

EFFECT OF BAR MODEL OF TEACHING MATHEMATICS ON THE ACHIEVEMENT OF IX STANDARD STUDENTS

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ABSTRACT-- *Mathematics plays very important in student's life. In any system of Education and also needed for day today life, Mathematics is basic and mandatory subject at Primary and Secondary level. The investigator is conducted an experimental Study on Bar Model of Mathematics. This is an innovative method of effect of Bar Model. The Pre-test study is conducted on Secondary School students. The sample by using experimental research consists of 70 students of IX std (35 Boys and 35 Girls). The instrument used in this research consists of questions of pre-test and post-test and a semi-structured interview. The statistical technique of the ANOVA and "t" tests was used. Data were analyzed by using SPSS 20.0 software and thematic analysis. The results showed that there is a significant difference in student's mathematical problem-solving achievement. The analysis of semi-structured interview transcripts revealed that level of understanding and motivation influence students' performance. Findings of this study showed that students perform better after the using of the Bar Model in Mathematical problem-solving. This study can provide an alternative or guidance for teachers to improve students' mathematical problem-solving skills.*

Key words-- *Secondary level, Bar model,*

I. INTRODUCTION

"Pure mathematics is, in its way, the poetry of logical ideas". -Albert Einstein

What is the main Aim of Mathematics Education in schools? Simply stated, there is one main aim the Maths of the child's thought processes. In the words of David Wheeler, it is "more useful to know how to mathematise than to know a lot of mathematics"

According to George Polya, we can think of two kinds of aims for school education: a good and narrow aim, which of turning out employable adults who (eventually) contribute to social and economic development; and a higher aim, that of developing the inner resources of the growing child. With regard to school mathematics, the former aim specifically relates to numeracy. In Primary schools students learn numbers and operations on them, measurement of quantities, fractions, percentages and ratios, which are numerical importance.

As per NCERT, the main Vision of Mathematics is students learn to enjoy Mathematics, learn important mathematical, operations pose and are able to solve meaningful problems use abstractions to perceive relationships, to see structure, to reason about things, to argue the truth or falsity of statements. Logical thinking is great gift of Mathematics to us, that inculcates habits of thought and communication children which is a principal goal of teaching mathematics & understand the basic structure of mathematics: i.e., Arithmetic, algebra,

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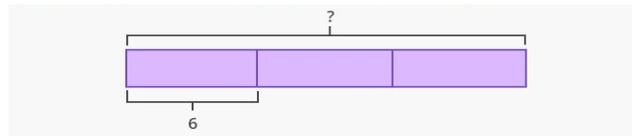
geometry and trigonometry, the basic content areas of school mathematics. These all offer a methodology for abstraction, structuration and generalization. Appreciating the scope and power of mathematics refines our instincts in a unique manner.

II. WHAT IS A BAR MODEL?

Bar modelling is an essential maths mastery strategy. A Singapore-style of maths model, bar modelling allows pupils to draw and visualize mathematical concepts to solve problems.

In Mathematics, a bar model can be defined as a pictorial (Box) representation of a number in the form of bars or boxes used to solve number problems. Bar models help us to attain an understanding of how a problem needs to be solved and calculated.

Here, for instance, one rectangle or box of the bar model represents a value of 6. We have value of one bar, which is 3 times of one rectangle i.e., $6 \times 3 = 18$.



III. REVIEW OF RELATED LITERATURE

Thirunavukkarasu.M (2014): “Bar Model for enhancing the learning of ‘Addition and Subtraction, at primary school level’”. The main objective of this study is found out the effectiveness if the Bar Model of Teaching Mathematics at the Primary level to measure the performance in the achievement tests in Mathematics. The Experimental methodology used and sample is of the study is Fifth Standard 68 Students, tested by Pre-Test and Post Test. Used Addition and Subtraction in Maths Bar model Problems. Four types of Variables are used, Gender, experimental group, special training like tuition takers and non-tuition takers, day scholars, and Hostlers. Used ‘t’ test respectively the pre-test and post-test achievement scores experimental group children’s are 2.22 and 7.08.

Jonathan Hsu (2013): conducted a study on the strengths and limitations of applying Singapore math techniques with high school students in a private school geometry class. A qualitative method with a constructivism framework was used to collect the data from surveys and interviews. The students were then introduced to the Singapore maths bar modeling techniques through solving a word problem activity. The students were all visibly impressed and full of praise of Singapore math’s bar modeling techniques. Singapore math has influenced my teaching style that appeals to all of the students visually. My visually inclined teaching style will be used continually to engage my students in math. Singapore maths bar modeling techniques should have a place in high schools because it can help increase students confidence in math and improve student’s level of critical thinking and problem solving skills. Teacher training in Singapore math and choosing an appropriate Singapore math textbook are challenges. More studies are still needed to implement Singapore math successfully at the secondary level in the U.S. However, it is not possible to completely transfer everything about Singapore math over to solve the problems of U.S. educational system.

Yadav Shailini & Aggarwal Deepali (2016): “Mathematical interest of Secondary school students in relation to their Demographic variables”. The present study was conducted to remove the stereotype from the society that males and the students living in urban areas are excellent in Mathematics. The sample of the study comprised of 200 secondary school students i.e. 100 Males and 100 Females. Mathematical interest inventory (MII) developed by LN Dubey was used to assess the Interest of students. The result showed that there was no influence of gender on the Mathematical interest of Students. Also there was no significant difference of Locality in the interest of Students.

STATEMENT OF THE PROBLEM

Bar Model of Mathematics is Singapore method, solving the problems by using Linear Equations “Effect of Bar model of teaching Mathematics on the Achievement of IX standard students”

OBJECTIVES OF THE STUDY

The main objective of the proposed study is to find out the effect of Bar Model of Teaching Mathematics at IX Standard students in terms of the performance in the achievements tests in Mathematics with specific reference to certain selected variables. The specific objectives of the proposed study are

- To measure the Achievement in Bar Model and Conventional method in the IX Standard students performance in Mathematics, after teaching them through Bar Model and Conventional method.
- To find out the attitude of the IX Standard students towards Bar Model and Conventional method of Mathematics.

SAMPLE OF THE STUDY

The Sampling technique was random and respective. The sample consists of 70 students. Out of 70 students 35 students IX ‘A’ Class and 35 students IX ‘B’. in order to confine the present study to a specific age and Educational level that is only Secondary level is Considered in the Study.

IV. METHODOLOGY OF THE STUDY

This is a quantitative research employed the pre-experimental design. Samples were chosen based on Convenience sampling. The Pre-test, Post-test Equivalent Group Design was adopted as the research design. The sample is divided in to Control group and treatment group. The sample is chosen for the study consists control group of 35 Children’s of IX standard, treatment group for the Conventional Method of teaching and 35 students of IX standard for the Bar Model of teaching. The two group of students were chosen thorough equated parallel group. The Conventional Method Group (CMG) was taught the unit ‘Liner Equations in mathematics’ through the chalk and talk method and the Bar Model Group (BMG) was taught the same unit of mathematics through the Bar Model. An Achievement Test in Mathematics was employed for the purpose of data collection. The collected data were analyzed using descriptive and differential analyses.

TOOLS OF THE STUDY

Researcher developed the self-made Lesson plan by using Conventional method and Bar Model of the Mathematics on the Chapter linear Equations of IX std. Standardized Attitude tool collected.

V. RESULT AND DISCUSSION

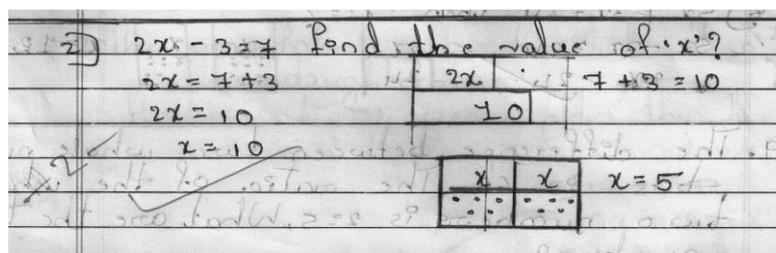
The conventional method and Bar model method of teaching Mathematics were compared with respect to Pre-test and Post-test achievement of IX std students in Mathematics, attitude and interest towards of IX standard students Mathematics by applying the independent/unpaired t test and the results of the same are presented in the following tables.

Null hypothesis (H0): There is No significant difference between conventional method and Bar model method of teaching Mathematics with respect to pretest achievement in Mathematics of IX standard students. To test the above null hypothesis, the independent/unpaired t-test was carried out and outcome of the test are presented in the table given below.

Table 1: Summary of independent/unpaired t-test between conventional method and Bar model method of teaching Mathematics with respect to pretest achievement in Mathematics of IX standard students.

Methods		n	Mean	SD	df	t -value	P-value
Conventional method	Pretest	35	12.74	1.82	68	0.7267	0.4699, NS
Bar model method		35	13.06	1.80			

The result of the above table clearly shows that, the calculated value of t test is 0.7267 and the critical value of t with 68 degrees of freedom at 5% level is 1.9600. It indicates that, the calculated value i.e. 0.7267 is smaller than 1.9600. It means that, no significant difference was observed between conventional method and Bar model method of teaching Mathematics with respect to pretest achievement in Mathematics of IX standard student. Therefore, the H₀ is accepted and H₁ is rejected. It concludes that, the pretest achievement scores in Mathematics of IX standard are similar in conventional method and Bar model method of teaching Mathematics.



Null hypothesis (H0): There is No significant difference between conventional method and Bar model method of teaching Mathematics with respect to posttest achievement in Mathematics of IX standard students.

To test the above null hypothesis, the independent/unpaired t-test was carried out and outcome of the test are presented in the table given below.

Table 2: Summary of independent/unpaired t-test between conventional method and Bar model method of teaching Mathematics with respect to posttest achievement in Mathematics of IX standard students.

Methods		n	Mean	SD	df	t -value	P-value
Conventional method	Posttest	35	13.11	1.83	68	17.7400	<0.001, S
Bar model method		35	26.06	3.91			

The result of the above table clearly shows that, the calculated value of t test is 17.7400 and the critical value of t with 68 degrees of freedom at 5% level is 1.9600. It indicates that, the calculated value i.e. 17.7400 is greater than 1.9600. It means that, a significant difference was observed between conventional method and Bar model method of teaching Mathematics with respect to posttest achievement in Mathematics of IX standard students. Therefore, the H_0 is rejected and H_1 is accepted. It concludes that, the posttest achievement scores in Mathematics of IX standard students is significantly higher in Bar model method of teaching Mathematics as compared to conventional method.

Null hypothesis (H0): There is No significant difference between conventional method and Bar model method of teaching Mathematics with respect to attitude scores towards achievement in Mathematics of IX standard students.

To test the above null hypothesis, the independent/unpaired t-test was carried out and outcome of the test are presented in the table given below.

Table 3: Summary of independent/unpaired t-test between conventional method and Bar model method of teaching Mathematics with respect to attitude scores towards achievement in Mathematics of IX standard students.

Methods		n	Mean	SD	df	t -value	P-value
Conventional method	Attitude	35	69.49	9.07	68	0.7991	0.4270, NS
Bar model method		35	71.11	7.94			

The result of the above table clearly shows that, the calculated value of t test is 0.7991 and the critical value of t with 68 degrees of freedom at 5% level is 1.9600. It indicates that, the calculated value i.e. 0.7991 is smaller than 1.9600. It means that, no significant difference was observed between conventional method and Bar model method of teaching Mathematics with respect to attitude scores towards achievement in Mathematics of IX standard students. Therefore, the H_0 is accepted and H_1 is rejected. It concludes that, the attitude scores towards achievement in Mathematics of IX standard students are similar in conventional method and Bar model method of teaching Mathematics.

Educational Implications

The following are the Educational implications of the study

- Bar model of Mathematics enables the students to think and work independently.
- It helps the students to learn Mathematics through concrete materials in an efficient and creative way.

- Children enjoy learning Mathematics subject as this Bar Model Suggests easy technique of solving problems.
- It saves time of Children as they solve the Mathematical concepts through pictorial representation very fast in a speedy way.
- The method helps the students to develop logical thinking, reasoning and visual impression.
- It Creates interest in children towards mathematics subject as they play with figures/adopt play way technique.
- Children enjoy the learning Mathematics subject which was considered as a boring and Scary.
- Mathematical concepts retain in the memory for longer period.
- Especially the Bar model of mathematics is helpful in particular age group, the decided period of 5-14 years is the best time which comes under the primary and Secondary students.

VI. CONCLUSION

The Experiment of this research indicates that the Bar Model will improve the Problem solving skill in the Students. It also helps the children to understand and better to visualizing and making sense a problem solving, using the rectangular bar. There is positive result impact not only on the research results also in attitude of Students. The research will prove the good effect of the Bar Model in comparison to that of the conventional method of teaching Mathematics at the secondary level. Bar model is beneficial for the students in improving their achievement level in Mathematics ability. The standard does not matter, if the students come under the category of Bar Model age group, the Bar Model learning improves their Brain power and Mathematical ability.

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