goal of discovering useful information, discussing conclusion and supporting decision making. The data analysis included creation of the field text consisting of field notes.

The researchers used two tools to gather data: the classroom observation and interview including word problem solving questions for students . The information collected from both primary and secondary sources will be analyzed and interpreted qualitatively. Efforts will be made to derive information and triangulation from class observation, interview and questionnaire and arrive at conclusion. During the data analysis five skills and error of difficulties in learning algebraic verbal problem of learning and five causes of difficulties in teaching and learning verbal problems. The initial work for analyzing information of student difficulties in algebraic equation of verbal problem and teaching strategies of algebraic equation of verbal problems. Will be used to interpret the field of findings andconclusions.

Ethical Consideration

Before the actual research took off, the researcher developed an 'informed by the participants. The researcher indicated how the participants were selected, explained verbally and in writing, the purpose and nature of the study, as well as the benefits for participants in the study. The researcher also made it clear that the participants' information would be kept confidential. The researcher further informed the participants that their participation was voluntary and that they were free to withdraw from the study, should they not wish to continue taking part at any stage. Throughout the study, the researcher used pseudonyms to ensure the anonymity of the participants and research sites, in order to protect the participants' identity. After the data were collected, the researcher stored the raw data in a lockable cabinet to which only he had access. After that, the researcher will destroy all the raw data: soft copies will be deleted from all hard drives and hard copies containing raw data and participants' information will be destroyed using a papers shredder. The data collected from the participants would be used for example for the purpose of this thesis and other publications in the form of conference presentations and journalarticles.

Chapter –IV

DATA ANALYSIS AND INTERPRETATION

This research was carried out at Mahakali municipality of darchula district. Where four schools in the study were aimed for investigating the Student difficulties in learning algebraic verbal problems among grade eight students. In the study two learners and one teacher were selected from each school.The data were obtained through the use of two Qualitative research methods, Interview and classroom observation. In the interview of students, researchers gave five different problems of algebraic equation of word problems. Students were asked questions about difficulties in mathematics. In the teacher's interview, the researcher asked the question about teaching strategies of algebraic word problems. The interpretation of analyzed data was done using differential perspective as explained in the literature review section. This chapter was organized in two sections, section I Discuss about learning difficulty of algebraic word problem and section II discuss teaching strategies of learning algebraic word problem in mathematics classroom.

Section I:Learning Difficulty Of Algebraic Word Problem

This section deals with learning difficulty of algebraic verbal problems. Majorly students difficulties of algebraic verbal problems are understanding, generalization, arithmetic operation, solving process, and applying. According to Newman error theory such difficulties are caused by reading error, comprehension error ,transformation nerror, process skill error, and encoding error. To identify these errors,I conducted an interview with the students using an achievement test question of word problem and carefully checked on the basis of the givensolution.

To determine learning difficulties of word or verbal problems I asked six different questions of word problems. All the questions were focused so as to identify the reading error, comprehension error, transformation nerror, process skill error, and encoding error of algebraic verbal problems. During this research i had taken interviews including problem solving questions with class eight students in mahakali municipality of darchula district. I collected these answer sheet papers and checked

Them finally,i found the following errors.

Comprehension error

If the students could read the problem but could not grasp the overall meaning of the word,symbol of question, such type of error is classified as comprehension error.

Q.N 1. **The present age of Ram and Gita are 8 and 12 years then what will be the age of them after 5 years? (Appendix I)**

The correct solution of this question is Ram and Gita of age 8 and 12 respectively.Then after five years their age becomes equal to sum of 8 and5 and 12 and 5.the age of Ram and Gita becomes 13 and 17 respectively.

In the picture the solution of the question was"find the age of Ram and Gita". The solution was done by students.They had only read the problem correctly but were unable to understand the actual meaning of the question.Also they could not identify there are two peoples' age to be calculated.

The present age of Ram and Gita are 8 and 12 years, then what will be the Age of them after 5 years?

Ans   The present age of Ram and Gita is

(8+5) (12+5) = 5

Comprehension error.

Thus this type of error is called comprehension error.They had only read a problem or word but did not understand the actual meaning or could not identify what the question was asking for. The solution was incorrect so the comprehension error was made by them.

QN3. **After twelve years I will be three times as old as I was four years ago. Find the present age? (AppendixI)**

The corrr solution of this question can be obtained by assuming the number to be 'X' then after twelve years the age will be the sum of X and12 i.e(X+12). And before fours the age wassubtraction

After twelve years, i will be the three times as old as i was four years ago. Find the Present age?

Ans ⇒   12 + (3×4)

⇒   12 + 12

⇒   24   Comprehension error.

of X and 4 i.e (X-4).After twelve years age will be three times of age before four years i.e X+12=3(X-4).By the solving the equation the present age was12.

In the solution of the picture the question was"to find the present age". The solution was done by students. They had only read words correctly but they were unable to understand the question. Also they did not find algebraic expression because they were unable to understand what is to becalculated.

Thus this type of error is called comprehension error. They only read problems or words but did not understand the actual meaning or couldn't identify what does question is asking for. The solution was incorrect so comprehension error was made by them.

Transformation error

An error is classified as a transformation error if the students understanding what the question wanted his/her to find out become unable to identify.

Q.N.2 Six less than, five times a number is nine. What is the number?(Appendix I)

The correct solution of this question can be obtained by assuming the number to be 'X'. Then five times the number X is 5 multiply x i.e 5X. Then six less than five times the number is equal to 9 i.e 5X-6=9. By solving the equation ,the number was 3.

In the solution of the picture the question was"find the number,Six less than five times the number is nine". The solution was done by students.They had only read the question but they were not able to express

the correct equation and also they were unable to identify what to find. Also they did not use any variable in the solution.
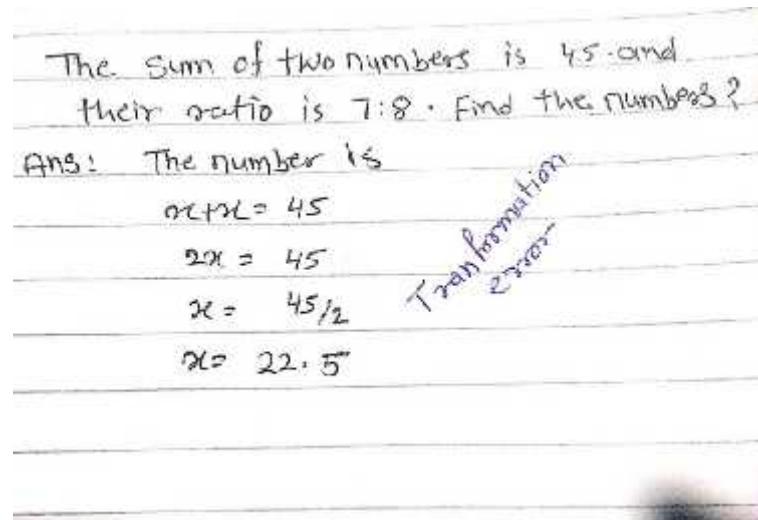
Thus type of error is called transformation error. They were unable to find what to do and what the question is asking for. They could not transform the given conditions into a correct equation.So transformation error was made bythem.

Transformation error

QN4. **The sum of two numbers is 45 and their ratio is 7:8. Find the numbers? (Appendix I)**

The correct solution of this question can be obtained by assuming the numbers whose ratio 7:8 is 7X and 8X. Then the sum of two numbers is 45 i.e 7X+8X=45. By solving the equation we get the value of X i.e 3. Then the numbers are 7muntiplay 3 and 8muntplay 3.The numbers are 21 and 24.

In the solution picture the question was"to find the numbers". The solution was done by students. They had only read the question correctly but they were not able to understand the meaning of the question or what is found there. Also the students couldn'tidentify

that there are two different numbers to be calculated. They even failed to turn the given conditions of equations into correct algebraic expressions.

Thus this type of error is called transformation error. Because students were unable to understand what is given and what is to be calculated according to the question reading them to be unable to convert the given question to an algebraic expression. So a Transformation error was made by them.

Process skill error

An error is classified as process skill error. If the students identify an appropriate operation of sequence of operation but do not know the procedure necessary to carry out these operations accurately.

QN5. **If twice sons age in a year added to the fathers age. The sum is 45 but thrice the father age added to son age the sum is 105. Find the age of father and son.(AppendixI)**

The correct solution of this question can be obtained by assuming the present age of father and son to be X and Y respectively. Then twice the son age added to fatherage

is equal to 45. Then they become X+2Y=45. Again thrice of fathers age added to son is equal to 105 i.e 3X+Y=105.Then by solving both equations the father and son was 33 and 6 resp[ectively.

In the solution of the picture the question was"to obtain being the age of father and son in which there are two equations given and solve the equations".The solution done by students was correctly solved but one simple error was that it wasn't solved incorrectly way. While the student needed to solve the question making two different equations, They triedto solve it assuming a single variable for both given conditions.

Thus this type of error is called process kill error. They performed the procedure incorrectly. So the process skill error was made bythem.

QN6. The length of the rectangular field is 10 meters less than 9 times the width.The perimeter is 140 meters.Find the length? (appendixI)

The correct solution of this question can be obtained by assuming the width as 'W'. Then according to the question the length is10

If twice the sons age in years is added to the fathers age, then sum is 45. But if thrice the fathers age is added to sons age, then sum is 105. Find the age of father and son?

Ans:

Let the sons age be x and fathers age be $2x$. Now!

$$x + 2x = 45$$
or $3x = 45$
$$x = 15 \quad \text{and} \quad 2x = 2 \times 15 = 30$$

∴ The age of son is 15 and father is 30 if twice the son age in year is added to the fathers age.

Agian, Let the son age be x and fathers age be $3x$ respectively. If thrice the father age is added to son age.

$$x + 3x = 105.$$
$$15 + 3x = 105$$
$$3x = 90$$
$$x = 90/3$$
$$x = 30, \quad 3x = 3 \times 30 = 90$$

∴ The age of son is 30 and father is 90.

meters less than 9 times of width i,e (L)=9W-10 now according to the formula of parameter of rectangular. P=2(L+W)or 140=2(W-10+W). Then by solution the equation we get the value of W is equal to 8. Then the length of the rectangle is equal to 9muntplay 8subtract 10.the length L is equal to 62 meters.

In the solution of the picture the question was"to find the length, which is 10 meters less than 9 times in width".The solution was done by students. They had solved the solution correctly but one simple error was found that they did not use the parameter formula of rectangular. They use the parameter formula of square. They forget the formula of the parameter of rectangular.

Thus this type of error is called process skills error. Because they understood the question correctly but they were unable to use the correct formula of perimeter of rectangle. So process skills were made by them.

Here most of the students were confused and were not able to understand the question, what doesquestion means and not able to provide the representation of the question by using symbols and notation. The answer paper shows the maximum number of students were not able to understand the question and didn't apply the correct solving process. Most of the students failed to find the solution of word problems like addition, subtraction and multiplication. The maximum number of students had no idea to choose the best way to get the correct solution. After observing the performance, major failure was found to be generalization of algebraic word problems. Thus the reason behind students having hard time in learning algebraic word problems like reading error,transformation error,and process skills error.

Section II:Discussed Teaching Strategies Of Learning Algebraic Word In Mathematics Classroom

This section deals with teaching strategies of learning algebraic words in mathematics

classroom. Manely the teaching strategies move through five factors such as prior knowledge of students, teacher students interaction, traditional approach, social interaction and teaching learning environment. It is observed while taking interviews with teachers and students to determine teaching strategies of learning algebraic words in mathematics classroom.It is observed in class eight students from each school.

It was, february 9, 2020 my sample school was S1 at mahakali . When I met the principal and informed him of my purpose the head teacher arranged grade eight classroom observation for me that day. The subject teacher had four year teaching experience. He graduated with a mathematics major but not from an education field. When I entered the T1 classroom. He was teaching mathematics in grade eight there were only fifteen students in class. The topic of the day was simulation equations. He was using a problem solving method to solve questions also following the discussion method. The teacher had good relations with students in the class. There was no use of teaching materials. (AppendixIV)

From the above classroom observation, it was claimed that the teacher started his class with specific objectives. The teacher tried to motivate the students to solve the question.The teacher provided clues for different ideas to solve the problem.Teacher did encourage students to reduce the confusion. But the teacher did not use any teaching materials. In the class all the students were looking at the white board and listening carefully and solving the questions given by the teacher.

After the classroom observation.Interview was scheduled with teacher as (Researcher R, Teacher T1) (Appendix III)

R: Did you prepare any lesson plan or note before entering the classroom?

T1: Teacher repealed, *"yes I prepared notes before entering the classroom"*.

R: What kind of teaching strategies do you use,to improve your students' difficulties in algebra?

T1: Teacher replied, *"I try to use teaching with a motivation language for the difficulty issue of students"*.

R: Weather the school administration provides necessary teaching instruments required for teaching students?

T1: Teacher replied "*the administration had good interactions with him and they helped him as much as needed*".

R: Which method do you use while learning algebra?

T1: Teacher replied, "*I use the student center method while teaching algebra*".

This means that the teacher was well known about preparing lesson plans before entering the classroom but eventually he was unable to practice in a real teaching environment. Also the teacher claimed that he was theoretically aware of the student center method but practically student centered method less.According to Vigotsky(1978) "posited group interaction as one source in the development of mental operations. He suggested that students gradually internalize the talk that occurs in groups". Also student center learning theory and practice are based on the constructivist learning theory that emphasize the learners critical role in constructing meaning from new information and priorexperience.

After the teacher interview or after solving the achievement test question of verbal problem, the interview was scheduled with students as (Researcher R, Student St1,Student St2).(Appendix II)

R: Which subject do you like the most?

St1: Student replied, "*I like mathematics and majorly geometry*".

St2: Student replied,"*I like mathematics*".

R: Does anyone teach or help you with mathematics at home?

St1: Student replied, "*nobody helped me athome*".

St2: Student replied," *nobody helped me athome*".

R: How is your relationship with the mathematics teacher in your class?

St1: Student replied, "*good and interactive*".

St2: Student replied, *"he helps me a lot for difficulties in mathematics"*.

R: What problems do you have in algebraic verbal problems?

St1: Student replied, *"I don't like algebra so I am very weak in algebraic equations"*.

St2: Student replied, *"I like math but i think i am very weak in converting it into an equation"*.

This means that students do not have prior knowledge about the topic of algebra. Then they were unable to understand what to do with the question and can not solve the problem. Also they mentioned their problems having no body to help at home. According to Sodeman(2007),"build pre-knowledge is important role to learning such as students need an understanding of vocabulary terms in order to conceptualize and connect new learning to previous learning for long term memory retrieval".It show that lack of pre-knowledge is one of the important cause of learning difficulties in mathematics.

It was february 11, 2020 my sample school S2 of darchula. According to my plan first of all, I directly went to the principal office and took permission for observing the class. After knowing about my purpose, the principal provided me the opportunity to visit the class. The subject teacher had only ten month teaching experience at that school. He completed his bachelor degree with major mathematics. When I entered the classroom the teacher T2 was teaching mathematics in grade eight there were only fifteen students in the classroom.The topic of the day was "simple interest". Teacher was using a lecture method with an example. The teacher had good relations with students in the class. There was no use of any materials. When I observed his classroom I found that he was introducing the formula of sample interest to students. Teacher gave the question of sample interest and then he helped the students to solve the question. At last the teacher summarized about simple interest. (AppendixIV).

From the above classroom observation,it was claimed that the teacher starts from the textbook materials and lets them get involved in practicing activities in the classroom.He does not make or involve students involved in any extra materials out of the coursebook.

After the classroom observation.Interview was scheduled with teacher as (Researcher R, Teacher T2) (Appendix III)

R: Did you prepare any lesson plan or note before entering the classroom?

T2: Teacher replied,"*i was well known about preparing lesson plans but i learned about the topic before entering the classroom*".

R: What kind of teaching strategies do you use,to improve your students' difficulties in algebra?

T2:Teacher replied, *"I used different types of materials for students' difficulty issues in algebra"*.

R: Weather the school administration provides necessary teaching instruments required for teaching students?

T2: Teacher replied, *"the administration does provide required instruments for teaching"*.
R: Which method do you use while teaching algebra?
T2: Teacher replied, *"I use problem solving methods"*.

This shows that the teacher was well known to prepare the note or plan before entering the classroom. but he was unable to practice it in a real classroom.According to Reed &Michaud(2010)"The lesson planning process allows teachers to evaluate their own knowledge with regards to the content to be taught". If the teacher is not sure of the rule the teacher would become unaware while teaching. Lesson plans can help in such a process to acquire information.

After the teacher interview or after solving the achievement test question of a verbal problem, the interview was scheduled with students as (Researcher R, Student St1,Student St2).(Appendix II)

R: Which subject do you like the most?

St1: Student replied, *"I like mathematics"*.

St2: Students replied, *"I don't like mathematics"*.

R: Does anyone teach or help you with mathematics at home?

St1: Student replied,"*yes my brother helped me at home*".

St2:Student replied,*" nobody helped me at home"*.

R: How is your relationship with the mathematics teacher in your class?

St1: Student replied, *"good"*.

St2: Student replied,*"good"*.

R: What problems do you have in algebraic verbal problems?

St1: Student replied, *"I cannot change the sentence into an algebraic expression"*.

St2: Student replied, "*I don't like mathematical operations in algebraic word problems and also I am confused about algebraic expressions*".

This means that students were poor in algebraic verbal problems because they were unable to practice enough at home.Since they were unable to do better in learning mathematics at school.This shows that due to lack of pracitic. They find mathematics the toughest subject of all.

According to my plan, I went to my sample school S3 on 23 February 2020 in the early morning. Firstly, I directly went to the principal office to meet the head teacher and took permission for observing a class. After knowing about my purpose, the principal provided me the opportunity to visit the class. Then I entered the classroom preparing all my observation materials and observed class. According to my observations, it was the second period in class eight to observe where a female teacher was teaching mathematics. She had only one year teaching experience. She graduated with a major in mathematics in the education field. When I entered the T3 classroom. She was teaching mathematics in grade eight. There were more than forty students in the class. The topic of the day was "Age word problem" she was using problem solving methods to solve questions. The teacher had a good relationship with students in class but the count of students was more than forty. According to my plan observation thirty percent of students were not having proper attention in the class. Teacher seemed to teach the initial bencher while ignoringothers.

From the above classroom observation. It was clear that the teacher started her class with a specific objective. The teacher provided clues for different ideas to solve the problem of age word problem with example. The teacher was only focused on the seventy percent of total students having intentions to study while ignoring the weeks. (Appendix IV)

After the classroom observation.Interview was scheduled with teacher as (Researcher R, Teacher T3) (Appendix III)

R: Did you prepare any lesson plan or note before entering the classroom?

T3: Teacher replied, *"Yes i prepared notes before entering the classroom"*.

R: What kind of teaching strategies do you use,to improve your students' difficulties in algebra?

T3: Teacher replied, *"I use materials for difficulties issues of students in algebra"*.

R: Weather the school administration provides necessary teaching instruments required for teachingstudents?

T3: Teacher replied, *"the school does provide required instruments but as the number of students is high. The instruments were never enough to teach all of them"*.

R: Which methods do you use while learning algebra?

T3: Teacher replied,*"I use problem solving methods while teaching algebra"*.

This means that the teacher was known about preparing lesson plans before entering the classroom but she was unable to use the plan in real teaching. Theoretically the teacher was also aware of the use of materials but she was unable to practice it in a real teaching environment.According to planner teaching materials can support student learning and increase student success.Also learning materials are important because they can significantly increase students achievement by supporting student learning.

After the teacher interview or after solving the achievement test question of verbal problem, the interview was scheduled with students as (Researcher R, Student

St1,Student St2).(Appendix II)

R: Which subject do you like the most?

St1: Student replied, *"I don't likemathematics"*.

St2:Student replied, *"I don't likemathematics"*.

R: Does anyone teach or help you with mathematics at home?

St1: Student replied, *"nobody helps me athome"*.

St2: Student replied, *"nobody helps me athome"*.

R: How is your relationship with the mathematics teacher in your class?

St1: Student replied, *"the relation of the math teacher was good"*.

St2: Student replied, *"the relation of the math teacher was good"*.

R: What problems do you have in algebraic verbal problems?

St1: Student replied, *"I was confused about all problems of mathematics"*.

St2: Student replied, *"I was weak in algebraic age word problem.Because i was unable to create expressions of algebraic equations"*.

This means the students are weak in their pre knowledge of mathematics and also they were less interactive with math teachers.According to Brazelton& Greenspan(2000)"Teacher-student interaction has impact on classroom management and affects learning and growth.According to the development perspective,the establishment of a positive teacher-student relationship aids a student's cognitive social and emotional growth and enhances their mental well-being".So teacher-student interaction is important in teaching learningenvironment.

It was the day of 24 febuary 2020, i went to my sample school S4. It was my fourth classroom observation. My observation class was grade eight of sample school. The main purpose was to observe the classroom teaching strategies . According to my plan first of all, I went to the office to meet the headteacher and to take permission forclassobservation.Afterknowingaboutmyproposedprincipalprovidedmethe

opportunity to observe the class. The subject teacher had five years experience at that school. He completed his master degree with a major in mathematics.

When I entered the classroom teacher T4 was teaching mathematics in grade eight. The topic of the day was "profit and loss". Teacher was using lecture methods and materials with examples.There were more than thirty of the students in the class. The teacher had a good relation with students in this classroom. The teacher started his class with specific objectives. He encouraged students to use materials to practice for them to have a clear concept of the topic. All students listened carefully and participated in the classroom activities. (Appendix IV)

From the above classroom observation, I found out that the teacher was well prepared about teaching subject matter and he was well evaluating the students.

After the classroom observation.Interview was scheduled with teacher as (Researcher R, Teacher T4) (Appendix III)

R: Did you prepare any lesson plan or note before entering the classroom?

T4: Teacher replied, *"ipreparepares a lesson plan before teaching and also I discovered useful teaching materials according to the topic"*.

R: What kind of teaching strategies do you use,to improve your students' difficulties in algebra?

T4: Teacher replied, *"I try to make students practice more and more to let them overcome their difficulties unless they understand the topic well"*.

R: Weather the school administration provides necessary teaching instruments required for teaching students?

T4: Teacher replied, *"the school staff interactions are supportive enough. The administration provides me all the instruments which are required while teaching"*.

This means that the teacher was known for preparing lesson plans before entering the classroom.The teacher was well known for the use of teaching materials.He uses different strategies while teaching in the classroom. According to C.F Frederick &mandal (2006) "The teaching strategies aim to organize new knowledge bymaking

different various knowledge elements "Teaching strategies include management of class, teacher-student interaction, teaching learning method and materials, teacher behaviour,etc.

After the teacher interview or after solving the achievement test question of a verbal problem, the interview was scheduled with students as (Researcher R, Student St1,Student St2).(Appendix II)

R: Which subject do you like the most?

St1: Student replied, *"I like mathematics"*.

St2: Student replied, *"I like mathematics"*.

R: Does anyone teach or help you with mathematics at home?

St1: Student replied, *"nobody helped me athome"*.

St2: Student replied, *"nobody helped me athome"*.

R: How is your relationship with the mathematics teacher in your class?

St1: Student replied, *"the relation was good also he helps me with the difficulties of mathematics"*.

St2: Student replied ,*"the relation was good also he was very friendly while teaching"*.

R: What problems do you have in algebraic verbal problems?

St1: Student replied, *"I like mathematics but sometimes I get confused about algebraic word problems"*.

St2: Student replied, *"I like algebra the most in mathematics but sometimes converting a problem into algebraic expression feels quite difficult"*.

This means that the students were confident about math subjects. They like math and sometimes they fail to process algebraic word problems. According to Newman error a process skill error is classified if the students could understand what the question wanted him/her to find out but became unable to identify the operation or need of

solving the problem.

In the above classroom observation and interview maximum students are weak in algebraic verbal or word problems because of their prior knowledge, their interaction with teachers and lack of practice at home. Also the teachers were well known about teaching learning activities but they were unable to use it in their real classroom Activities. The interaction of teachers shows that teachers are aware of teaching plans, teaching strategies, and teaching materials of teaching algebra but they are not serious about teaching. Also I found that the teacher was not focused towards all the students. The teacher was only focused on some of the students in the classroom because of that the students were weak in algebraic verbal problems.

CHAPTER -V

FINDINGS CONCLUSION AND IMPLICATION

In this chapter, I have drawn the findings, conclusions and implications through collected data.

Findings

Findings are the information reached after investigation. After the analysis and interpretation of collected data the finding of the study has been derived. The following were the findings of study.

In mathematics students encounter difficult experiences while solving different problems of mathematics. This study was totally based on affected factors of student difficulties of verbal problems at grade eight. The specific objectives of the study were, to explore student difficulties in learning algebra word problems and to find out the learning strategies for teachers to teach algebraic equations of verbal problems. The study was based on a qualitative method. I conducted interviews with teachers and interviews including achievement questions of verbal problems to students and classroom observation as the data collection tool. The respondents were selected from different two public and two private schools of mahakali municipality of Darchula district. The collected data or finding related with the existing interview of the student in section first, try to figure out the solution of the question of algebraic verbal or word problem. Also the finding related with existing classroom observation and interview of teacher and students are second part try to diy out the perception of students and teacher and their teaching learning strategies. Classroom observation helps to provide the prior knowledge of students, teacher student interaction, teaching learning environment and teaching learning activities of the classroom. Thus the findings of this section are deducted through classroom observation,interview guidelines of teacher and students. Data collection procedure are asfollows;

- Most students have not good results in algebraic word problems. They failed to understand the word problemquestion.

- Students lack appropriate choice education representation and incorrect use of sign, symbol and notation.
- Student's performance was not good in calculation problems; there were lots of mistakes in arithmeticoperations.
- Students lack calculation practice of algebraic verbal problems because they lack pre knowledge about relatedconcepts.
- Students lack participation in the classroom because they lack good interaction with mathematics teachers having more than forty students in a single classor large number of students.
- Students do not have required pre knowledge about solving algebraic word problems; it leads to difficulties inlearning.
- There were difficulties in learning algebraic word problems due to the lack of good concepts about word problems to students.
- Most students do not have interest in mathematics because they have nobody to guide them athome.
- The students' difficulties in learning algebraic word problems were due to less participation in mathematicsclassroom.
- Students have a lack of symbolic generation of verbalproblems.
- Students have avoided error,so students have a lack of ideas to identify useful patterns.
- The teachers were theoretically well known about how to prepare lesson plans but practically they were unable to practice in actual classroomteaching.
- Theoreticallytheteacherswereawareaboutstudentcenteredmethods.That we have to use but practically they didn't use in their actual classroom teaching.
- Not having knowledge for selecting appropriate teachingmaterials.

Conclusion

From the above finding, I concluded that the learning of algebraic word problems is not satisfactory for grade eight students. There were different categories of problem as described above, symbolization problem, language problem, notation problem, arithmetic or calculation problems. Generally such problems are due to lack of practice, negative thinking about algebraic word problems,large number of

students, teacher center method use in the classroom, and also rote and memorization learning, etc. It was concluded that the present situation of classroom discourse was basically more teacher centered. It should be made student centered.Also it is better to use different strategies and teaching materials in learning algebraic word problems in the classroom. To avoid the rote learning memorization. Finally, teaching students good relations and practicing concepts is a productive way to solve student's difficulties.

Implications

On the basis of above findings and conclusion, following implication have been drawn to improve teacher performance can skills provided implications for instruction regarding teaching and learning mathematics and curriculum development are given below

Pedagogical and educational implications

- This study shows that solving algebraic word problems is difficult for many students. This suggests that teachers need to find a way that could help students minimize their difficulties and find the way to encourage students to think.
- This study provides numerous examples showing the variety of ways students make mistakes inalgebra.
- This study shows that difficulty made by lack of pre knowledge and lackof practice related topics being the major problem since teachers should use more variety of teaching learning strategies and also help students learn algebraic wordproblems.
- Thisstudyfocusesonclassroomdiscussioninalgebraicclassroom,sothatit would be helpful for teachers and curriculum planners to develop in theirfield.
    - Thisstudyfocusesonthelearningstrategiesofalgebraicverbalclassrooms. So that it would be helpful to mathematics teachers for cooperative learning.
- The research focuses on difficulties of algebraic verbal problems. So that it would help for teachers to know about wealler students and help them improve.

- This study focused on students' errors in algebraic verbal problems, so that it would be helpful for teachers to improve teaching strategies.

Theoretical implications

The preceding discussion of this study provides implications for future research in mathematics education and teacher education such as

- This study was conducted using a small sample thus the findings of the study could not be generalized in a broad sense. Thus, it would be more valuable if the study would be done covering broadareas.
- The result of this study shows that student's errors in algebraic verbal problems. In addition future study might also focus on student misconceptions in algebra.
- The researcher would also be helpful to make teacher student interaction better and friendly.
- This research could be a good learning resource for teachers, students and researchers aswell.
- This research opens the door for more researchers to study the difficulties of mathematicslearning.
- This research opens the doorformore   researchers to study the error of mathematics learning inalgebra.

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Appendix I

Achievement Test Question for Students

- The present age of Ram and Gita are 8 and 12 years then what will be the age of them after 5years?
- Six less than, five times a number is nine what is the number?
- After twelve years I will be three times as old as I was four years ago. Find the present age?
- The sum of two numbers is 45 and their ratio is 7:8 Find thenumbers?
- If twice the son's age in years is added to the fathers age, the sum is 45. But thrice the fathers age added to son's age, the sum is 105. Find the age offather and son.

Appendix II

Interview guidelines with students

In order to collect data I had conducted semi-structured interview on the basis of interview guidelines

- On the basis of their solution of their solution of algebraic verbalproblems.
- Personal interest
- Reading opportunity athome
- Discussion withteacher
- Learning activities
- School environment forlearning
- Teacher studentinteraction

Appendix III

Interview Guideline with teacher

In order to collect data I had conducted semi-structured interview on the basis of

interview guidelines

School environment forteaching

Teaching strategies of teachingalgebra

Prepared the lesson plans/notes before enteringclassroom

teaching methods use of teaching learningclassroom

Encouragement provided to the studentlearning

Relation withstudents

Relation withadministration

Appendix IV

School environment for teaching andlearning

Classroom environment

Teacher student interaction in classroom activities

Use of teaching materials and teaching method in classroomteaching

Preparing lesson plan or note before enter the class

Students participation of classroomactivities