EFFECTIVENESS OF MULTIPLE INTELLIGENCE BASED TEACHING (MIBT) IN TEACHING MATHEMATICS FOR PRIMARY SCHOOL STUDENTS

By

P. XAVIER*   P. ANNARAJA**

ABSTRACT

Multiple Intelligence Based Teaching (MIBT) applies the multiple intelligence theory in the process of teaching and learning. MIBT explores and develops the intelligence of the students. Also it teaches the content in a multiple way to the students. The objective of the present study is to find out the effectiveness of multiple intelligence based teaching (MIBT) for teaching mathematics for primary school students. Equivalent group experimental design has been selected for conducting the experiment. For each control and experimental groups, 30 sixth standard students have been selected from a school in Karaikal. Finally the study concludes that the experimental group is better than the control group i.e., the Multiple Intelligence Based Teaching (MIBT) method is an effective method for teaching mathematics for primary school students than the traditional method of teaching.

INTRODUCTION

Intelligence is the ability to solve problems or to create products that are valued within one or more cultural settings. Intelligence is not unitary but rather comprises eight multiple intelligence: verbal linguistic intelligence, logical mathematical intelligence, visual spatial intelligence, bodily kinesthetic intelligence, musical rhythmic intelligence, interpersonal intelligence, intrapersonal intelligence and naturalistic intelligence. Each of this intelligence is a distinct module in the brain and operates more or less independently of the others. It is very important that a teacher take individual differences among learners very seriously. The bottom line is a deep interest in children and how their minds are different from one another and in helping them use their minds well. An awareness of multiple intelligence theory has stimulated teachers to find more ways of helping all students in their classes.

Gardner and Hatch (1989) discussed about the educational implications of the theory of multiple intelligence. In this, Gardner opposed the practices of traditional education system that typically place a strong emphasis on the development and use of verbal and mathematical intelligence. Blythe and Gardner (1990) proposed the process of implementation of multiple intelligence theory based instructional strategies for the schools. They stressed the urgency and importance of adopting this method in schools. Munro (1994) conducted a study on a model of individual ways of learning and its implications for Mathematics teaching. Constanzo and Paxton (1999) pointed out that multiple intelligence theory could be used in the classroom as a guide to provide a great variety of way for students to learn and to demonstrate their learning. As learners and teachers work together, intelligence can emerge naturally through interviews, preference grids and need assessments. Kuzniewski, (2002) conducted an action research project described a program for expanding multiple intelligence to increase reading comprehension in both English and Mathematics. A review of solution strategies and analysis of the problem setting resulted in the selection of two major categories of intervention, incorporation of multiple intelligence strategies combined with cooperative learning techniques in English and Mathematics units.

Generally, students' are afraid of studying mathematics. There are various reasons for this, method being one of them. Pupils tend to learn mathematics through a meaningful approach to mathematics rather than by a mechanical process. In order to make children learn

effectively the teacher has to adopt the right method of teaching. For choosing right method for a given situation, the teacher must be familiar with different methods of teaching. Already there are various methods of teaching mathematics. Even though, if we consider the individual difference and the influence of scientific and technological advancement, then the development of innovative methods of teaching mathematics are essential in teaching and learning of mathematics. Since Multiple Intelligence theory opens the door to a wide variety of teaching strategies that can be easily implemented in the classroom. Hence the present study focuses to find out the Effectiveness of Multiple Intelligence Based Teaching (MIBT) in teaching mathematics for the primary school students. The intelligence like verbal linguistic intelligence, logical mathematical intelligence, visual spatial intelligence, bodily kinesthetic intelligence, musical rhythmic intelligence, interpersonal intelligence, intrapersonal intelligence and naturalistic intelligence were considered for the development of MBIT.

Objectives of the study

1. To find out the level of performance of control and experimental groups in their gain scores.

2. To find out the difference between control and experimental group students in their gain scores.

Design of the experiment

Based on the objectives of the study, the investigator has selected the parallel design or equivalent group design for conducting the experiment. The investigator randomly selected 60 VI standard students from a high school at karaikal in Poncicherry. These students were grouped into two equivalent groups on the basis of their achievement in mathematics, which is obtained from the school records.

Tools used

Achievement test in mathematics for the VI standard students and Multiple Intelligence Based Teaching (MIBT) developed and standardized by the investigator has been used to collect the data.

Thomas Armstrong (1994) has defined the following

Intelligence	Instructional Strategies (examples)	Teaching Materials (examples)	Teaching Activities
Linguistic	Lectures, discussions, word games, storytelling, choral reading, journal writing	Books, tape recorders, type writers, stamp sets, books on tape.	Read about it, write about it, talk about it, listen to it.
Logical Mathematical	Brain teasers, problem solving, science experiments, mental calculation, number games, critical thinking.	Calculators, math manipulative, science equipment, math games.	Quantify it, think critically about it, put it in a logical framework, experiment with it.
Spatial	Visual presentations, art activities, imagination games, mine-mapping, metaphor, visualization.	Graphs, maps, video, Logo sets, art materials, optical illusions, cameras picture library	See it, draw it, visualize it, color it, mind-map it
Bodily-Kinesthetic	Hands-on learning, drama, dance, sports that teach, tactile activities, relaxation exercises	Building tools, clay, sports equipment, manipulative, tactile learning resources	Build it, act it out, touch it, get a "gut feeling" of it, dance it
Musical	Rhythmic learning's, rapping, using songs that teach	Tape recorder, tape collection, musical instrucments	Sing it, rap it, listen to it
Interpersonal	Cooperative learning, peer tutoring, community involvement, social gatherings, simulations	Board games, party supplies, props for role plays	Teach it, collaborate on it, interact with respect to it
Intrapersonal	Individualized instruction, independent study, options in course of study, self-esteem building	Self-checking materials, journals, materials for projects	Connect it to your personal life, make choices with regard to it, reflect on it
Naturalist	Nature study, ecological awareness, care of animals	Plants, animals, naturalists' tools (e.g., Binoculars) gardening tools	Connect it to living things and natural phenomena

Table 1. Multiple intelligence activities, materials and strategies

teaching activities, teaching materials and instructional strategies for multiple intelligences based teaching.

Development of multiple intelligence based teaching

Based on Table 1, the investigator has derived the activities for these multiple intelligence to develop MIBT. To develop the MIBT, the investigator has selected the topics like profit and loss, measures or time and basic geometrical points from VI standard mathematics. Considering the theory of Multiple Intelligence some relevant activities have been constructed by the investigator for each and every intelligence. The following table gives some sample of multiple intelligence activities.

SL. NO.	Multiple Intelligence	Multiple Intelligence Activities
1.	Linguistic Intelligence	read, write, discuss the problems, solve word puzzles, math riddles, word games, write poems, formula and write the symbols
2.	Logical-mathematical intelligence	analyze the problems (What is given? What is to be found?), Solve the problems, solve number puzzles and solve the problems by mental calculation
3.	Spatial Intelligence	show pictures, diagrams and shapes, draw pictures, diagrams, graphs and shapes, solve picture puzzles, Jig sag puzzles, graphical puzzles
4.	Bodily kinesthetic intelligence	construct models, touch figures, shapes and models, act in a situation (drama, role play etc.)
5.	Musical Intelligence	play music, sing the song related to the topic, tell the poem
6.	Interpersonal intelligence	group discussion, group assignments, role play, play board games
7.	Intrapersonal intelligence	construct problems by self, connect the classroom problems in to the personal life, give assignments and homework
8.	Naturalistic intelligence	connect with nature

Table 2. Sample of Multiple intelligence Activities

Based on these core activities, more number of MI activities can be generated to teach a particular content. For example,

1. Linguistic Intelligence:

Ex: a) The teacher asks the students to write the problem

b) The teacher asks the students to read the problem and

c) The teacher asks the students to tell the formula etc.

2. Logical mathematical intelligence:

Ex: a) The teacher asks the students to find the reason "Why?"

b) The teacher asks the students to analyse the problem?

i.e. What is given in the problem?

What is to be found?

c) The teacher asks the students to solve the problem

d) The teacher asks the students to find the solution for a puzzle

3. Spatial Intelligence

Ex: a) The teacher asks the students to draw a triangle

B) The teacher asks the students to solve the picture puzzles

c) The teacher asks the students to arrange the zig zag

pictures

d) The teacher asks the students to measure the plane

e) The teacher asks the students to create an environment of a fruit stall

4. Bodily Kinesthetic Intelligence

Ex: a) The teacher asks the students to touch the shapes

b) The teacher asks the students to paint a picture

c) The teacher asks the students to construct a model

d) The teacher asks the students to measure the plane

e) The teacher asks a student to act as a shopkeeper

5. Music Intelligence

Ex: a) The teacher asks the students to sing a song "triangle"

b) The teacher asks the students to listen music

c) The teacher asks the students to act a drama with background music

6. Interpersonal Intelligence

Ex: a) The teacher asks the students to solve the problems in the group

b) The teacher gives a discussion to the students

c) The teacher gives a project to the students

7. Intrapersonal Intelligence

Ex: a) The teacher asks the students to construct the problems

b) The teacher gives homework to the students

c) The teacher gives a project to the students

8. Naturalistic Intelligence

Ex: a) The teacher asks the students to find the relations from the real life situations

b) The teacher asks the students to find the seasons in terms of month.

c) The teacher asks to collect the real life situations for profit and loss.

Like these activities the investigator has developed three activities for each intelligence with the help of various resources like text book, puzzle books, magazines etc.

Conducting the experiment

Pre-test was administered to both control and

Group	Low		Moderate		High		Total
	N	%	N	%	N	%	
Control Group (N=30)	6	20.00	21	70.00	3	10.00	30
Experimental Group (N=30)	3	10.00	19	63.33	8	26.67	30

Table 3. Level of gain scores of control and experimental group students

Group	Mean	S.D	Calculated 't' value	Remarks at 5% level
Control Group (N=30)	4.20	1.22	8.09	Significant
Experimental Group (N=30)	7.13	1.56		

(At 5% level of significant the table value of 't' is 1.96)

Table 4. Difference Between Control and Experimental Group Students in their Gain Scores

experimental group students. After conducting the pre-test to the both control and experimental groups, the control group was taught the lessons by traditional method. For the experimental group students the investigator had used the Multiple Intelligence Based Teaching (MIBT). The treatment was given for 10 days and finally the post-test was given to both the groups.

Analysis of Data

The collected data were subjected to the following statistical analysis to arrive the meaningful conclusion.

It is inferred from the above table that in the control group, 20% students have low level, 70% of them have moderate level and 10% of them have high level of gain scores. In the experimental group, 10% of students have low level, 63.33% of them have moderate level and

Objectives	Groups	N	Mean	S.D	Calculated 't' value	Remarks at 5% level
Knowledge	Experimental Group	30	1.60	0.66	4.24	Significant
	Control group	30	0.80	0.79		
Understanding	Experimental Group	30	1.67	0.70	3.99	Significant
	Control group	30	0.97	0.66		
Applications	Experimental Group	30	1.70	0.74	3.00	Significant
	Control group	30	1.17	0.64		
Skill	Experimental Group	30	2.27	0.93	4.44	Significant
	Control group	30	1.27	0.81		

(At 5% level of significant the table value of 't' is 1.96)

Table 5. Difference Between Control And Experimental Group Students In Their Gain Scores For the Attainment Of Knowledge, Understanding, Application And skill Objectives

26.67% of them have high level of gain scores.

Null Hypothesis 1.1

There is no significant difference between control and experimental group students in their gain scores.

It is inferred from the above table that the calculated 't' value 8.09 is greater than the table value 1.96. Hence the null hypothesis is rejected. That is, there is significant difference between control and experimental group students in their gain scores.

Null Hypothesis 1.2

There is no significant difference between control and experimental group students in their gain scores for attainment of knowledge, understanding, application and skill objectives.

It is inferred from the above table that there is significant difference between control and experimental group students in their gain scores for the attainment of knowledge, understanding, application and skill objectives.

Conclusion

The 't' test result reveals that the experimental group students are better than the control group students in their gain scores. This may be due to the fact that the Multiple Intelligence Based Teaching (MIBT) of mathematics is more effective than the traditional method of teaching mathematics. Multiple Intelligence based teaching helps the students to improve their achievement in learning mathematics. Moreover, this method provides opportunity to develop their multiple capabilities of learning.

The 't' test result shows that the experimental group students are better than the control group students in their gain scores for the attainment of knowledge, understanding application and skill objectives. This may be due to the fact that the Multiple Intelligence Based Teaching (MIBT) has developed the readiness of the students to acquire the knowledge of mathematics. Also it motivated the students to understand the concepts easily, since this method gave pleasurable values in learning mathematics. Also it provides eight different

potential pathways in learning and to develop the various skills in mathematics. So the experimental group is better than the control group in the attainment of knowledge, understanding, application and skill objectives.

In general, Multiple Intelligence Based Teaching (MIBT) is an effective method in teaching and learning mathematics among primary school students. This method inspired the exploration of multiple intelligence, nurtured and used various strategies, properties and relationships in learning mathematics. So the Multiple Intelligence based teaching is very useful in teaching and learning mathematics to the primary school students.

Reference

[1]. Armstrong. T. (1994), *Multiple Intelligence in the Classroom,* Second Edition, Association for Supervision and Curriculum Development, Alexandria.

[2]. Gardner, H., & Hatch, T. (1989). *Multiple intelligences go to school: Educational implications of the theory of multiple intelligences*. Educational Researcher, *18*(8), 4-9.

[3]. Costanzo, M., & Paxton, D. (1999). *Multiple assessments for multiple intelligences*. "Focus on Basics, 3"(A), 24-27.

[4]. Munro,J.(1994) *Multiple Intelligence and Mathematics Teaching*, January (ERIC Document No. Ed372927)

[5]. Kuzniewski. F (2002) *Using Multiple intelligence to increase reading comprehension in English and Math*, ERIC Document No. Ed420839

[6]. Blythe, T & Gardner, H.(1990) *A school for all intelligences*, Educational leadership, 47(3), 33-37.

[7]. Http://www.thirteen.org/edoline/concept2class/mi

[8]. http://www.ipride.net/mi.htm

[9]. http://www.cookps.act.edu.au/mi.htm

[10]. http://www.gigglepotz.com/mi8.htm

ABOUT THE AUTHORS

* Lecturer in Mathematics, Department of Education, Karunya University, Coimbatore.

** Reader in Mathematics, St. Xavier's College of Education, Palayamkottai.

Mr. P. Xavier is working as a Lecturer in Mathematics Education in the Department of Education, Karunya University, Coimbatore. He has published few research articles in the area of mathematics education. He is specialized in the areas of Mathematics Education and Information and Communication Technology. He can be reached at xavimath@cheerful.com

Dr. P. Annaraja is working as a Reader in Mathematics Education, St. Xavier's College of Education (Autonomous), Palayamkottai. He is specialized in the areas of Psychology of Education and Information and Communication Technology. So far he has guided 7 Ph.D. Scholars and number of M.Phil. and M.Ed. Students. He has served as a Resource Person for various national and international level programmes. He has published three Monographs and is serving as an Editor for the Journal of Research and Reflections. He is available at alannaraja2004@yahoo.com