# DEVELOPING COMPREHENSION ABILITY OF THE LEARNER IN MATHEMATICS LEARNING

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## ➢ 1.1 Introduction :

Comprehension is the base of cognitive domain. Without comprehension higher mental processes like thinking, problem solving, creative thinking, solving example, applying rule are not possible.

Mathematics is an abstract subject, rote learning is not useful in this subject so as a teacher it is essential to develop comprehension ability of the learner in Mathematics learning.

There are various learning strategies which help to develop comprehension ability of the learner.

## ➢ 1.2 Present Situation :

At school level Mathematics is supposed to be very difficult, tedious and bore subject. Most of the students do not like this subject. Their interest about this subject is less. So they do not learn mathematics by heart. They do not willingly study mathematics. It is observed that there is a sense of fear regarding mathematics among majority of learners. Its impact is that number of failures in mathematics is increasing day by day.

After analyzing these problems following solutions are suggested in National Curriculum Framework 2005

a. Engage every student in learning process with a sense of success.

b. Change modes of assessment to examine students' mathematical abilities.

c. Create mathematical learning environment in the class.

d. Adopt such techniques of evaluation which will help to remove the fear of mathematics from children's mind.

Today it is found that mathematical language is a barrier in the achievement of the learner in Mathematics subject. Sometimes it is observed that learner could not understand the meaning of mathematical symbol and due to that he/she fails to solve the example. Or sometime he/she takes wrong meaning of symbol. Also it is observed that while solving word problems learner confuses, couldn't able to understand what to do and keeps that example unsolved. He/she fails to convert word problem into numerical form. He/she feels very difficult to convert word problems in the numerical form . But after supplying help of conversion they feel easy to solve problem. This is because of inefficiency in understanding the mathematical language. Its impact is an increase in number of failures in mathematics.

In the mathematics class it is observed that most of the time teacher explains the meaning of example , converts the example in the simpler form and then asks to solve. But while doing independently , or at the time of examination learner feels very difficult to understand the meaning , learner could not think over it. This is because spoon feeding habit of teacher. This habit kills learner's comprehension ability,

thinking ability. This ability could develop after introducing various language learning strategies of mathematics.

Actually for this inefficiency we, teachers and parents are most responsible. In our methodology of teaching mathematics to read a book of mathematics is not mentioned anywhere. To read a book is must essential for learning language of mathematics. But we never allow pupil to read a book of mathematics. We never allow them to open a book in the class. We always ask them to open a book of mathematics only for drill and practice. Drill and practice helps them to solve examples mechanically. This habit of studying mathematics wont develop comprehension ability of the learner.

In the text book of Mathematics of Maharashtra State while mentioning Educational Approach it is clearly mentioned that, 'the emphasis should be on comprehension of the content rather than merely solving the problems'.( M. S. Bureau of Textbook Production and Curriculum Research, , Pg. Educational Approach)

To develop comprehension ability, thinking capacity , of learner about mathematics learning researcher decided to do something on solution **'c'** given in NCF 2005 and decided to develop comprehension ability of the learner through various learning strategy and undertake following subject for her study.

- **1.3 Title :**

Developing comprehension ability of the 7th grade learners' in Mathematics learning.

- **1.4 Objectives of the Study:**

1. To coin various learning strategies of mathematics subject which will help to increase comprehension ability of the learner .
2. To implement all these strategies in the class.
3. To study the impact of all these strategies on the comprehension ability of the learner.

- **1.5 Operational definitions of the terms used in title:**

**1. Comprehension Ability**: It is defined as the level of understanding.

In this research comprehension ability means ability to understand the meaning of mathematical symbols, language, table, graph etc

**2. Learning strategy: L**earning strategy means ways which are applied by researcher to enhance learning and comprehension ability of the learner.

In this research Learning Strategy means specific actions, behaviors', steps, or techniques applied by researcher for understanding mathematical concepts. With the help of these strategies students (often intentionally) use to improve their progress in developing primary skills of mathematics, i.e. .keen observation, identification, reasoning, logical thinking.

**3. 7th Grade Learners**: Girl students who are studying in the 7th class, of Premlila Vithhaldas Thackersey Prashala, Pune.

**4. Mathematics Learning** : In this research Mathematics Learning means Understanding and proper use of mathematical symbols, language, diagrams, charts, tables, graphs etc .involved in the textbook of mathematics up to 7th Grade.

- **1.6 Hypothesis :**

After applying various learning strategies comprehension ability of mathematics of the learner will increase .

- **1.7 Variables:**

1. Independent variable : Various learning strategies of mathematics
2. Dependent variable ; Comprehension ability of the learner

3. Controlled variable : Basic Units of Mathematics up to 7th Grade, planned activities by the researcher

- **Research Method :**
  Researcher used Experimental method for her study.
- **Design of the Study** :
  Pre test –post test single group design is selected for the study.
- **Data Collection Tools :**

**1. General Comprehension ability test** :

This is Teacher made comprehension ability test. Same test is used as pre and post test.

35 test items with multiple choice are included in this test. Three alternatives are given to each test item, student has to identify and to do tick mark on the appropriate one. This test checks comprehension ability of the learner regarding mathematical language. Score obtained by students in this test are taken for qualitative analysis.

2**. Comprehension Ability test of Battery** :

This is Grade wise and unit wise set of tests.

After applying various learning strategies these tests implemented to see the comprehension ability of the learner. These tests are grade wise and also unit wise Basic units from 5th to 7th grade such as Fraction, Equation in one variable, Basic concepts of Geometry, Integers are included in this set. The units which selected for this study are the basic foundation for learning mathematics and useful to study higher grade mathematics. These tests are used as diagnostic tests.

**3. Observation Technique :**

For noting the behavioural changes observation technique is applied by the researcher.

- **1.8 Sample :**

14 students of 7th Grade from Premlila Vithhaldas Thackersey Kanyashala, S.N.D.T. University's Campus, Karve Road, Pune 411038

For this study the researcher has used a method of incidental sampling.

- **1.9 Data Collection:**

Researcher wanted to develop comprehension ability related to mathematics subject among the learner, so she coined various learning strategies of mathematics and applied these in the class . The coined strategies by researcher are given below.

**Learning Strategies of Mathematics Subject :**

**1. Reading strategy** : Mathematics subject is having its own language. It is said that no any language is as beautiful as mathematics. Mathematics language includes symbols, diagrams, formulae and numbers. For proper understanding of subject it is essential to develop ability of reading mathematics language.

**2. Drawing strategy** : Mathematics is a logical and abstract subject. Human brain is a learning organ, helps to think logically and rationally. Brain starts its full functioning at the age of 18-20. Fully developed brain can think logically, rationally. But in the earlier years brain is yet to develop so limitations occurred to think rationally and logically . In those days Drawing strategy works better. This strategy helps learner to produce concrete meaning to abstract terms. With the help of drawing strategy learner is able to convert word problems in the numerical form, able to create/ prepare formulae independently, without help of teacher. Drawing format helps learner to identify appropriate formula for the particular example, helps to understand the meaning , helps to identify particular operation. Impact of drawing strategy results to remember mathematical terms lifelong .

**3. Activity based strategy** : Activity based learning helps to permanent retention. This strategy stresses on learning by doing. This strategy helps learner to take evidence of assumptions and theorems by actual measurement. Following activities such as paper folding activity, cut and paste activity, construction activity and measurement activity are included in this strategy.

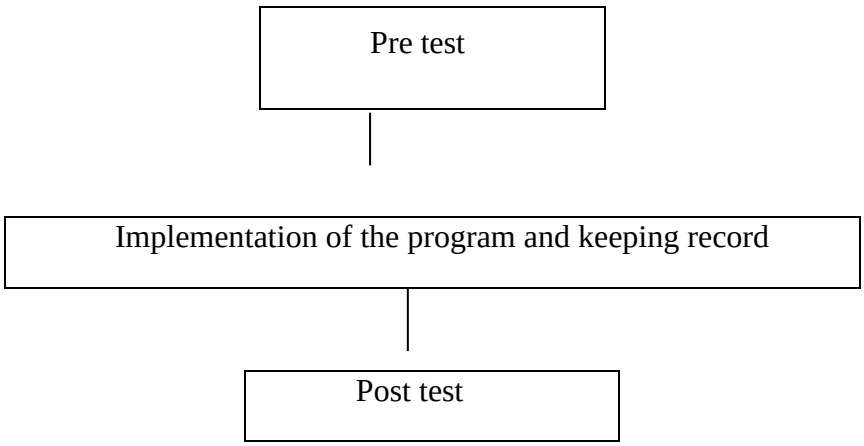
In above all three strategies following activities are included.

- Read loudly
- Read the content meaningfully.
- Read the symbols meaningfully (Match the pair)
- Draw signs and symbols .
- Draw the diagrammatically presentation of word problem.
- Convert word problem into numeral form.
- Represent the numeral form (fraction)into diagrammatic form.
- Convert diagrammatic form (fraction ) into numeral form.
- Read the table.
- Read the graph.
- Represent geometrical concepts by paper folding method.
- Draw number line.
- Perform mathematical operations with the help of Nomography ( model of number line), such as addition and subtraction of integers.
- Take actual measurement and draw conclusions.
- Use cut and paste activity and prepares formulae of various geometrical figures.
- Draw geometrical figures by actual measurement and search some properties.
- Perform geometrical concepts by paper folding method.

➢ **1.10 Implementation of the Program** ;

Researcher implemented a teaching program according to the following stages

**Flow chart of implementation of programme:**




As researcher is not working as a teacher in the same school, so she faced the problem to implement the prepared program. After discussion with head mistress and students she decided to implement the program prior to school time, she asked students to come in the school at 11 am . Daily one hour (60 minutes) dose was not sufficient for enriching the content knowledge, so researcher planned to complete various activities during the off periods. Researcher's college and selected school is in one premises (

100 meters distance) so sometimes she called students in her department and asked to handle and play with various instruments .

**Pre Observations Noted by Researcher** :

Researcher noted following observation during her research. Learners were

1. unable to read fraction numbers.
2. Unable to identify fraction from diagrammatical presentation and vice versa.
3. Unable to identify simple symbols which are introduced in their textbook.
4. Unknown about the proper way of solving equation with one variable.
5. Unknown with the rules of equality.
6. Unable to differentiate geometric figures such as line-segment, rectangle- square.
7. Couldn't read ray, angle, and quadrilateral properly.
8. Unable to guess what to calculate, which formula has to use while solving word problems.
9. Doing operations on integers without understanding the properties of signs.
10. Couldn't do proper addition, subtraction, multiplication and division of decimal fractions.

According to noted observations researcher decided her line of action and decided to give stress on particular units.

During implementation of program each day researcher ***stressed on earlier days work,*** asked learners to memorize previous lecture's content. After that she turned to new concept, introduced and explained new concept in simple manner. After explanation she gave ***activity sheets*** to learners to do work independently. When some students faced problems in understanding she had taken help of co-learners , she used ***pair and share technique*** ,she asked fast learners to help their friends to solve or to understand meaning, symbol of content. Sometime she asked fast learners to ***create examples independently*** for drill and practice. Also she asked them to ***evaluate each other's work***. This activity developed keen observation, critical view and creative power among learner. Automatically developed self esteem and raised confidence of the learners. As the group is small so researcher tried to develop comprehension ability of each learner up to mastery level i.e. up to 80% . Here she followed the features of action research. During implementation researcher applied following stages of action research given by Kurt Levin

1. Plan
2. Act
3. Observe and
4. Reflect.

She required maximum three cycles of action research.

Through these three cycles and by using various units researcher tried to develop comprehension ability of the learner regarding mathematics . Some photographs are attached here.

| | |
|---|---|
| Identification  | Peer evaluation  |
| Independent learning  | Learning from Peers  |

In this way researcher implemented a program in 13 days with the help of 52 lectures.(One lecture was of 30 minutes.)

After implementation of the program researcher gave post test.

- **1.11 Analysis of data :**

Analysis of data done qualitatively and quantitatively.

**Quantitative Analysis :**

Quantitative analysis is done with the help of General Comprehension ability test . Researcher wanted to see the impact of learning strategies individually, so she used percentage as a statistical tool for quantitative analysis. Percentage is drawn by calculating difference between pre and post test score.

Pre and post test Scores , difference between the scores and their percentage are given in the following table .

| Name of the Student | Pre test score Out of 35 | Post test score | Difference between pre and post test | Percentage of post score |
|---|---|---|---|---|
| Puja Shelke | 18 | 32 | 14 | 91.43 |

| | | | | |
|---|---|---|---|---|
| Disha Shinde | 14 | 32 | 18 | 91.43 |
| Manali Pote | 23 | 34 | 11 | 97.15 |
| Neha Sonje | 14 | 32 | 18 | 91.43 |
| Punam Pawar | 21 | 34 | 13 | 97.15 |
| Chinmayi Kamble | 18 | 32 | 14 | 91.43 |
| Sanjana Shilvant | 18 | 30 | 12 | 85.72 |
| Priyanka Mohol | 14 | 28 | 14 | 80 |
| Heena Shaikh | 12 | 28 | 16 | 80 |
| Mohini vadavrav | 12 | 28 | 16 | 80 |
| Namrata Mazire | 14 | 28 | 14 | 80 |
| Surekha Kasbe | 14 | 30 | 16 | 85.72 |
| Anjali Bokefode | 10 | 28 | 18 | 80 |
| Madhuri Trimbake | 12 | 28 | 16 | 80 |

As this is action research, so after implementation of various learning strategies and three cycles of action research researcher reached up to mastery level. After each cycle of implementation researcher wanted to see impact, so for seeing impact researcher used Comprehension Ability test of Battery. With the help of these tests researcher identified the weak points in learning and provided remedy accordingly to each student. So in the post test all students gained score above 80%. Six students reached above 90%, two gained above 85% and remaining reached up to 80% .

- **Qualitative Analysis :**

For qualitative analysis the researcher used observation technique. With the help of this technique researcher recorded students' behavior changes and derived the following conclusions:

1. In the beginning of the program only 2-3 students were present regularly in time, but later on the number of students increased, they started to come in the school before time.
2. The students completed their home work and projects and started to prepare questions independently.
3. Before the experiment it was observed that most of the students could not able to read the book of mathematics but after implementation of the program it was found that they started to read book meaningfully, understood mathematical language and symbols. They drew symbols properly.
4. Students started to take interest in the subject.
5. Various activities helped to develop following factors of mathematical ability among the learner**.**
   **i**. keen observation ability.
   **ii** logical thinking.
   **iii**. Creative thinking ability.

**iv**. Critical view

## ➢ 1.12 Conclusions :

**1.** Various learning strategies and related activities

- Created mathematical learning environment in the class.
- Developed comprehension ability of the leaner.
- Developed interest about the subject among pupils.
- Developed mathematical abilities such as keen observation, critical view, creative thinking.
- Developed self esteem , raised confidence and developed sense of success among the learner.

**2.** Due to various activities active processing of learning took place.

**3.** Pupils could read mathematics book meaningfully.

**4.** Prepared program also helped for strengthening the content knowledge of the learner, basic ideas are also cleared.

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