



EFFECTIVENESS OF CONCRETE TEACHING IN TEACHING OF WORD PROBLEMS IN MATHEMATICS

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Abstract

As a teacher educator, the researcher often observed the school students expressing that they are unable to remember various formulae in Mathematics and use them correctly to solve word problems. The present action research project has been undertaken with the purpose to explore the effectiveness of Concrete Teaching in teaching of Word Problems for Std VI students. The pre-test and post test scores revealed that the performance of the students improved significantly, and the students expressed better confidence and felt motivated in the Mathematics class.

Keywords: Mathematics, Word Problems, Concrete Teaching, Action Research.



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Introduction

It is often found that the subject of Mathematics is a 'frightening' proposition for school students as well as for their parents. Many a times, students avoid the subject not because of their lack of competency but more so because of lack of preparedness and correct study habits. This in turn results in a feeling of tension, anxiety and apprehension that interferes with the performance of the student in Mathematics. Students often develop lack of confidence in solving Maths problems due to faulty methods of teaching adopted by the teachers. Such teachers usually heavily rely on teaching exclusively from textbook, guide students to memorize mathematical facts without understanding them, employ drill and practice with reasoning only to reinforce the lesson. It is also found that the Mathematics

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teachers often discourage the students to solve sums in their own way and expect the students to rigidly follow the steps taught by them. The outcome of this is that students resort to rote learning. Several research in the field of Mathematics education reveal that teachers presentation of Mathematics problem solving should be learnable and creative.

The context of the present Action Research is based in the similar setting.

The Context of the Study

The purpose of the present study was to establish the effectiveness of concrete understanding and solving of Word Problems (Profit-Loss) in the subject of Mathematics in std 6 class of a prominent school in the suburbs of Mumbai. The students shared with the researcher that they find it difficult to remember and understand the formulae of Profit and Loss. Apart from that, students were slightly confused with the calculation methodologies adopted as the complexity of the numerical went on increasing. The researcher observed that the existing teaching method of teaching mathematics in the school does not involve the use of innovative strategies for teaching. The researcher came to this realization that the absence of interactive methodologies in teaching Profit-Loss might have led to lack of practical understanding on the part of students which further led to confusion in understanding solving numerical as the complexity goes on increasing. Due to the aforementioned reasons, researcher felt the need for conducting the research on the effectiveness of concrete teaching of understanding and solving numerical (Profit-Loss) in the subject of Mathematics.

The present study was guided by the outcomes of studies, which show that students learn best when they are active rather than passive learners (Spikell, 1993). This indicates that when Mathematics is presented using Cooperative Group Structures, visual aids, hands-on activities and technology, retention of learnt material is better and at the same time students are motivated. Children enjoy experimenting and hence providing opportunities for children to explore, conjecturing and thinking emphasizes the importance of original quality thinking rather than rote manipulation of the formula.

The study was guided by the following objectives: Effectiveness of concrete, real-life scenarios in visualizing and remembering the formulas of Profit and Loss, Effectiveness of concrete teaching strategies like Role-play, dramatization and skits in remembering, understanding and subsequent solving of word problems involving the increasing

complexities on Profit.

Although the degree of effectiveness of the concrete teaching differed from student to student, overall, the present study revealed that the students can remember the situations and analyze word problems more effectively when a realistic approach was adopted. The increased percentage of marks obtained by the students in the post-test, which was 100% in some cases revealed that concrete teaching through various innovative methodologies indeed helped the students to remember, understand and solve the word problems on Profit.

Statement of the Problem

Effectiveness of Concrete Teaching in Teaching of Word Problems In Mathematics.

Purpose of the Study

The purpose of study is centered on finding out whether:

- a. Effectiveness of concrete, real-life scenarios in visualizing and remembering the formulae of Profit and Loss.
- b. Practical application contributes to remembering the formulae of Profit and Loss.
- c. Motivating maximum involvement of students augment the understanding and application of word problems of Profit and Loss.

Justification

According to the National Curriculum Framework (NCF) 2005, the main goal of Mathematics education in schools is the 'mathematization' of a child's thinking. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise of a child's thinking.

At each level, the first step towards mathematical competency and liberation is that of building concepts. The purpose of teaching through activities ensures that students develop a tangible understanding of the math concepts/skills they learn. When students are supported to first develop a concrete level of understanding for any mathematics concept/skill, they can use this foundation to later link their conceptual understanding to abstract mathematics learning activities. Weane and Hiebert stated that consistent success in the use of concrete materials to aid students understanding of decimal fractions and decimal numeration. Fuson and Briars (1990) reported astounding success in the use of base-ten blocks in teaching addition and subtraction.

Methodology

The research was conducted on the students of standard 6 of a prominent SSC English medium school located in the suburbs of Mumbai. The class size was 53. The researcher used Single Group Pre-Test Post Test Experimental Design involving usage of pre-test to check the previous knowledge and understanding of the students and post-test questionnaire to test the change in the level of understanding of the topic of Profit-Loss. The tests were supplied to all the students of 6th standard Division A. The researcher prepared lesson plans and used innovative methodologies while conducting lessons which was the treatment provided to the group. The data collected from both pre-test and post-test were analyzed, percentages of the number of correct answers for each question was calculated and a bar chart was obtained for each question to compare the performance of students in pre-test and post-test. In total the research was conducted over a period of 8 weeks.

Collection and Analysis of the Data

Based on data collected, the researcher tabulated the total marks obtained by the students in pre-test, post- test and calculated the difference in marks to understand the impact of using concrete teaching aids. The researcher had planned to collect the responses from all 53 students of division A 6th standard. But, out of the total no. of students, 19 students were absent, and some had gone for interschool competitions. Hence, the data could be collected from only 34 respondents. Accordingly, sample size was reduced to 34 students.

Findings of the Study

The Figure 1 depicts student wise comparative performance in Pre-Test and Post Test.

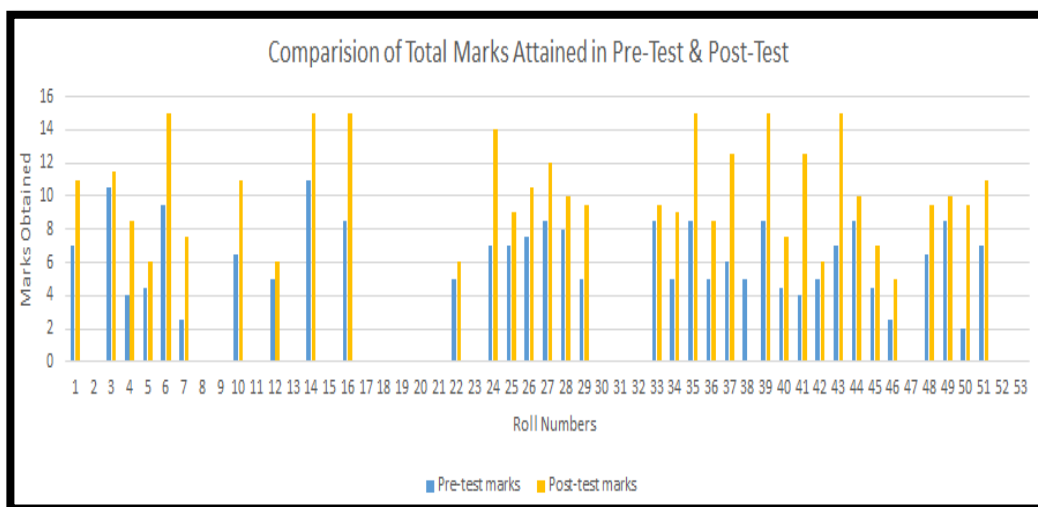


Figure 1 Comparative Performance of the Students in Pre-Test and Post Test

The overall findings represented by the bar graphs clearly shows that there has been a considerable improvement in the performance of each student after using innovative strategies which were introduced in the teaching learning process. The question wise findings further strengthen the belief that innovative teaching methodologies augments the mental processes like remembering, understanding and application of solving word problems in mathematics. The researcher noticed that student's attention and eagerness greatly improved as a result of using maximum involvement of the students in the teaching-learning process. The researcher found that although students have understood the background of the formulae and were able to remember the formulae better than before, due to the introduction of innovative and interesting strategies, it is their calculation mistakes that led to the reduction of marks. The researcher discovered that most of the students found it difficult to carry out operations of multiplication and division with 5 digit numbers during problem solving.

Recommendations

The concretization of concepts requires complete participation of schools, parents, and teachers as well as on the part of government. The researcher points out that the teaching aids needs to be made by keeping in mind the safety of students. The following are the suggestions made by the researcher to make simple concrete teaching with innovative methodologies for

understanding and solving of the word problems.

Differentiate the Numbers in The Word Problems

Initially discuss the steps of solving the word problem and only after that give students numbers related to the situation in the word problem. Depending upon the numerical competency of the student, different numbers can be provided. At the beginning of the topic, all the students solve the same sums. This is done with the purpose of making the student understand the process. After students are familiar with the process, then start to give different students different numbers, based on their level of mathematical thinking.

Using Academic Vocabulary

Students can be taught to identify the **start** of the problem, the change in the problem and the **result** of the problem. They also can be taught to look for the **unknown**. These are all words one may use when solving problems and one learns the structure of a word problem through the vocabulary and relationship of the numbers. In fact, using the same vocabulary across problem types helps students see the relationship of the numbers at a deeper level.

The following strategies were followed by the researcher while helping students to learn solving Word Problems based on Profit and Loss correctly as well as speedily.

Read the entire Word Problem

Before students look for keywords and try to figure out what to do, they need to slow down a bit and read the wholeword problem once (and even better, twice). This helps students get the bigger picture to be able to understand it a littlebetter too.

Think about the Word Problem

Students need to ask themselves three questions every time they are faced with a word problem. These questions will help them to set up a plan for solving the problem using KWN strategy.

Write on the Word Problem

This step reinforces the thinking which took place in step number two. Students use a pencil or coloured pencils tonotate information on worksheets (not books of course unless they're consumable). There are lots of ways to do this, but here's what the students can be asked to do:

- Circle any numbers that is to be used.

- Lightly cross out any information that is not needed.
- Underline the phrase or sentence which tells exactly what needs to find.

Draw a Simple Picture and Label It

Drawing pictures using simple shapes like squares, circles, and rectangles help students visualize problems. Adding numbers or names as labels help too.

Estimate the answer before Solving

Having a general idea of a ballpark answer for the problem lets students know if their actual answer is reasonable or not. This quick, rough estimate is a good math habit to get into. It helps students really think about their answer's accuracy when the problem is finally solved.

Check your work when done

This strategy goes along with the fifth strategy. One of the phrases we can constantly use during math time is, "Is your answer reasonable?"

Also, when students get into the habit of checking work, they are more apt to catch careless mistakes, which are often the root of incorrect answers.

Practice Word Problems often

Just like it takes practice to learn to play the cricket, to dribble a ball in football, and to draw realistically, it takes practice to become a master word problem solver. When students practice word problems, often several things happen. Word problems become less scary (no, really). They start to notice similarities in types of problems and are able to more quickly understand how to solve them. They will gain confidence even when dealing with new types of word problems, knowing that they have successfully solved many word problems in the past.

Modelling

Mathematical Modelling and charts can be used to teach the concepts and formulae of Profit-Loss to make it more realistic and life-oriented for the students to develop a better understanding and further application of the same.

Mathematics Laboratory

The Mathematical laboratory should be made part of the school where one can find a collection of games, puzzles, and other teaching and learning material. The materials are

meant to be used both by the students on their own and with their teacher to explore the world of mathematics, to discover, to learn and to develop an interest in mathematics. The Maths lab provides an opportunity for the students to discover mathematics through doing. The activities help students to visualize, manipulate and reason. They provide opportunity to make conjectures and test them, and to generalize observed patterns. They create a context for students to attempt to prove their conjectures.

Conclusion

Jean Piaget's theory, often referred to as constructivism, infers that children use their existing knowledge to interpret their new experiences. In the concrete stage, students still rely on concrete materials and situations they have already experienced when interpreting new information. Using real-life examples helps students relate topics to prior knowledge.

Concrete teaching aids can be used in teaching science, geography, environmental studies and even economics and is equally applicable to students with different learning styles and disabilities. Thus, the real-life experiences help in better understanding of abstract concepts which can be done with the help of giving situations, stories, role-play, dramatization and many more child centered activities. As it is said, "learning by doing" helps in better retention which will facilitate their problem-solving skills and scientific temperament which will result in their holistic development as an individual.

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