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A STUDY OF THE IMPACT OF LANGUAGE USED IN MATHEMATICAL WORD PROBLEMS ON THE EFFICIENCY OF CLASS VI STUDENTS IN SOLVING THEM

A Dissertation submitted in the partial fulfilment of the requirement for the Degree Of Master Of Education (2015-17)

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DECLARATION

I hereby declare that the study entitled **"A STUDY OF THE IMPACT OF LANGUAGE USED IN MATHEMATICAL WORD PROBLEMS ON THE EFFICIENCY OF CLASS VI STUDENTS IN SOLVING THEM"** submitted to the Department of Teachers' Training and Non-Formal Education(IASE)**, Jamia Millia Islamia**, New Delhi, is my original piece of research work done by me. I have specified by means of references from where the information has been taken. To the best of my knowledge and belief, my dissertation is not substantially the same as those which may have already been submitted for the degree or diploma of any other University or Board.

NAAJIA ZAINAB

Investigator

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CERTIFICATE

This is to certify that the Dissertation entitled **"A STUDY OF THE IMPACT OF LANGUAGE USED IN MATHEMATICAL WORD PROBLEMS ON THE EFFICIENCY OF CLASS VI STUDENTS IN SOLVING THEM"** submitted in partial fulfillment for the degree of **Master of Education**, **Department of Teacher Training and Non-Formal Education (IASE)**, **Jamia Millia Islamia**, is a record of research carried out by **Naajia Zainab** under my supervision. This work to the best of my knowledge and belief is original and no part of the Dissertation submitted for any other degree or diploma.

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May, 2017 **Naajia Zainab**

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CHAPTER: I

INTRODUCTION

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1. INTRODUCTION

Education is a bipolar process that combines the educand with the educator. In this process, the personality of the educator acts on that of the educand in order to modify the latter's development.

Education Commission (1946-1966) stated that "Education ought to be related to the life, needs and aspirations of the people so as to be powerful instrument of social, economic and cultural transformation."

Education is as old as human race. The importance has been realized since times immemorial and it continues right unto this day.

Education is a biological necessity for man. The younger the child, the greater is the need for education. The first impression is the best, hence the importance of right education during childhood.

1.1 Introduction

Meaning of Mathematics

Mathematics is an integral part of the universe. It plays a vital role about thinking. There are many ways of thinking and the kind of thinking one learns in mathematics is an ability to handle abstractions. Mathematics helps in the development of scientific and constructive thinking, logic and creativity in all walks of life. The core of mathematics lies in its beauty and its intellectual challenge. The use of mathematics is felt at each and every step, every

minute and every moment of man's life. The importance of mathematics is how it applies the problem situations to their day-to-day work. Students need to understand mathematics as part of the systematic/well organized endeavor, understand the nature of mathematical thinking, and become familiar with key mathematical ideas and skills.

In the words of David Wheeler, "it is more useful to know how to mathematize than to know a lot of mathematics."

Mathematics is also called the "science of reasoning". As Locke (1960) defined, "Mathematics is a way to settle in the mind a habit of reasoning." Here the results are developed through the process of reasoning. Reasoning in Mathematics is a peculiar kind and processes a number of characteristics such as simplicity, accuracy, certainty of results and originality to the reasoning in life.

Therefore, mathematics is to be visualized as the vehicle to train each child to think, to reason, analyze and to articulate logically and to function effectively as citizens.

1.2 Theoretical Background of the study

Mathematics is an integral part of the universe whose every aspect is quantitative. It is an admitted fact that widespread is the applications of mathematics and enormous is its practical value. The use of mathematics is felt at each and every step, every minute and every moment of man's life.

Every country needs effective and productive citizens who can display scientific and constructive thinking in all walks of life. This is possible to a great extent through carefully devised curricula, which included mathematics.

This study will have intended to study the impact on language used in Mathematical word problems on the efficiency in solving them especially in middle school level of class VI students. Students gradually grapple with the language experience difficulty in

comprehending word problems. Therefore, it seems reasonable to expect that a student's performance in solving word problems is affected by difficulties in comprehension. Keeping in mind the importance of comprehension in solving word Middle problems of class VI students because at this stage, i.e. the middle school level, the language used in word problems are tricky and difficult for students to understand the language used in word problems and to translate these word problems into a number sentence. 6th standard is the level where abstract thinking becomes much needed one and students at this level have the capacity to think only that way, if they know the application of any word problems with their real life activities. At this level, unknown variables are depicted by letters which are found in the form of linear equations. Therefore, it becomes very important to first find their basic understanding of knowledge about different operations and sign of equality.

Nature of Mathematics

Mathematics is the science of numbers and space or science of measurement, quantity and magnitude. It covers other things, their operations and relations: how they are put together and measured.

It has originated from numbers and number system which is a specific field of it, from which other branches of Mathematics are developed.

According to Sylvester, "There is no study in the world which brings in more harmonious actions of all the faculties of mind than mathematics."

Importance of Mathematics

The history of human civilization reveals the necessity of counting, measuring, weighing and drawing in all aspects of environment. Mathematics is an integral part of the universe whose every aspect is quantitative.

Mathematics is one of the most fundamental subjects in the curriculum at school level. Mathematics plays a very important role in our daily living. The use of Mathematics in our

daily life is immense. It has bread and butter value. A housewife is in need of mathematical knowledge in the form of measurement of milk, rice, vegetables, budgeting the household expenditure, etc. right from the morning till the night of every day. Even a coolie has to calculate his wages and buy things. He could do without knowing how to read and write but he cannot pull on without learning to count. In every vocation like tailoring, carpentry, house building, banking, etc. a working knowledge of mathematics is required. It is a subject that deals with problems which involve a process of analysis, computation and other mental skills. Historically, learning mathematics and teaching it has been motivated by the belief that a study of mathematics helps individual to learn, to reason and to apply such reasoning to everyday problems. Mathematics develops the mind to think critically and analytically. It is more than counting, measuring and computing. It is an eye opener to all sciences. As far as mathematics instruction is concerned, the major goal is the involvement of the students in the process of discovering mathematical ideas and formulating process.

A mathematics curriculum framework released by the US National Council of teachers of mathematics (NCTM, 2000) offers a research based description of what is involved for students to learn mathematics with understanding. The approach is based on “how learners learn”, not on “how to teach”, and it should enable mathematics from the standpoint of the learner as he progresses through the various stages of cognitive development.

No Science can be nobler, more excellent, and more useful for men and more demonstrative than Mathematics. Locke strongly endorses this view saying, "Mathematics is a way to settle in the mind; a habit of reasoning."

Thus, Mathematics is essentially a programme of education, which fosters higher order mental processes of questioning, reasoning, analyzing, inducting and logical thinking. Hence, the teaching of Mathematics attains utmost importance in any school curriculum. But within the school curriculum, learning mathematics is uniquely challenging in challenging in that it is highly organized sequential and progressive. Especially the word problems in mathematics often pose a challenge because they require that students read and comprehend

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the text of the problem, identify the question that needs to be answered, and finally create and solve a numerical equation.

Objectives of Mathematics Curriculum at Middle School Level

i. To develop in each child the ability to perform computations with speed and accuracy.

ii. Ability to translate verbal statement in mathematical form using appropriate symbols.

iii. Ability to recognize patterns and symbols.

iv. Ability to handle abstractions, develop reasoning skills and logical thinking capacity.

v. Ability to apply mathematical concepts and to solve problems of daily life situations.

To attain these objectives, the levels of learning computations have been outlined under the following five areas of mathematics at this level:

i. Understanding whole numbers and numerals

ii. Ability to add, subtract, multiply and divide whole numbers

iii. Ability to use and solve simple problems in daily life relating to units of money, length, weight, capacity, area and time.

iv. Ability to use fractions, decimals and percentage.

v. Understanding of geometrical shapes to spatial relationships.

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Problems faced by students at Middle School Level

1) A sense of fear and failure regarding mathematics among a majority of pupils.

2) Secondly, a curriculum that disappoints both a talented minority as well as non- participating majority at the same time.

3) Thirdly, crude methods of assessment that encourage perception of mathematics as mechanical computation. (Concept learning is replaced by procedural learning)

4) Another reason is said to be the predominance of symbolic language. (Language difficulty in understanding and solving mathematical word problems, especially at elementary level)

5) Structural problems in Indian Education, reflecting structures of social discrimination, by way of class, caste, gender contributes further to failure in mathematics education as well. Social attitudes see girls as incapable of mathematics. For example, "Girls are born to do household activities only"

6) Lack of teacher preparation and support in teaching of mathematics. (Teachers to be trained so as to make linkages between formal mathematics with experiential learning)

Word Problems

In math, a problem is presented as text, usually in scenario (narrative or story) with varying number of sentences.

Word problems are a part of school curriculum. They are taught at all levels of education. In word problems, relevant information is presented in the form of a short narrating rather than in mathematical notation. (Verschaffel et al 2000)

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Verschaffel et al 2000 defined word problem as "verbal description of problem situation wherein one or more question is raised, the answer to which can be obtained by the application in problem statement"

Word problem in mathematics plays a vital role to link/relate the problem with the real world situations to mathematical concepts. This helps in mathematization of child's thinking and develops their mathematics knowledge in solving their daily life problems. The mathematical word problems are known as instruments which develop the students' ability and talent in solving mathematical word problems. (De Coete et al, 1989)

"A mathematical problem stated in words rather than in symbols or equations is called a word problem." ~Mathematics Thesaurus

The primary aim of teaching of mathematics is mathematization of child's thinking, to develop understanding, to reason and develop skills related to mathematical concepts, principles, formulas and operations and to develop abilities to apply them to real problem solving situations.

Rosenbloom (1966) stresses that problem solving is a basic mathematical activity. He says, "We regard problem solving as a basic mathematical activity. Since in mathematical education, our first concern must be with what we want the students to do we must focus our attention on this domain"

Barnes (1959) says that mathematical problem solving should be major concern of mathematics teacher. He emphasizes that the major aim of teaching of mathematics is to increase child's ability to think with the ideas of mathematics.

The utility of mathematics lies in problems of mathematics and hence, the learning of mathematics becomes congruent with the ability of solving of mathematical problems. This unambiguous assertion naturally leads one to understand the place and nature of problems in the teaching of mathematics.

Word problems in mathematics often pose a challenge because they require that students read and comprehend the text of the problem, identify the question that needs to be

answered, and finally create and solve a numerical equation. Word problems are tricky. To get the right answer, a child has to be able to read the words, figure out which mathematical operations to use and then perform the calculations correctly. A breakdown in any of these areas can lead difficulty with word problems. There are some basic mathematical operations whose understanding of mathematical calculation is needed to start a word problem keeping in mind the steps:

Steps to solve a word problem:

The most difficult thing about doing math word problem is taking the English words, understanding it, translating them into mathematics and solve word problems effectively. The steps involved to solve a word problem are as follows:

1. The first step is to read the problem statement very carefully. It can often mislead if you start trying to solve the problem without reading the full problem. It will be effective, if you read the problem as a whole at first, analyze the problem, understand what the problem requires to be find out and try to get the complete information from the problem.

2. The second step is to work in an organized manner. Figure out what the actual problem is, what needs to be find out and check what you need but don't have: writing the variables equals to known and unknown figures accordingly.

3. The third step is to determine what exactly the problem is asking.

4. The fourth step is to eliminate the information which is not necessary.

5. The fifth step is to draw a diagram and label it, if necessary because a diagram helps in visualization of the problem.

6. The sixth step is to find or create a formula/equation for the information needed.

7. Calculate it and solve for unknown(s).

8. Lastly, check the answer by switching the answer in the formula/equation.

Translation of word problems: "key words"

One of the most important steps involves while solving a word problem is to look for "key words". Certain words denote certain mathematical operations (addition, subtraction, multiplication and division) and applying them to the figures accordingly.

Key words:

Key words manage to elucidate mathematical operations, for example if 4 is increased by 8 then, "4+8" which is 12 denotes addition. If 4 times of 8 gives a total of "4*8" or 32 denotes multiplication.

Again, if we say, difference between 10 and 2 then we must subtract 2 from 10 which denote subtraction.

And, lastly, if 10 divided by 2, we write 10/2 gives the answer 5 which denote division.

The following table denotes a list of key words of these operations which in a way, helps to apply them to the figures:

Table no. 1: Key words and their meanings

Mathematical Operations	**Keywords**

Addition	Increased by More than Combined , together Total of Sum, plus Added to
Subtraction	Decreased by Less than Difference between Minus Subtracted to
Multiplication	Of Times, multiplied by Product of Increased/decreased by a factor of (this type can involve both addition or subtraction and multiplication)
Division	Per, a Out of Ratio of, quotient of Percent (divide by 100)
Equals	Is, are, was, were, will be, gives etc.

Importance of Word Problems

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Word problem in Mathematics often pose a challenge because they require that students read and comprehend the text of the problem, identify the question that needs to be answered, and finally create and solve a numerical equation.

1. Word Problems show Real-World Application to Math Concepts:

One of the most important reasons that word problems are so important to students learning math is the way they show how math concepts apply to real world situations. Its use in our daily life is immense. For example: A housewife in in need of mathematical knowledge in the form of measurement of milk, rice, vegetables, budgeting household expenditures can be used as a problem.

2. Word Problems require higher order thinking:

Word problems require more than simply looking at numbers and symbols and figuring the solution. To solve a word problem, the students must be able to read the problem statement, able to identify and apply the correct/appropriate method, form a number sentence and solve the math equation and make sure the answer makes sense in the context of the problem. Therefore, this requires higher order thinking than simply solving an equation.

3. Word Problems connect several areas of Math Instruction:

A word problem can bring together many different concepts in mathematics into one problem. Whole numbers, addition, subtraction, multiplication, division, decimals, fraction, algebra and geometry can all be used in word problems. In this way, these problems help a child to achieve mastery of the subject.

4. Word Problems encourage creativity in Mathematics:

Word problems help increase thinking capacity. For example, when a child sees 3+2 they simply know that the answer is 5. Word problem require children to break that problem into parts, try to build linkages with life situations and know how to forma number sentence. This

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helps them to think visually and logically about the problem they are reading in order to find the solution.

Signs of Difficulties in Mathematics Word Problems:

A. Output Difficulties

A student with problems in output may:

i. be unable to recall basic math facts, procedures, rules, or formulas

ii. be very slow to retrieve facts or pursue procedures

iii. have difficulties maintaining precision during mathematical work

iv. have difficulty remembering previously encountered patterns

B. Organizational Difficulties

A student with problems in organization may:

i. have difficulties sequencing multiple steps

ii. become entangled in multiple steps or elements of a problem

iii. lose appreciation of the final goal and over emphasize individual elements of a problem

iv. not be able to identify salient aspects of a mathematical situation, particularly in word problems or other problem solving situations where some information is not relevant

v. be unable to appreciate the appropriateness or reasonableness of solutions generated

C. Language Difficulties

A student with language problems in math may:

i. have difficulty with the vocabulary of math

ii. be confused by language in word problems

iii. not know when irrelevant information is included or when information is given out of sequence

iv. have trouble learning or recalling abstract terms

v. have difficulty understanding directions

vi. have difficulty explaining and communicating about math, including asking and answering questions

vii. have difficulty reading texts to direct their own learning

viii. have difficulty remembering assigned values.

D. Attention Difficulties

A student with attention problems in math may

i. be distracted or fidgety during math tasks

ii. lose his or her place while working on a math problem

iii. appear mentally fatigued or overly tired when doing math

1.3 Need and Importance of the Study

The need of my study "A study of the impact of language used in mathematical word problems on the efficiency of class VI students in solving them" is that since at this stage the language used in word problems are tricky and difficult for students to understand the language used in word problems and to translate these word problems into a number sentence. At the middle school level, i.e. 6^{th} standard is the level where abstract thinking becomes much needed one and students at this level have the capacity to think only that way, if they know the application of any word problems with their real life activities. At this level, unknown variables are depicted by letters which are found in the form of linear equations. Therefore, it becomes very important to first find their basic understanding of knowledge about different operations and sign of equality.

1.4 Research Question

It has been brought to the forefront that the effects of linguistic complexity faced by the students while solving problems from across the globe. Since the topic for some children is not an issue, as they enjoy solving word problems. On the basis of the need and importance and some theoretical understanding and the research title, research questions that guide this investigation are:

1. Is there any problem while understanding word problems?
2. Is there any difficulty in understanding language of the book?
3. Does the student find word problem interesting or do they find it boring or difficult?

1.5 Statement of the problem

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The present study aims at finding the basic understanding of the students of class VI while translating a word problem into mathematical expression, the linguistic complexities and their interest and attitude towards solving word problems.

The study is entitled as "A Study of the Impact of Language Used in Mathematical Word Problems On the Efficiency of Class VI Students In Solving Them"

1.6 Objectives of the Study

Ø To study the basic understanding of the students of class VI while translating a word problem into mathematical expression.

Ø To study the effects of linguistic complexity in word problems of class VI while solving them.

Ø To find out their interest and attitude towards mathematics while solving word problems.

1.7 Operational Definition

1. Mathematics:

Mathematics itself has its own language. It can be recognized as a language in its own right, a language which has its own vocabulary, grammar and symbols.

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2. Word problem

Word problems in mathematics means a descriptive text or a narrative story using numbers and symbols to solve the problem.

3. Problem solving situations

The mathematical situations the students come across in classroom and/or day- to-day life requiring problem solving situations.

4. Linguistic

Linguistic relates to a word or language.

5. Difficulty

Difficulty is something which makes a condition more complex or difficult. For the purpose of this study, difficulty areas are-

i. Lack in understanding of the problem statement.

ii. Language barriers.

iii. Lack in understanding the key words and lack of ability to apply mathematical operations.

iv. Have difficulty with the vocabulary of mathematics word problems.

1.8 Delimitation of the study

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· The scope of the study is limited to the sample drawn from middle school students of Joga Bai, New Delhi.

· There are time and resource constraints which further limit the study focusing on main aspects only, compromising a comprehensive and extensive study which could either have done in a better way.

· The researcher has selected only one class for the purpose of study and found the difficulty areas of each students' and their interests and attitudes towards Mathematics Word Problems which further needs to be extended to word problems associated with complex situations of arithmetic with big numbers.

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CHAPTER: II
LITERATURE REVIEW

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2. Review of Related Literature

Researchers take the advantage of the collected information in the past. The collected work done by earlier researchers is technically called the literature. (Singh, 2002)

A summary of the writing of previous studies provides the evidence that the researcher now knows what is already known and what is still untested and unknown. This step helps the researcher to prevent the error of duplication. It provides the researcher a background citing various researches to sharpen the knowledge in the area of research project. (Best and Kahn, 2007)

2.1 Purpose of the Review

The purpose of this chapter is to provide an overview of difficulties in understanding mathematics, with a particular focus on word problems of primary school children from across the globe.

This review of the research literature on difficulties with solving mathematical word problem shows us that problem solving in mathematics is a complex process which requires an individual who is engaged in a mathematical task to coordinate and manage domain-specific and domain-general pieces of knowledge. It also suggests that

(i) The mathematics content level of the problems which students at different year levels of schooling will be able to solve successfully and

(ii) The different strategies or heuristics which students at different year levels use to solve the same mathematical problems mustgovern the design of problem-solving curricula at the various year levels of schooling.

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2.2 Reviews

1. Sara Gooding (2009), conducted a study to find out student's difficulty areas in word problems. Four students from class V were chosen to solve word problems and the findings were:

a. Reading and Understanding of all the words in the problems.

b. Lack in linking the problem statement with their real life situation.

c. Lack in formulating a number sentence.

d. Lack of accurate methods for calculating.

e. Lack in interpretation of the answer in the content of the question.

2. In a position paper on basic skills the National Council of Supervisors of Mathematics (1977) stated that:

Learning to solve word problems is the principle reason for studying mathematics Cockcroft (1982) also attempted to characterize problem solving:

The ability to solve word problems is at the heart of mathematics. Mathematics is only useful to the extent to which it can be applied to a particular situation and it is the ability to apply mathematics to a variety of situations to which we give the name 'word problem'.

3. Prior to the 1980s, before "solving word problems" became the focus of much mathematics education research, it tended to be subsumed under the label "mathematical thinking" in the area of cognitive psychology of mathematics. Burton (1984) made a clear distinction between mathematical thinking and the body of knowledge described as

mathematics. She emphasized that mathematical thinking which relies on mathematical operations. Mathematical word problems are the starting points of mathematical inquiry which lead to thinking. Law (1972) contended that thinking takes place when a person meets a problem and accepts the mental challenge it offers and Burton (1984) added that:

But what then is a problem in mathematics? Krulik and Rudnick (1988) defined problem as "a situation that requires resolution and for which the individual sees no apparent or obvious means or path of obtaining the solution"

4. According to Stendall (2009), the abilities to give good concentration, to make meaningful perceptions, to think logically and to use memory effectively are important factors in learning skills and solving problems. These abilities vary among students. Cognitive and psychological factors could have affected the ability to use mathematics skills and thinking in problem-solving.

5. Miranda (2006) stated that children might experience difficulties in thinking and learning when they demonstrated difficulty in giving attention, describing orientation of shape and space, making perception by visual and auditory, memorizing simple things and understanding language. As a result, students might struggle in different phases in the process of problem-solving.

6. Tay Lay Heong (2005) had stated weakness in understanding concepts and lacking of strategic knowledge result in difficulties in problem-solving. Moreover, students who were weak in conceptual understanding were found to lack in

arithmetic and procedural skills (Latha, 2007). Thus, there might be an interaction among all these skills.

7. According to Ibrahim (1997) there are two main procedural steps in solving word problem;

i) Transforming the problem into mathematical sentences; and

ii) Computation of the operational involved in the mathematical sentences.

Difficulties faced among students were noticeable during the first procedural step in solving word problem compared to the other. There are many problem solving models.

8. Poyla (1981)

Four hierarchy phase:

i)Understanding the problem

ii)Planning

iii) Performing the plan

iv) Confirmation of the answer.

9. Krulick and Rudnick (1996)

5 hierarchy phase

i) Reading and thinking

ii) Analyze and planning

iii) Organizing strategy

iv) Getting the answer

v) Confirmation of the answer.

10. Zalina (2005) 3 hierarchy phase

i) Understanding the problem

ii) Solving the problem

iii) Stating the answer.

A three phase problem solving process was adapted for the study. The three phase problem solving consists of;

i) Reading and understanding problem

ii) Organizing strategy and solving problem

iii) Confirmation of the answer and process.

11. Carleton Washurne'sCommittee (1928) conducted a study of ways to train children to solve arithmetic problems. In one phase of the project a test was devised consisting of pairs of problems, one dealing with a familiar and the other with an unfamiliar situation.

Although the students tended to be more successful in solving problem of the "familiar" type, the Committee concluded that while the element of unfamiliarity with the situation enters in as a difficulty in problem solving, it is not as large an element as might be supposed.

12. Washburne's Committee (1928) found 441fifth grade children scored higher in attacking problems (i.e. deciding which operation to use in solving the problem) and in computations when working in the more familiar rather than in the less familiar problem situations. They observed that, part of the difficulty those

children have in applying their arithmetic to textbook problems lies in the problem, not in the children. Textbook makers and teachers alike should make the problems they expect children to solve childlike and real.

13. A research test was devised by Travers (1965) in an attempt to identify preferences of high school mathematics students for solving problems form three situations commonly used in textbooks: Mechanical-Scientific, social-economic and abstract problems. A sample of 240 students was drawn from schools with different background situations and representing high and low achieving levels. Research test preference scores were obtained on the basis of the number of problems chosen from each situation. Students were made to solve problems from preferred as

well as non-preferred groups. A strong relationship was found between the preferences of high school boys with their inventoried interests. Low achievers were also showing interest in the three areas of problems, namely, mechanical-scientific, social-economic, and abstract problems.

14. An investigation from Jamia Millia Islamia 1969-1970 has been done to find difficulties faced by class VII students in solving word problems in mathematics. Some of the findings are:

a. Poor reasoning capacity.

b. Hardly understands the basic mathematical concepts, facts and principles.

c. Lacks in understanding the fundamental processes.

d. Lack of practice, which methods to apply, when to apply is the major drawback.

15. H. Ballew and J. W. Cunningham (1982) have done a study on diagnosing strengths and weaknesses of VI standard students in solving word problems in mathematics:-

a. Computational skills.

b. Interpretation of the problems.

c. Reading.

d. Integration of these problems into the solution of the given problem.

Major Findings:

i). 75% students were able to do computational part correctly. ii).

21% students did the interpretation part.

iii). 4% students could understand the reading part only.

16. Dr Yeo Kai Kow Joseph (2004), has done an investigation to explore the difficulty levels faced by "Secondary 2" students while solving word problems. Number of students participated in the study were: -

Secondary 2 (13years-14years old) students.

56 Secondary two students from ten secondary schools participated in this study.

Major Findings were: -

a. Lack of comprehension of the problem posed.

b. Lack of strategy knowledge.

c. Inability to translate the problem into mathematical form.

d. Inability to use the correct mathematical terms.

CHAPTER: III

METHODOLOGY

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3. Methodology

3.1 Introduction

The focus of the present chapter is the nature of the research, the research design and the description of the methods used in carrying out the study. This chapter aims to elaborate on the research methods, presents the population used, as well as the sampling technique that was engaged, organization of the study, data collection procedures and analysis of data.
Methodology is the science of studying how research is done scientifically. It is a systematic way of solving the research problem by logically adopting various steps. Methodology helps to understand not only the products of scientific inquiry but the process itself.

3.2 Research Design

Research design is the plan prepared before carrying out the study which explains the methodology of the study (Babbie, 2004). Besides, it enables the investigator in making informed choice of methods for data collection and analysis. The development of the suitable research design is a part of planning and clarifying the research problem and conducting the analysis. Research design is planning of strategy to conduct a research. It decides the framework for the study to achieve our goals. Research design includes the

description of the techniques or methods and tools the researcher has used for collecting, organizing and analyzing the data. Thus, the research design

conducts the investigator in all the activities and links them together into unified whole.

In the words of Mayhem, Research design not only anticipates and specifies the seemingly countless decisions connected with carrying out data collection, processing and analyzing but it presents a logical basis, for these decisions.

According to Zikmund (1988), "Research design is a master plan, specifying the methods and procedures for collecting and analyzing the needed information.

In the present study, the investigator uses strategies like observations, interviewing, and achievement tests etc. Research design maybe of different types namely:

1. Descriptive (includes case study, naturalistic observation, survey)
2. Correlation (includes case control study, observational study)
3. Semi-experimental (includes field experiment, quasi experiment)
4. Review (includes literature review, systematic review)

There are distinct research designs. For example, a distinction is made between "fixed" and "flexible" or, synonymously, "quantitative" and "qualitative" research designs.

The present study is "qualitative research" in which some aspects were observed and treatment was experimented. In education, the qualitative research is often called "naturalistic" because the researcher hangs around where the event naturally occurred, data being gathered by people, engage in natural settings, visiting and observing.

3.4 Research Methodology of the study

The present study aims firstly at the subjects i.e. the information about the population from which the researcher plans to select the sample. The second step is the procedure which describes in detail what will be done, what data will be needed, and what data gathering

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devices will be used to conduct the study. The information given in the data analysis section should be specific and detailed enough to demonstrate to the reader exactly what is planned in the research (Best and Kahn, 2007).

Population:

The population of the present study is the students of class VI who uses NCERT textbooks.

Sample for the study

The sample for the present study has been chosen from the class VI students of JogaBai, Jamia Nagar, and New Delhi-110025. A total of 15 students have been present at the time of data collection.

Sample Techniques

The present study conducted on the Middle school level students of Joga Bai area, Jamia Nagar, New Delhi-110025. So the population is all the students of middle school level of class VI age group being 12-13 years as a sample.

The sample is considered keeping in mind the convenience of the researcher as well as the time constraints for which the study has been conducted. Therefore, the sampling technique used in the study is convenience sampling where the choice of sampling is totally under the circumstances face by the researcher.

Tools

Data must be gathered with which the investigator test the hypothesis. Different methods and procedures have been adopted to collect data. These tools employ distinctive ways of describing and quantifying the data.

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There is probably too much dependence upon single methods of inquiry. Because each data gathering procedure or device has its own particular weakness or bias, there is merit in using multiple methods in collecting data we need to get the required information. (Best and Kahn, 2007)

Methods adopted

In the present study, the following methods being used in the collection of data:

1. **Questionnaire for students**

The data is collected from the students using questionnaire consisting of 20 questions which includes word problems from NCERT class VI textbook and open ended questions. The questionnaire in a way is also a kind of

achievement test as few initial questions tries to access the basic understanding of mathematics concepts for their standard.

2. **Achievement Test**

The achievement records of students for their annual examination of class VI have been collected from JogaBai area in order to record their performances in mathematics.

3. **Observation Schedule**

The distinctive feature of observation as a research process is that it offers an investigator the opportunity to gather 'live' data from naturally occurring social situations (Cohen, 2007). Observational data may be useful for recording non-verbal behavior, behavior in natural or contrived settings, and longitudinal analysis (Bailey 1994: 244).

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An observation is generally a text type that records events and facts that have been witnessed (either seen or read). An observation does not necessarily need to be in chronological order (the order it happened). The observation includes descriptive elements of the subject or the topic. The focus is on recording the details so that you can later respond to your observation. In the present study, the investigator observes the answer sheets of the diagnostic test to find out the difficulty areas faced by the students of class VI.

4. Interview

Interviews may vary in the extent to which they are structured. A structured interview was used, it proceeds with an organized list of standardized questions, it may be found desirable to ask question that are open-ended.

After analyzing the answer sheets of the diagnostic tests the investigator first identifies wrong answers from the answer sheets and then try to diagnose problems faced by the students while solving the mathematical word problems. The investigator takes a semi structured interview of the students to discuss those problems faced by the students.

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CHAPTER: IV

ANALYSIS AND INTERPRETATION OF DATA

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4. Analysis and Interpretation of Data

4.1 Introduction

Once the data is collected, the next step for the researcher is to analyze the data and establish the results and findings. Analysis and interpretation of data collection play a vital role in research purpose. Data analysis and interpretation is the process of assigning meaning to the collected information and it helps in determining the conclusions, significance and implications of the findings.

Markshall and Rossman (1999:150) describe data analysis as the "process of bringing order, structure and meaning to the mass of collected data. Data analysis requires some sort or form of logic applied to research". In this regard, Best and Kahn (2006:354) clearly states that the "analysis and interpretation of data represent the application of deductive and inductive logic to the research". Verma and Mallick (1999:29) and Morrison (2012:22,24) on the contrary states that the "interpretive approach which involves deduction from the data obtained relies more on what it feels like to be a participant in the action under study, which is a part of the qualitative research". There are two methods of data analysis: quantitative (numerical) data and qualitative (narrative) data.

4.2 Quantitative Analysis of the Research Data

In quantitative data analysis you are expected to turn raw numbers into meaningful data through the application of rational and critical thinking. The same figure within data set can be interpreted in many different ways; therefore it is important to apply fair and careful judgment.

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The analysis of the present study has been done quantitatively based on the data collected from the students of class VI of JogaBai area, New Delhi through the questionnaire distributed to them.

(1)Primary Data Analysis (Questionnaire)

Basic mathematical understanding of the student:

The questionnaire for the students consists of twenty open end questions. Question number 1 to 11 consists of word problems taken from NCERT textbooks of class VI covering the different aspects of basic mathematical understanding integrated with language to assess the students' ability to

a. Understand the language of the problems given

b. Their ability to convert language problems into mathematical solutions

c. Understanding of basic mathematical key words.

The researcher here tries to find out the responses given by the students in terms of total attempted questions, not attempted questions, correct responses and incorrect responses.

Below is the table no.2 showing the performance of all 15 students and their respective percentage in all the eleven word problem questions collectively.

Table No. 2: Responses and Accuracy of the Students

Particulars	Responses		Accuracy
	Number	Percent	
Attempted	149	90.30%	
Not Attempted	16	9.70%	
Total	165	100.00%	
Correct	111	67.27%	74.50%
Incorrect	38	23.03%	
Total	149	100.00%	

Form the above table no. 2 it can be clearly seen that the students have attempted 90.30 % of the questions, 9.70% questions remains unattempt. Out of 149 questions attempted the students got 111 correct which are 67.27% and 38 questions were incorrect having 23.03%. The accuracy of the students is found to be 74.50%.

4.3 Individual analysis of the students

Student 1: The student attempted 11 questions out of which 9 questions were correct and 2 were incorrect. The students' got 81.81% correct responses and same is the accuracy of the students 81.81%.

Question no 1 and 11 were incorrect as the student lacks inability such as L.C.M, problems in multiplication as well as there are also difficulties in interpreting the language of the sum.

Student 2: The student attempted 7 questions out of 11. The marks of the student is 54.55% and he has got 6 correct responses out of 7, therefore the level of accuracy is 85.71%

The student gave incorrect response for question no. 10 in which the question asks to find the perimeter of the rectangle whose length and breadth is given. The formula the student used is correct but the answer he arrived upon was wrong as he did not convert the length and breadth in the same unit before calculation.

Student 3: The student attempted 10 questions out of 11. The marks of the student is 63.64%and he has got 7 correct responses out of 10, therefore the level of accuracy is 70%

Question no 1, 3 and 5 got incorrect. These questions are on L.C.M, basic numerical ability, concepts of fraction where the student has some degree of problem either in relating the word problems in equations or is lacking the concepts for the same.

Student 4: The student attempted 10 questions out of 11. The marks of the student is 45.45%and he has got 5 correct responses out of 10, therefore the level of accuracy is 50%

Question no 1, 6, 8, 9 and 10 were incorrect, these problems are related to L.C.M, word problems related to distance-time problem, mensuration and subtraction of fractions.

Student 5: The student attempted 9 questions out of 11. The marks of the student is 72.72%and he has got 8 correct responses out of 10, therefore the level of accuracy is 88.89%

The student gave wrong response for question no. 6 which is the extension of fractions in word problems.

Student 6: The student attempted all the questions. The marks of the student is 72.72%and he has got 8 correct responses out of 11, therefore the level of accuracy is 72.72%

Question no. 1, 7 and 11 were wrong which are problems related to L.C.M, mensuration and divisibility rules. The student is best at attempting direct questions but has some considerable level of difficulty while dealing with complex problems having multiple mathematical dimensions.

Student 7: The student attempted all the questions. The marks of the student is 81.81%and he has got 9 correct responses out of 11, therefore the level of accuracy is 81.81%

Question no. 5 and 11 were attempted wrong relating with the concepts of application of fraction in day to day life whereas the next question was targeted at a mix of L.C.M with divisibility rule. Student has a problem in fraction and multi- dimensional question.

Student 8: The student attempted 9 questions out of 11. The marks of the student is 72.72%and he has got 8 correct responses out of 9, therefore the level of accuracy is 88.89%

Question no. 6 was wrong which was related to the application of distance-time problem in real life with the extension of fractions. The student is not properly able to comprehend this mix of concepts.

Student 9: The student attempted 10 questions out of 11. The marks of the student is 63.64%and he has got 7 correct responses out of 10, therefore the level of accuracy is 70%

Question no. 1, 2 and 5 were attempted wrong by the student. These are related to L.C.M, multiplication and fractions. The student may have difficulty in understanding the concept extension with the word problems in the descriptive mathematical problems.

Student 10: The student attempted 10 questions out of 11. The marks of the student is 72.72%and he has got 8 correct responses out of 10, therefore the level of accuracy is 80%

Question no. 1 and 3 were attempted wrong by the student and are related to concepts of L.C.M, divisibility rule as well as basic arithmetic in word problems.

Student 11: The student attempted 9 questions out of 11. The marks of the student is 45.45%and he has got 5 correct responses out of 9, therefore the level of accuracy is 55.55%

Question no. 3, 5, 6 and 7 were attempted wrong by the student. These problems are related to the application of L.C.M, basic arithmetic in word problems, application of fractions and distance-time as well as mensuration.

Student 12: The student attempted all the questions. The marks of the student is 81.81%and he has got 9 correct responses out of 11, therefore the level of accuracy is 81.81%

Question no. 6 and 11 was wrongly attempted which are related to the concepts of fractions with distance-time problem and divisibility rule integrated with L.C.M. The student finds it difficult to reduce the complexity of word problems to the mathematical solutions.

Student 13: The student attempted all the 11 questions. The marks of the student is 81.81%and he has got 9 correct responses out of 11, therefore the level of accuracy is 81.81%

Question no. 1 and 11 were incorrect as both the problems are related to the application of L.C.M through divisibility rules in word problem format. Student faced difficulty while relating the complex problem to the solution statement.

Student 14: The student attempted 10 questions out of 11. The marks of the student is 45.45%and he has got 5 correct responses out of 10, therefore the level of accuracy is 50%

Question no. 1, 5, 6, 7 and 8 were attempted wrong. These are related to the application of L.C.M, basic arithmetic understanding, application of fractions, mensuration and decimals.

Student 15: The student attempted 10 questions out of 11. The marks of the student is 72.72%and he has got 8 correct responses out of 10, therefore the level of accuracy is 80%

Question no. 1 and 7 were attempted wrong. These are related to the problems on application of L.C.M and mensuration through word problems. The student has considerable level of difficulty in understanding the word problems and also lacks the knowledge of formula for the respective class.

4.4 An Overview of the Individual Analysis of the Data Collected (for Word Problems)

From the above individual analysis of students' questionnaire for word problems, it can be clearly seen that the majority of the students lack inability such as L.C.M., as well as there are also difficulties in interpreting the language of the sum, basic numerical ability, concepts of fraction where the student has some degree of problem either in relating the word problems in equations or is lacking the concept for the same. Most of the students wrongly attempted word problems which are related to the application of distance-time problem in real life with the extension of fractions as well as have difficulty in understanding the concept extension with the word problems in descriptive mathematical problems. They were unable to comprehend this mix of concepts this is why the students finds it difficult to reduce the complexity of word problems to the mathematical solutions.

4.5 Qualitative Analysis of the Research Data

Qualitative data analysis can be described as the process of making sense from research participants' views and opinions of situations, corresponding patterns, themes, categories and regular similarities (Cohen et al, 2007:461). Nieuwenhuis (2007:99-100) captures the essence of data analysis well, stated the definition of qualitative data analysis as follows" "…qualitative data analysis tends to be an ongoing and iterative process, implying that data collection, processing, analysis and reporting are intertwined, and not necessarily a successive process". In short, as Gibbs (2007:vol. 6:1) said, qualitative data analysis is a

process of transformation of collected qualitative data, done by means of analytic procedures, into a clear, understandable, insightful, trustworthy and even original analysis.

According to individual respondents, interview data may be organized by grouping answers together across respondents. Observations may also be organized individually or by grouping similar types of occurrences together, also keeping this in mind the differences among individuals' settings. This may depend on the purpose of research: whether the focus is on any particular being, setting, similarity or difference.

Interest and Attitude towards mathematics word problems

The next 9 questions from question number 12 to 20 tries to gather information regarding attitude, interests, like ability, difficulties faced according to them, their understanding of word problems in terms of their day to day routine activities.

4.6 Analysis of Qualitative Data (for open end questions from question no. 12 to 20.

Analysis of the question no. 12: The question is about whether the students find mathematics interesting or not, the responses of the students are as under:

- I hate mathematics.
- There is nothing to learn, everything is to practice.
- It is an easy subject.
- It is very interesting, it has games and puzzles which sharpens our mind.
- It is easy and I like this subject.
- Because in mathematics, we do not just learn but apply it and understand.
- I find mathematics interesting because I love solving equations and playing with numbers.
- It has lot of new things to learn.

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- It is my favorite subject.

Analysis of the question no. 13: The question is about the interest of the students in mathematical calculations; the responses for the same are as under:

- I have interest in mathematical calculations because I enjoy solving math but initially I was confused.
- Yes, there are many intelligent sums in mathematics.
- Yes, it helps to improve our memory through calculations.
- Yes, because it increases our thinking skills.
- Yes, because it is very easy to solve.
- Yes, because it is easy to solve calculations like addition, subtraction, etc.
- Yes, because it is very easy and I love this subject.
- Yes, I have interest in mathematical calculation because I like to calculate.
- Yes, because I feel, what the answer is, and how it is solved.
- No, it bores me.
- No, because it is very difficult.
- No, because it is so time consuming.

Analysis of the question no. 14: The question is about the understanding of the contents in the mathematics class and why. Following are the responses of the students:

- I fully understand the contents in the mathematics class because the way our teacher teaches mathematics is so interesting.
- Yes, because I focus on mathematics class.

- Yes, because my teacher help me deal with all the problems.

- Yes, because mathematics is my favorite subject.
- Yes, because it is the most important subject in our life.
- Yes, I understand because our sir let us enjoy math class.
- Yes, I fully understand the content in math class.
- I am not sure, sometimes I understand and sometimes I do not.
- No, because I can't understand the calculations.
- No, because it is very difficult.
- No, because I am not good at formula and table.
- No, because, I was busy in the previous chapter.

Analysis of the question no. 15: The question is about whether the students have confidence in solving word problems. The responses given are as under:

- No, I think it is a waste of time.
- No, because I often make mistakes in word problems.
- No, because I cannot remember all formula.
- No, because I hate word problems.
- No, because I am sometimes wrong in solving word problems.
- No, because every question is not easy to solve.
- Yes, because it is interesting.
- Yes, but not much better.
- Yes, because it relates to the problem in my life.
- Yes, because I have trust on me that I can do it.

- Yes, because it is easy.
- Yes, because I like to solve word problem.

Analysis of the question no. 16: The question is about whether the students know which method to be used despite knowing how to calculate. The responses given are as under:

- I learn the formula but I forget them.
- Sometimes, I forget the method and I use wrong method to solve.
- Due to our over confidence, we may sometimes confuse between the methods and end up choosing the wrong method.
- Our excitement may sometime be the reason of doing mistakes.
- Since, there are a lot of methods for solving a problem, it makes me confused.
- The language used in the word problem is sometimes difficult to understand.
- I can't remember the formula and the tables.
- I know the method but I am confused which method to prefer.
- Actually this doesn't happen to me.

Analysis of the question no. 17: The question is about the difficulty in understanding the language used in the word problems and the reasons for the same:

- Yes, it is difficult for me because they use mathematical English.
- Yes, I have difficulty in understanding what is written there though I know the calculations.
- The words are complex to understand and relate to mathematics.
- Yes, because some words are difficult.
- Yes, because it is so boring and there is no add or subtract sign in the question and we have to apply our mind to insert suitable symbols in the solution.

- Yes, because I have pass from Hindi medium and there is a little bit difficult to understand questions in English of class sixth.
- No, because I am used to it.
- Sometimes it is difficult because language creates confusion.
- No, because it has easy language.
- No, I love solving problems, it is written in very easy language.

Analysis of the question no. 18: The question is asked to know whether the word problem help to link/relate the problem with day to day life situations. The responses are as under:

- No, it does not seem to be.
- No, I did not find any relation.
- Yes, it is true that word problem helps relate the problem with day to day life situation.
- Yes, I sometimes find it.

Analysis of the question no. 19: The question is about whether the word problem is difficult and for what reasons. The responses given are as under:

- I do not find it difficult.
- Because there are no arithmetic operations mentioned in the question.
- Because they are out of my mind.
- Because it is difficult to understand sometimes.
- Because it is in English.
- Because it has number of calculations.
- Because it is hard.

Analysis of the question no. 20: The question is whether the student love solving word problems or not. The responses are given as under:

- I love this subject.
- It is very interesting.
- It relates to our daily life situations.
- Because sometimes I got the questions in Hindi.
- I enjoy solving mathematical problems.
- It is easy to solve just like a magic.
- I have interest in questions.
- No, I did not like solving problems.
- No, I did not like because it takes my all attention to the words not to the problems.

4.7 Overview of the Analysis of Qualitative Data (for Open-end questionnaire)

On the basis of the overall analysis of open end questionnaires about the attitudes and interests towards mathematics like ability, difficulties faced according to them, their understanding of word problems in terms of their day to day routine activities, the students felt there is nothing to learn in mathematics, everything is about practicing. Few students felt mathematics as a very interesting subject because it

has games and puzzles which sharpens their mind. When inquired about the interest in mathematical calculations, few students said that it helps to improve their memory through calculations and therefore increases their thinking skills. Majority of the students felt that

there is no need of mathematics and do not have confidence in solving word problems as they think that it is a waste of time. Few students agreed that word problems help them relate to the problems in their day to day life. When asked about the difficulty in understanding the language used in word problems the students find it difficult because they use mathematical English. Some finds it boring because there is no add or subtract sign in the question and therefore they have to apply our mind to insert suitable symbols in the solution. Some felt that the language used in word problems creates confusion as there is no arithmetic operations mentioned in the question

4.8 Analysis of the overall performance of the students

Below is the table showing overall performance of the students in terms of their percentage of marks and the level of their accuracy in terms of percentage.

Table no. 3: Average Accuracy and Performance of the Students

Student	Marks Percentage	Accuracy Percentage
S1	**81.81%**	**81.81%**
S2	**54.55%**	**85.71%**
S3	**63.64%**	**70%**
S4	**45.45%**	**50%**
S5	**72.72%**	**88.89%**

S6	**72.72%**	**72.72%**
S7	**81.81%**	**81.81%**
S8	**72.72%**	**88.89%**
S9	**63.64%**	**70%**
S10	**72.72%**	**80%**
S11	**45.45%**	**55.55%**
S12	**81.81%**	**81.81%**
S13	**81.81%**	**81.81%**
S14	**45.45%**	**50%**
S15	**72.72%**	**80%**
Total	**1009.02%**	**1119.00%**
Average	**67.27%**	**74.60%**

From the above Table no. 3, the average marks of the students are found to be 67.27%. The level of accuracy is higher as compared to their marks and it stands at 74.60%.

Analysis of the Overall Data collected:

4.9 Conclusion

On the basis of the overall analysis of the students' for word problem taken from NCERT textbook of class VI covering the different aspects of basic mathematical understanding integrated with language to assess the students' ability to understand the language of the problems given, their ability to convert language problems into mathematical solutions and understanding of the basic mathematical keywords. It has been found that most of the students wrongly attempted problems related to L.C.M., problems in multiplication as well as there are also difficulties in interpreting the language of the sum. Many of them wrongly attempted the question which was asked to find the perimeter of the rectangle whose length and breadth is given. The formula the students used is correct but the answer they arrived upon was incorrect because they did not convert the length and breadth in the same unit before calculation. There are also difficulties in interpreting the language of the sum, basic numerical ability, concepts of fraction where the student has some degree of problem either in relating the word problems in equations or is lacking the concept for the same. Most of the students wrongly attempted which are related to the concepts of fractions with distance-time problem and divisibility rule integrated with L.C.M. Students have difficulty in understanding the concept extension with the word problems in descriptive mathematical problems. They were unable to comprehend this mix of concepts therefore finds it difficult to reduce the complexity of word problems to the mathematical solutions.

On the basis of the overall analysis of students' questionnaire for open end questions, the investigator tries to gather information regarding attitude, interests,

like ability, difficulties faced according to them, their understanding of word problems in terms of their daily life activities. Some students enjoy mathematics and love solving equations and playing with numbers. Few students felt there is nothing to learn in

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mathematics, everything is about practicing. Few students felt mathematics as a very interesting subject because it has games and puzzles which sharpens their mind. When asked about the interest in mathematical calculations, few students said that it helps to improve their memory through calculations and therefore increases their thinking skills. Majority of the students felt that there is no need of mathematics and do not have confidence in solving word problems as they think that it is a waste of time. Due to use of mathematical English, some students find it difficult to understand and solve word problems. Some finds it boring because there is no add or subtract sign in the question and therefore they have to apply our mind to insert suitable symbols in the solution. One of the student's dislikes soling word problems because it takes all his attention to the "word" than to the problem. Some felt that the language used in word problems creates confusion as there is no arithmetic operations mentioned in the question.

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CHAPTER: V

CONCLUSION

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Summary, Conclusion, Implication And Recommendation

5.1 Summary of the Research:

Mathematics is an integral part of the universe whose every aspect is quantitative. It is an admitted fact that the widespread is the applications of mathematics and enormous is its practical value. The use of mathematics is felt at each and every step, every minute and every moment of man's life. The importance is how it applies the problem situations to day to day routine activities.

Mathematics is also termed as "science of reasoning". In the words of Locke (1960), "Mathematics is a way to settle in mind a habit of reasoning." Thus, mathematics is regarded as the vehicle to train each child to think, to reason, to analyze and to articulate logically and to function effectively as citizens. It is more than counting, measuring and computing. Therefore, the major goal is to involve each child in the process of discovering mathematical ideas and formulating process. Thus we can conclude this in the words of Locke that, "Mathematics is a way to settle in the mind; a habit of reasoning."

The nature of mathematics is the science of numbers and space or science of measurement and it has originated from numbers and number system which is a specific field of it, from which other branches of mathematics are developed.

A mathematics curriculum framework released by the US National Council of teachers of mathematics (NCTM, 2000) offers a research based description of what is involved for students to learn mathematics with understanding. The approach is based on "how learners learn", not on "how to teach", and it should enable mathematics from the standpoint of the learner as he progresses through the various stages of cognitive development.

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"A mathematical problem stated in words rather than in symbols or equations is called a word problem." (Mathematics Thesaurus)

Word problems are a part of school curriculum. They are taught at all levels of education. In word problems, relevant information is presented in the form of a short narrating rather than in mathematical notation. (Verschaffel et al, 2000)

Word problems in mathematics plays a significant role to relate the problem with the real world situations to mathematical concepts, as it helps in mathematization of child's thinking and develops their mathematics knowledge in solving their daily routine activities. The mathematics word problems are known as instruments which develop the students' ability and talent in solving mathematical word problems. (De Coete et al, 1989)

Word problems in mathematics pose a challenge because they require that students read and comprehend the text of the problem, identify the question that needs to be answered, and finally create and solve a numerical equation. Word problems require more than simply looking at numbers and symbols and figuring the solution. Therefore, to solve a word problem the student must be able to read the problem statement, able to identify and apply the correct methods, form a number sentence and solve the mathematical equation and make sure that the answer

makes sense in the context of the problem. Thus, mathematical word problems require higher order thinking than simply solving equation.

The purpose of studying the difficulties in word problems of class VI students because at the middle school level, the students have some degree of problem either in relating the word problems in equations or have some considerable level of difficulty while dealing with complex problems having multiple mathematical dimensions. Word problems also become complex due to lack of understanding of the "key words" used. Students at this level, generally, find it difficult to reduce linguistic complexity of word problems to the mathematical solutions.

5.2 Conclusion:

On the basis of the overall analysis of the students' for word problem taken from NCERT textbook of class VI covering the different aspects of basic mathematical understanding integrated with language to assess the students' ability to understand the language of the problems given, their ability to convert language problems into mathematical solutions and understanding of the basic mathematical keywords. It has been found that most of the students lacks inability such as L.C.M., problems in multiplication as well as there are also difficulties in interpreting the language of the word problems. The investigator found that some students wrongly attempted the question when asked to find the perimeter of the rectangle whose length and breadth is given. The formula the students used is correct but the answer they arrived upon was incorrect because they did not convert the length and breadth in the same unit before calculation. The investigator found that some student lacks in the understanding of concepts of fraction where they have some degree of problem in relating the word problems in equations. It has been found that students usually

are best at attempting direct questions but have some considerable level difficulty while dealing with complex problems having multiple mathematical dimensions. There are also difficulties in interpreting the language of the sum and basic numerical ability. Most of the students wrongly attempted which are related to the concepts of fractions with distance-time problem and divisibility rule integrated with L.C.M. Students have difficulty in understanding the concept extension with the word problems in descriptive mathematical problems. They were unable to comprehend this mix of concepts therefore finds it difficult to reduce the complexity of word problems to the mathematical solutions.

On the basis of the overall analysis of students' questionnaire for open end questions, the investigator tries to gather information regarding attitude, interests, like ability, difficulties faced according to them, their understanding of word problems in terms of their daily life activities. From the interview, the investigator found that some students enjoy mathematics

and love solving equations and playing with numbers. Few students felt there is nothing to learn in mathematics, everything is about practicing. Few students felt mathematics as a very interesting subject because it has games and puzzles which sharpens their mind. When asked about the interest in mathematical calculations, few students said that it helps to improve their memory through calculations and therefore increases their thinking skills. The investigator found that majority of them felt that there is no need of mathematics and do not have confidence in solving word problems as they think that it is a waste of time. After interviewing the students, the investigator found that due to use of mathematical English, some students find it difficult to understand and solve word problems. Some finds it boring because there is no addition or subtraction sign in the question and therefore they have to apply our mind to insert suitable symbols in the solution. One of the student's dislikes soling

word problems because it takes all his attention to the "word" than to the problem. Some felt that the language used in word problems creates confusion as there is no arithmetic operations mentioned in the question.

5.3 Educational implications:

Following are the educational implications of the studies:

- There is a proper understanding of subject matter need to be developed in teachers so as to better manage the students with difficulties faced while dealing with word problems.
- It should be ensured properly that the students must organize the concepts first before solving the problem, including vocabulary and the proper understanding of relations among various entities.

· Recognition of conceptual framework by the students regarding the problem and the chapter should be properly and thoroughly explained to the students, and then only they are allowed to solve the problems.

5.4 Further Suggestions:

· The study is conducted with a limited time and resource constraints by the researcher and the possibility for further improvements is always there. Following are the suggestions as deliberated upon by the researcher:

· As the study was limited to only a small number of students, therefore sample size could be increased to include more number of students to better represent the population.

· The study was only limited to the basic understanding of the language used in word problems therefore; these problems were limited to their 6^{th} standard NCERT textbook. Further study can have done for word problems associated with complex situations in accordance with the language used and other mathematical concepts such as fractions, decimals, H.C.F., and L.C.M. etc. Also the questionnaire prepared was to check their level of understanding and the application of operations in the known content.

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APPENDIX 1

Questionnaire (Class VI Student)

Name

_____

Sex: Male

_____Female_____

Class _____

_____

D.O.B _____

Instruction to the Questionnaire:-

- **Read the questions below, understand the problem and solve accordingly.**
- **There are 20 questions in this questionnaire. (open ended questions)**
- **This test is not for your academic purpose, you just have to feel free to solve them.**
- **Your information/details will be kept confidential.**

Q1. Find the smallest 4-digit number which is divisible by 18, 24 and 32.

Q2. The town newspaper is published every day. One copy has 12 pages. Everyday 11,980 copies are printed. Find the total pages printed every day.

Q3. Shekhar is a famous cricket player. He has so far scored 6980 runs in test matches. He wishes to complete 10,000 runs. How many more runs does he need?

Q4. Sharmila had 5/6 of a cake. She gave 2/6 out of that to her younger brother. How much cake is left with her?

Q5. Sarita and Lalita bought 2/5 metre and 3/4 metre of ribbon. Find the total length of the ribbon they bought.

Q6. Nandini's house is 9/10 km from her school. She walked some distance and then took a bus for 1/2 km to reach the school. How far did she walk?

Q7. Shabana wants to put a lace border all around a rectangular table cover 3m long 2m wide. Find the length of the lace.

Q8.Rashid spent Rs 35.65 for Math book and Rs 32.60 for Science book. Find the total amount spent.

Q9. Rahul had Rs 7.45. He bought toffees for Rs 5.30. Find the balance amount left with him.

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Q10. Find the perimeter of a rectangle whose length and breadth are 150cm and 1m respectively.

Q11. Find the least number which when divided by 12, 16, 24 and 36 leaves a remainder 7 in each case.

Q12. I find Mathematics interesting because: _____

Q13. I have interest in mathematical calculations. (Yes/No) WHY?

Q14. Do you fully understand the content in the mathematics class? Why?

Q15. Do you have confidence in solving word problems in Mathematics? (Yes/No) WHY?

Q16. Though I know how to calculate, sometimes I do not know which method to be use. Justify your statement.

Q17. Do you think you have difficulty in understanding the language used in word problems? Why?

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Q18. Does Word problem help to link/relate the problem with your day-to-day life situations?

Q19. I find word problems difficult because: _____

Q20. I love solving word problems because: _____