Chapter I

Introduction

1.0 Introduction:

The question why we teach mathematics is important from more than one point of view. The answer to this question depends on what we should teach in the subject and how we should teach it. It is known that the ‘WHAT’ and ‘HOW’ have always been governed by the ‘WHY’. ‘WHAT’ concerns with the curriculum. ‘HOW’ concerns with the objectives and the processes of thinking. Human brain is used for thinking. The ability to think and reason is the most precious possession of the human brain. Therefore, one should develop the capacity to think, reason and understand.

The National Policy on Education (1986) has also considered the importance of mathematics in general education and suggests that ‘mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically. Apart from being a specific subject it should be treated as concomitant to any subject involving analysis and reasoning’. In the recent past there have been tremendous developments in theories of learning and the science of teaching. Though mathematics occupies a place of importance, the researches in this area have been scanty.

Technology has entered the portals of our life in a big way and will continue to stay for times to come in modified packages. When technology is impacting each and every domain of life education has also been largely influenced by technology. Educational Technology, in its wide sense as understood today, includes “The development, application and evaluation of system, techniques and aids in the field of learning”. Technology is very much
essential in the field of education. It is thoughtful ideas regarding the usage new scientific inventions in the field of education.

In today’s world teachers need to be equipped not only with subject-specific expertise and effective teaching methodology, but with the capacity to assist students to meet the demands of the emerging knowledge-based society. Teachers therefore require familiarity with new forms of information and communication technology and need to have the ability to use that technology to enhance the quality of teaching and learning. Educational Technology involves applying ideas from various resources to create the best learning environments possible for students.

Educational Technology helps teacher to perform his task in effective and efficient manner. It helps the teacher to find and develop new systems, processes and strategies to achieve educational objectives to its maximum level in effective and efficient manner. Educational Technology enables the teacher to make sensible and systematic use of computer, over head projector, LCD projector, slide projector etc. Educational Technology provides the scope of using principles and theories of psychology, the application of the technology and knowledge of other disciplines to enrich the teacher in the process of attainment of set goals. It helps the teacher in the development of cognitive, affective and Psycho-motor abilities of the learners.

The latest and biggest contribution of technology to the field of education is computers. Computers are the new teachers that communicate messages worldwide through image and sound. The use of computers in education has grown from computer-aided instruction systems and then to micro worlds.

The computer can be used as a tool in extending our mental capabilities. In this sense, it is different from the other tools but basically, its purpose is to make life simpler, easier and generally give up the freedom to use our time in activities of our choice. Further, it can be used in normal as well as handicapped and learning disabled classes Computers can never replace teachers. A teacher always plays a very important role in the teaching-learning process and computers will have to be used as teaching aids. Using quality educational software packages, good learning environments can be created in schools. Control free software packages, like a power point presentation, a data base programme, word processing
programme, etc., will find extensive applications in the whole curricular area of schools. The above mentioned software packages can be used as tools by teachers and students. Teaching by computer has been known by many names: Computer-Based Instruction (CBI), Computer-Assisted Instruction (CAI), Computer-Assisted Teaching (CAT) etc.

An application of the Educational Technology in the field of education now a day’s seems at the bottom level, trend of using computer in the schools is increasing, but still it is not at the satisfactory level. The present study is concerned with the construction and implementation of computer assisted teaching programme on the achievement of students of standard IX in mathematics.

1.1 Goal of teaching of mathematics:

The process of education can be kept on right lines only with the help of clear-cut aims. Aimlessness in teaching would result in the wastage of time, energy and other resources. According to Kulbir Singh Sidhu-

“Knowledge of educational values helps the teacher to avoid aimlessness in teaching. Value is the spring board of aim and vice-versa.” ¹

There are three main values of mathematics, Practical or utilitarian value, Disciplinary value, Cultural value. Aim will be based on the educational values of the subject. One can prepare a long list of goals of teaching mathematics. These aims pertain to the entire school stage. Apart from enabling the student to acquire essential mathematical knowledge, skills, interests and attitude, the teaching of mathematics has to help them in many ways. Aims of teaching mathematics are as follows-

Utilitarian aim:

Mathematics will be taught primarily for its practical values and aims. The students will be given mathematical knowledge and skills needed in his day-to-day life and enabled to make use of that knowledge and skill. This aim makes the study of mathematics functional and purposeful and establishes relation between the subject and practical life.
Disciplinary aim:

The subject has also to be taught for its disciplinary and intellectual values. It has to aim at providing training to the mind of the learner and developing intellectual habits in him.

Cultural aim:

This aim helps the learner to understand the contribution of mathematics in the development of civilization and cultural.

It has enabled him to understand the role of mathematics in fine arts and in beautifying human life.

Adjustment aim:

It is help the learner to develop a healthy, purposeful, productive, exploratory and controlling adjustment with environment.

Social aim:

It is to help the learner to imbibe essential social virtues.

Moral aim:

It enables the learners to imbibe the attribute of morality.

Aesthetic aim:

It is to develop their aesthetic sensibilities, meet their varying interest and help them in the proper utilization of their leisure time.

International aim:

To develop in them international outlook and understanding.

Vocational aim:

It is to prepare them for technical and other vocations where mathematics is applied.
Inter-disciplinary aim:

To give them insight into the application of mathematics in other subjects.

Self-education aim:

It is to help them to become independent in learning.

Educational preparation aim:

It is to prepare them for higher education in science, engineering, technology, etc.

Development of powers aim:

It pertains to the development of powers of thinking, reasoning, concentration, expression, discovery, etc.

Harmonious development aim:

Ultimately the overall aim of teaching all the subjects including mathematics is to ensure all-round and harmonious development of the personality of the child.

1.2 Justification of the present study:

Students who are good in mathematics consists one of the nation’s most valuable assets. The future of any nation depends upon the students who are good in mathematics. Hence mathematics is an important subject for development of a country. So mathematics teaching is also very important.

According to Mohammad Miyan in a trend report

“The commission points out that, 'In the teaching of mathematics emphasis should be more on the understanding of basic principles than on the mechanical teaching of mathematical computations. Commenting on the then prevailing situation in schools, it observed that in the average school today instruction still conforms to a mechanical routine, continues to be dominated by the old besetting evil of verbalism and therefore remains as dull and uninspiring as before.” ²
This remark shows that there is a scope of research in mathematics teaching. The traditional didactic method of teaching is no longer adequate to meet the demands of mathematics education in line with National Education Policy 1986. In the light of National Education Policy 1986, to develop the skills reiterated in the policy and to provide practical experience of mathematical concepts, assumption, assertions and rules an appropriate method of instruction or a suitable platform to use such strategies is the need of the hour.

In the recent years Media and Educational Technology are being employed to revitalize the entire education system all over the world. In India, the National Policy on Education (NPE) 1986 has emphatically emphasized that “Educational Technology” will be employed in the spread of useful information, the training and retraining of teachers, to improve quality education, sharpen awareness of arts and culture, inculcate abiding values, etc., both in the formal and non-formal sectors.

Further to promote ET in schools Government of India initiated ET scheme since 1972. Under this scheme, Colour Television (CTVs) and Radio-cum-Cassette Players (RCCPs) have been supplied in primary and upper primary schools (88,178 CTVs and 4,15,709 RCCPs) identified by respective State Governments along with the order materials and equipments (Source: Annual Reports- 2001-02, MHRD, GOI).

The National Curriculum Framework- 2005 states that the significant of ET as a site for curriculum planning has been widely recognized, but detailed guidance and strategies for its educationally optimum use have not yet been worked out.

Integration of knowledge and experience stated above would take away the sense of burden and boredom which our present-day education induces. In Mathematics the potential of computers and ICT is widely appreciated. It is important to realize this potential to achieve curricular goals, with more age-specific planning on use of ET. Governments and other agencies responsible for financial planning need to take this fuller range of ET’s demands and benefits.

We all are aware that the future of India is being designed in the classroom of our schools. We talk about the ideals of Education but in reality a little work has been done for the student community. Now a day’s teacher is confined with only chalk and duster but on the other side he has failed to make the subject interesting and innovating. We can bring a
change and innovation in the classroom teaching in future. Science has given many teaching aids and now time has come to present the real environment in the classroom. This can only be possible when the teachers are made aware of such teaching aids like Computer.

   Every country is developing through the advancement of Mathematics. To make our learners accurate and confident teaching of Mathematics becomes the demand of the time. Human are benefited by the practical advantage of Mathematics. We are quite aware of the role of education. The role of education is to develop the individual intellectually. In our school curriculum teaching of Mathematics develops intellectual capacity of the learners and develops modern intellectual society.

   After seeking independence many commission and committees worked for the teaching of Science. The Secondary Education Commission (1953), UNESCO planning (1963), recommended for the teaching of Mathematics as well as Science. It was made compulsory as a part of general education. Science is core subject.

   CAT is one of the devices of IT, which has great importance in the field of education. And with its advantages of giving drilling, simulation, tutorial and gaming, it makes teaching and learning more interesting and encouraging for the students. At present the number of student in classroom are increasing very fast and now it is becoming overcrowded. The over crowdedness of the class has changed the teacher and the student ratio. It has made the condition of classroom worse. Even it has made it difficult for the teachers to give proper attention to the students. This situation can be dealt with the help of Computer Assisted Teaching Programme. Computer Assisted Teaching Programme is more advantageous to both students and teachers. It also allows teacher to give attention to an individual student. The researcher has selected ten topics of Mathematics of IX standard. CATP helps to decrease the abstract nature of mathematics. It makes the subject interesting. CATP is interesting and joyful for learner. The learner acquires a clear understanding of the subject.

   Present study is concerned with the development and implementation of computer assisted teaching programme. Also in this study investigator checks the effect of this programme on student’s achievement in mathematics.
1.3 Title of the study:

The problem under study could be stated as:

“A study of the effect of Computer Assisted Teaching programme on the achievement of the students of standard IX in mathematics”

This study was an experimental study. This attempt to develop and check the effect of Computer Assisted Teaching Programme in the teaching of Mathematics is supposed to be different from other researchers conducted in this university as per knowledge of the researcher.

1.4 Key word and their meaning:

(i) Effect

For the present study, Effect refers to bringing out of the result intended. Here effect means the effect of computer assisted teaching programme on the achievement of the students of standard IX in mathematics.

(ii) Computer Assisted Teaching Programme :( CATP)

For the present study, Computer Assisted Teaching Programme is a teaching programme recorded on a C.D .which is constructed on the basis of power point presentation. This can be presented through computer. The CATP was prepared on selected 10 units of Mathematics for the students of std. IX.

(iii) Achievement:

According to Encyclopedia of Education

“Achievement is generally used in the sense of acquired abilities to do, capacity to do or tendency to do.” ³
According to International Dictionary of Education

“Performance in school or college in a standardized series of educational tests. The term used more generally to describe performance in the subject of the curriculum.” 4

(iv) Standard-IX :

For the present study, the word standard-IX means:

Standard-IX is the second standard of secondary school of Gujarat state.

(iv) Mathematics:

According to International Dictionary of Education

“Mathematics is a science of magnitude and number.” 5

“Mathematics is the process of defining ideas, words, which we have to use to describe the world, understanding, the simple universal rules which have been discovered by those before us, connecting facts and events and learning logical methods of combining the simple rules to understand and predict complex phenomena.” 6

For the present study, the word Mathematics means: One of the compulsory subjects which are taught to the students of std. IX, prescribed by Gujarat State Board of School Textbooks, Gandhinagar.

Mathematics is such a school subject through which the mental faculty of human being is developed to think logically. Therefore, it is a must subject in education system.

1.5 Variables:

One of the objectives of the study is to study effect of CATP on the student’s achievement toward mathematics. So, treatment was chosen as an independent variable.

Several studies have shown that sex is an important biological factor that influences other variable like achievement. Hence, sex was taken as independent variable.
Intelligence quotient is an effective variable in nurturing the achievement of the students. So I.Q. was taken as independent variable.

Socio- Economic factors like standard of living, parent income and parental education have much influence on student’s achievement and his school performance. Hence, social economical status was also chosen as an independent variable.

Thus, there are four independent variables each of two levels. Achievement is the dependent variable. The details of these variables are shown in table 1.1

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the variable</th>
<th>Nature of the variable</th>
<th>Number of level</th>
<th>Name of the level</th>
</tr>
</thead>
</table>
| 1       | Treatment(CATP)*     | Independent            | 2               | 1. Experimental(A_1)  
|         |                      |                        |                 | 2. Control (A_2)    |
| 2       | Sex                  | Independent            | 2               | 1. Boys(B_1)       
|         |                      |                        |                 | 2. Girls (B_2)      |
| 3       | IQ*                  | Independent            | 2               | 1. High IQ(C_1)   
|         |                      |                        |                 | 2. Low IQ(C_2)      |
| 4       | SES*                 | Independent            | 2               | 1. High SES(D_1)  
|         |                      |                        |                 | 2. Low SES (D_2)    |

Achievement is considered as dependent variable.

* CATP: computer assisted teaching programme, I.Q: Intelligence Quotient, SES: Social Economical Status
1.6 Objectives of the study:

Every work is based on certain objectives because without objective one can not get idea to plan his work. The purpose of this study was to investigate the effects of CATP on the achievement of students in mathematics. This study was undertaken with the following objectives:

1. To construct the computer assisted teaching programme in mathematics of standard IX.

2. To implement the computer assisted teaching programme and to study its effects on student’s achievement in mathematics.

3. To study the main effect of factors like sex, intelligence and social economical status on the achievement.

4. To study the interaction effect of treatment, sex, intelligence and social economical status on achievement of students in mathematics.

1.7 Hypotheses:

In present study, the hypotheses are formulated on the bases of objectives and variables. They are as mentioned below.

H₀₁: There is no significant difference between the achievement of control group and experimental group.

H₀₂: There is no significant difference between the achievement of boys and girls.

H₀₃: There is no significant difference between the achievement of students of low I.Q group and high I.Q group.

H₀₄: There is no significant difference between the achievement of students of low S.E.S group and high S.E.S group.
**Hypotheses for interaction effects:**

**First order interaction effects**

H\(_{05}\): There is no significant effect of the interaction of treatment and sex on the achievement of students in Mathematics.

H\(_{06}\): There is no significant effect of the interaction of treatment and I.Q on the achievement of students in Mathematics.

H\(_{07}\): There is no significant effect of the interaction of treatment and S.E.S on the achievement of students in Mathematics.

H\(_{08}\): There is no significant effect of the interaction of sex and I.Q on the achievement of students in Mathematics.

H\(_{09}\): There is no significant effect of the interaction of sex and S.E.S on the achievement of students in Mathematics.

H\(_{10}\): There is no significant effect of the interaction of I.Q and S.E.S on the achievement of students in Mathematics.

**Second order interaction effects:**

H\(_{011}\): There is no significant effect of the interaction of treatment, sex and I.Q. on the achievement of students in Mathematics.

H\(_{012}\): There is no significant effect of the interaction of treatment, sex and S.E.S on the achievement of students in Mathematics.

H\(_{013}\): There is no significant effect of the interaction of treatment, I.Q. and S.E.S. on the achievement of students in Mathematics.

H\(_{014}\): There is no significant effect of the interaction of sex, I.Q. and S.E.S. on the achievement of students in Mathematics.
**Third order interaction effects:**

$H_{015}$: There is no significant effect of the interaction of treatment, sex, I.Q. and S.E.S on the achievement of students in Mathematics.

Following hypotheses were formed to check effects of treatment on achievement of student of different groups.

$H_{016}$: There is no significant difference in achievement of boys of treatment group and control group.

$H_{017}$: There is no significant difference in achievement of girls of treatment group and control group.

$H_{018}$: There is no significant difference in achievement of high I.Q students of treatment group and control group.

$H_{019}$: There is no significant difference in achievement of low I.Q. students of treatment group and control group.

$H_{020}$: There is no significant difference in achievement of high S.E.S students of treatment group and control group.

$H_{021}$: There is no significant difference in achievement of low S.E.S students of treatment group and control group.

$H_{022}$: There is no significant difference in achievement of high I.Q. boys of treatment group and control group.

$H_{023}$: There is no significant difference in achievement of high I.Q. girls of treatment group and control group.

$H_{024}$: There is no significant difference in achievement of low I.Q. boys of treatment group and control group.

$H_{025}$: There is no significant difference in achievement of low I.Q. girls of treatment group and control group.
\( H_{026} \): There is no significant difference in achievement of high S.E.S boys of treatment group and control group.

\( H_{027} \): There is no significant difference in achievement of high S.E.S girls of treatment group and control group.

\( H_{028} \): There is no significant difference in achievement of low S.E.S boys of treatment group and control group.

\( H_{029} \): There is no significant difference in achievement of low S.E.S girls of treatment group and control group.

### 1.8 Limitation of the study:

The present study is delimited as follows:

1. The study is limited to Gujarati speaking students only.

2. The study is limited to the students of two secondary school of Baroda District in Gujarat.

3. The study is conducted on the small sample which consists of 250 students of std. IX.

4. CATP is prepared on the basis of the content of mathematics of standard IX.

5. The computer assisted teaching programme were prepared on the basis of the content of Mathematics of std. IX.

6. The study of the effect of CATP is only restricted to some closely related variables like Sex, I.Q. and SES.
1.9 The plan of report:

The following matter is the brief outline of the thesis. All the details of study are included so that any investigator who wants to replicate the experiment can do it with the help of the thesis. It has six chapters followed by references and appendices.

The first chapter includes the need, importance and significance of the study. It provides a outline for the whole thesis. The key words used in the statement of the problem are defined. The objectives of the study are explained and the limitations are stated. Also variables are mentioned.

The second chapter describes the reviews of some research works in the area of mathematics education.

The third chapter deals with planning and programme construction.

The fourth chapter deals with experimental design and execution of the programme. How the design and samples are chosen is explained. The tools used to measure the dependent and independent variables were described. It includes the observations of the investigator during the experiment.

The fifth chapter contains the data and its analysis using ANOVA. The hypotheses for main effects and interaction effects were tested.

The sixth chapter contains the summary of research work, observations, conclusions, educational implications and suggestions for further study.

At the end of the report, book and references consulted with the present study have been listed. The appendices include the programme and tools used for measuring the dependent and independent variables.
Footnote

5. Ibid. Page No.216
6. K. Ramnathan, Suganitam.ganit mandal,Ahmedabad:March, 1963,Page No.02