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Effect of Multimedia Package on Enhancing the Learning of Real Numbers among IX Standard Students

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ABSTRACT

In mathematics, a real number is a value that represents a quantity along a continuous line. Multimedia helps in development of higher order thinking skills. Interactive multimedia encourages students to seek information, apply knowledge and re-attempt tasks (based on feedback given), behaviours that are associated with higher order learning. Hence in this study multimedia approach of teaching real numbers in mathematics for IX standard students were studied. The sample of the study consisted of 80 students studying in IX standard in two schools of Chennai district. The design opted was pretest and posttest for single group design. Results revealed that there is significant difference between pre test and post test score of experimental group students in Mathematics. Moreover, both male and female are similar in their mathematics achievement. It is also inferred that Government and private school students of IX standard differ in their achievement in mathematics. The educational implications for teaching Mathematics through multimedia approach have been discussed.

Keywords: *Multimedia, Real numbers in Mathematics, Achievement in Mathematics, IX standard students.*

INTRODUCTION

Education develops the personality of an individual in all fields and aspects making him intelligent, learned, bold, and courageous and possessing strong good character much in the same way. The term "Mathematics" may be defined in a number of ways. It is an exact science which is related to measurements, calculations, discovering relationships and dealing with the problems of space[5]. The chief characteristics of discipline are simplicity, accuracy, certainty of results, originality, reasoning and correlation of the teaching of the subject with the problems of life. All these characteristics are developed to a large extent by the teaching of mathematics so teaching of mathematics fulfils this aim of education.

REAL NUMBERS

In mathematics, a real number is a value that represents a quantity along a continuous line[1]. The real numbers include all the rational numbers, such as the integer -5 and the fraction 4/3, and all the irrational numbers such as √2 (1.41421356… the square root of two, an irrational algebraic number) and π (3.14159265…, a transcendental number). Real numbers can be thought of as points on an infinitely long line called the number line or real line, where the points corresponding to integers are equally spaced. Any real number can be determined by a possibly infinite decimal representation such as that of 8.632, where each consecutive digit is measured in units one tenth the size of the previous one. The real line can be thought of as a part of the complex plane, and correspondingly, complex numbers include real numbers as a special case.

A Real definition: The definition of real numbers is often not helpful to the average person who is trying to gain an introductory and intuitive sense of what a real number.

Real numbers are just the numbers on the number line.

It is the easiest way to think of them. Basically, if you can put the number in question on an infinitely big number line, then it is a real number. Also, you have to be adding, subtract, multiply, divide that number in a way that is consistent with the number line. They include many types of numbers:

- A real number is any positive or negative number. This includes all integers and all rational and irrational numbers. Rational numbers may be expressed as a fraction (such as 7/8) and irrational numbers may be expressed by an infinite decimal representation (3.1415926535...). Real numbers that include decimal points are also called floating point numbers, since the decimal "floats" between the digits[6].
- Real numbers are relevant to computing because computer calculations involve both integer and floating point calculations. Since integer calculations are generally simpler than floating point calculations, a computer's processor may use a different type of logic for performing integer operations than it does for floating point operations. The floating point operations may be performed by a separate part of the CPU called the floating point unit, or FPU.

Types of Real Numbers with examples

- **Rational Numbers:** in other words all integers, fractions and decimals (including repeating decimals)
  ex: 2, 3 -2, ½, -¾ , .34
- **Irrational Numbers:**

$\sqrt{3}$, $\sqrt{5}$, yes, irrational numbers can be ordered and put on a number line, we know that $\sqrt{3}$ comes before $\sqrt{11}$

Properties of Real Numbers: Real numbers can be ordered (this is not true, for instance, of imaginary numbers)

They can be added, subtracted, multiplied and divided by nonzero numbers in an ordered way. So what does that mean? Basically it means that $\sqrt{3}$ comes before $\sqrt{11}$ on the number line and that they both come before $\sqrt{3} + \sqrt{11}$. We know that this fact is true for rational and irrational numbers. Think about the rational numbers 3 and 5, we know that we can order 3 and 5 as follows. 3 comes before 5 and both numbers come before 8(3+5)

VARIOUS STAGE IN MULTIMEDIA PACKAGE TO TEACH MATHEMATICS.

Multimedia approach calls for the use of more than one media in the teaching-learning process[2]. It is imperative that a judicious mix of the several possible media available needs to be done. The following are the six stages to be followed while adopting the Multimedia approach.

- Stage 1 → Initiates teaching learning Activities
- Stage 2 → demonstrates a specific and specialized portion to be taught
- Stage 3 → Preparing the students to embark on Independent Learning
- Stage 4 → Students interaction and active participation in that Content
- Stage 5 → Effective integration of Multimedia in that particular Content and practices in the same

USES OF MULTIMEDIA PACKAGE IN MATHEMATICS TEACHING

- Multimedia can take into account different learning styles – some students learn by interpreting text, while others require more graphical or aural representations.
- Multimedia helps in development of higher order thinking skills. Interactive multimedia encourages students to seek information, apply knowledge and re-attempt tasks (based on feedback given), behaviours that are associated with higher order learning.
- Multimedia provides the students the flexibility of 'anywhere', 'any time' learning.
- Multimedia helps in developing group and interpersonal skills. Better communication between students via e-mail, chat sessions, etc., can encourage collaborative learning and enhance student/teacher interactions.
- Multimedia helps students to learn the content in a given discipline. It helps students to think effectively, practice problem solving and decision making.

THEORETICAL FRAMEWORK:

Theorizing Technology – Enriched Mathematics Teaching: The present study builds on a research program informed by socio-cultural theories of learning involving teachers and students in secondary school mathematics classrooms. The theoretical framework for the study

is based on the zone framework extends Vygotsky's concept of the Zone of Proximal Development (ZPD) to incorporate the social setting and the goals and actions of participants. Valsiner (1997) describes two additional zones: the Zone of Free Movement (ZFM) and Zone of Promoted Action (ZPA). The ZFM represents constraints that structure the ways in which an individual access and interacts with elements of the environment. The ZPA comprises activities, objects, or areas in the environment in respect of which the individual's action are promoted. For learning to be possible the ZPA must be consistent with the individuals possibilities for development (ZPD) and must promote action that are feasible within a given ZFM. When we consider teacher's professional learning involving technology, the ZPD represents teacher's knowledge and belief about mathematics, mathematics teaching and learning, and the role of technology in mathematics education. The ZFM can be interpreted as constraints within the school environment such as students (their behavior, motivation, perceived abilities), access to resources and teaching materials, curriculum and assessment requirements, and organizational structures and culture, whereas the ZPA represents formal and informal opportunities to learn, for example, from secondary school students, pre-service teacher education, professional development, and colleagues at school.

PURPOSE OF THE STUDY

Information and communication technology have brought new possibilities into school education. Information and communication technologies exemplified by the Internet and interactive multimedia are obviously of great significance for mathematics learning. The positive attitude among teachers and learners towards Information and Communication Technology can promote the usage of Internet and other tools of ICT and Multimedia in the teaching-learning process effectively. Hence, in this context, it is essential to know how the role of Information and Communication Technology can promote the usage of Internet and other ICT tools to enhance the Mathematics achievement especially on real numbers of IX standard students.

OPERATIONAL DEFENITION

Real Numbers: A real number is any positive or negative number. This includes all integers and all rational and irrational numbers. Rational numbers may be expressed as a fraction (such as 7/8) and irrational numbers may be expressed by an infinite decimal representation (3.1415926535...). Real numbers that include decimal points are also called floating point numbers, since the decimal "floats" between the digits.

Academic achievement: Academic Achievement as a systematic procedure for determining the amount a student has learned through instruction. Knowledge attained or skills developed in the school subjects, usually designated by test scores or by marks assigned by teachers.

Gender: Gender is also considered as a variable which assess the effectiveness through multimedia package among the students. Here the investigator considers gender as independent variable. There are two levels of gender male and female.

RESEARCH QUESTIONS

1. Is there any significant difference between pretest and posttest of experimental group students?
2. Is there any significant difference between male and female in post-test of Mathematics achievement?
3. Is there any significant difference between government and private school students in post-test of Mathematics achievement?

MATERIALS AND METHOD

The sample of the study consisted of 80 students studying in IX standard in two schools of Chennai district. The investigator had chosen two schools through stratified random sampling technique, one is Government school and another is private school. In Government school 50 students were chosen from 125 students through random sampling procedure. In private school 30 students were chosen from 85 students through random sampling procedure. The sample was selected by using random sampling technique. The sample consists of both boys and girls. The sample forms a representative sample of the entire population on the basis of their scores in achievement in mathematics. The present study was experimental in nature. The design opted was pretest posttest single group design. The layout of the experiment is as follows.

$$O_1 \xrightarrow{X} O_2$$

(Pre test) (Micro flash version 6) (Post test)

To develop mastery over the content in real numbers in mathematics subject has been taught in non-routine way. The investigation had developed the multimedia package for the following topics: Introducing the topic, Decimal representation of the Rational Numbers, Irrational Numbers and Real Numbers, Surds and four basic operations on Surds, Rationalization of Surds and Division algorithm. The experiment group sample of 80 students were taken to the hall were the projector is fixed. These students were taught with multimedia package way of instructions. Corrective feedback was given wherever necessary. When any point was not learnt additional time was given and the media material was screened once again wherever necessary. The treatment was given for 45 minutes per day by the investigator for ten days.

The schematic representation of the activities done by the investigator is given below.

Table 1: Scheme of Experimentation

S. No.	No of days	Activity	Description
1.	1st day	Pre testing	Pretest of achievement test in mathematics was conducted in one class period 45 minutes.
2.	2nd day	Introducing the Real Numbers and Decimal Representation of the Rational numbers.	1 day recalling about real numbers and types of numbers. 1 day explaining the concept of Rational numbers in decimal form.
3.	3rd day	Irrational and Real Numbers.	1 day teaching the Irrational numbers. 1 day teach with suitable examples. 1 day solve the problems by the students.
4.	5th day	Surds	1 day explain about surds.
5.	6 & 7th day	Four basic operations on Surds.	2 days explaining the surds and the four basic concept about surds.
6.	8 & 9th day	Rationalization of Surds and Division algorithm	1 day to teach and explain with suitable examples. 1 day to give exercise problems for practice.
7.	10th day	Post testing	Posttest of achievement in mathematics test was administered in one class period 45 minutes.

In this way the whole experiment was conducted 10 days at the rate of 45 minutes per day. It also includes in the multimedia package the text, animations, video, graphics and sound in an effective manner.

FINDINGS AND DISCUSSION

Question 1

Table 2: Mean differences between pretest and posttest of experimental group students

Test Group	N	Mean	S.D.	df	t	Level of significance
Pretest	80	76.6	12.85	79	12.735	0.001** S
Post test	80	90.4	7.30			

It was found that there is significantly difference between pretest and post test score of achievement in Mathematics. As post test mean score of achievement in Mathematics was found to significantly higher than the pre test mean score of achievement in Mathematics. This finding corroborate with the findings of Dhevakrishnan and Deviand Chinnaiyan (2012), were researchers studied effectiveness of computer assisted instructions (CAI) in teaching of mathematics at secondary level adopted experimental method3 and observing the difference between (CAI) and traditional method. Findings of the study clearly point out that significant increase in the mean gain scores has been found in the post test scores of the experimental group.

Question 2

Table3: Mean difference between male and female in post-test of Mathematics achievement

Gender	N	M	S.D	df	t-value	Level of significance
Male	35	89.71	7.65	78	0.739	Not significant
Female	45	90.93	7.05			

It was found that post test mean score of achievement in Mathematics was not significant difference between male and female IX standard students. It means both male and female are similar in their mathematics achievement. This finding was the mirror finding of Javed Mustafa et al ., (2011) in their experimental study about games-based teaching approach[4], were both male and female students are similar. This finding contradict with Wu-Yuin Hwang, Nian-Shing Chen et al., (2006) found that the performance of female students[7] was superior to male students in communications and mathematical problem solving.

Question 3

Table 4: Mean differences between Government and Private school students in post-test of Mathematics achievement

Type of Institution	N	M	S.D	df	t-value	Level of significance
Government	50	89.04	8.15	78	2.203	0.005* S
Private	30	92.67	4.94			

It was found that Government and private school students of IX standard differ in their achievement in mathematics scores. The Private school students possess higher achievement in mathematics scores than the Government school students.

EDUCATIONAL IMPLICATIONS OF THE STUDY

- At secondary level, the major features is the diversified curriculum, the teacher may be assigned a subject other than his interest. The diversity of interest and curriculum necessities the application of Multimedia package. It may be used on remedial teaching. The classroom teaching may be followed by this strategy.
- Multimedia allows for self-pacing and discovery. Students can take the time they need and choose the path of learning, making learning meaningful and pleasurable.
- It helps in development of higher order thinking skills. Interactive multimedia encourages students to seek information, apply knowledge and re-attempt tasks, behaviors that are associated with higher order learning.
- It provides the students the flexibility of 'anywhere', 'anytime' learning.
- It helps in developing group and interpersonal skills. Better communication between students via e-mail, chat sessions etc., can encourage collaborative learning and enhance students/teacher interactions.
- Multimedia helps students to learn the content in a given discipline. It helps students to think effectively, practice problem solving and decision making.

CONCLUSION

The development of Multimedia package is the latest technology in the communication network which enhances the various aspects of innovative strategy in sharing and interchanging information through web of mass media. It has been proved by this research that multimedia in secondary schools are effective for students to learn both 'from' and 'with it'. The focus is now on media and technology because of their advantages in terms of repeatability, transportability and equity of access. Thus, Multimedia helps students to construct knowledge actively, work in groups and use multi-senses at a time for learning Real Numbers in Mathematics.

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