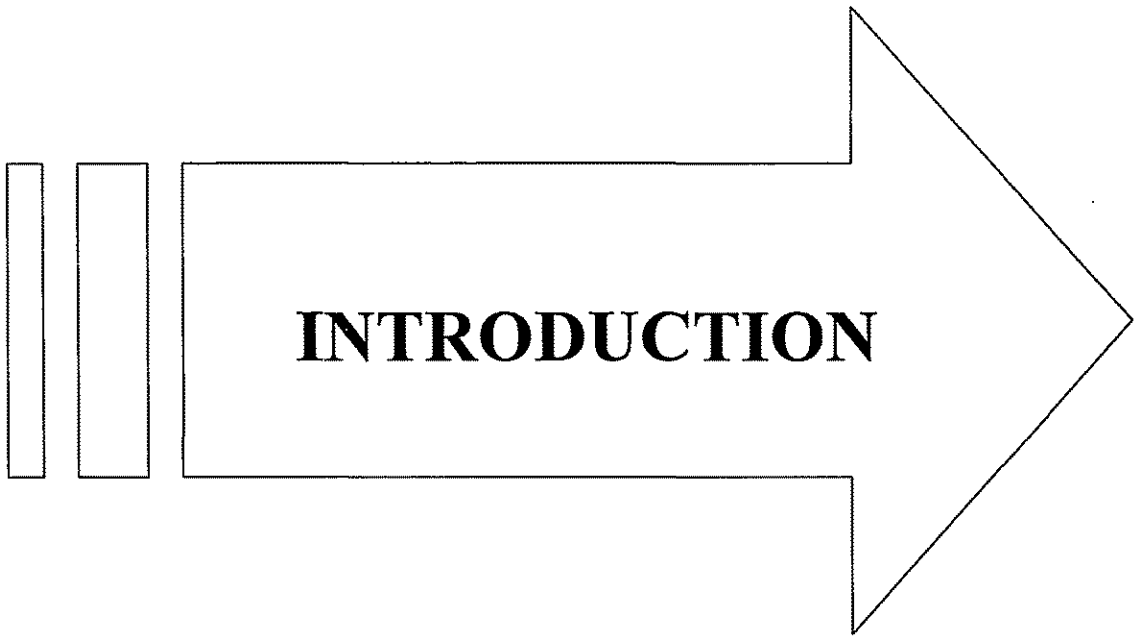


CHAPTER - I



INTRODUCTION

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1.1 Importance of Science

Science is a cumulative and endless series of empirical observations which results in the formation of concepts and theories, with both concepts and theories being subject to modification in the light of further empirical observations. Sciences are both body of knowledge and the process of acquiring it. Due to importance of science in almost every walk of life, all commissions and committee, including **National Policy of Education(1986)** have emphasized "**Science for all**" as an integral part of general education at school level. The implication being that school system should accept accountability of achievement of minimum levels of learning for all.

Science has helped man to quantify ideas to be precise and to utilize spatial concepts in his day to day life. In a society which is rapidly changing into an industrial and technological society, scientific literacy is essential for each and every citizen.

1.2 Importance of Chemistry

"Chemistry is the science of substances, their structure, their properties, and the reaction that change them into other substances." Chemistry is the science of matter, molecules and the changes they undergo during chemical reactions. It is an experimental science, related to a variety of human activities. It is concerned with the structure, properties, reactions and energy effects associates with

substance.

Chemistry harnesses observation as an important approach to learning which implies sample sensory responses. Senses in subsequent advanced operation are attempted to be augmented and sharpened through sophisticated instruments. Everything which we can see is made of the chemical elements and the molecules that they form. Studying chemistry gives us the opportunity to better understand the world that we live in.

Fireworks and explosions are based on chemistry .It plays an important role in discovering and understanding of materials contained in many household items. Almost anything you do during the course of a normal day involves chemistry in some way. The gases and tires in cars we drive, the makeup we put on our faces, the soaps and cleaners used everyday burning wood or other fossil fuels, chemistry is all round in our day to day life.

1.3 Introduction of Chemistry: At Secondary level

The **National Curriculum Framework** published by **National Council of Educational Research and Training(NCERT)**in 2000, has recommended **Science and Technology** as a curricular area at the upper primary stage(VI-VIII).It is envisaged that the science and technology course would aim at promoting scientific and technological literacy among the learners at this stage.

At the secondary stage (IX-XII) the chemistry is taught as a one of the branch of the science. The course offered of this stage is termed as **Science and Technology** and is aimed at developing scientific and

technological attitudes and skills among children. At this stage separate courses on Physics, Chemistry and Biology are offered as a part of the electives.

1.4 Aims and Objectives of Teaching Chemistry

1. To acquire the knowledge of terms, concepts, processes techniques and principles relating to the subject of chemistry.
 - a. To develop the ability to understand terms, concepts, facts, processes and principles of chemistry.
 - b. To develop the ability to apply the knowledge of concepts and principles of chemistry in new or unfamiliar situation.
 - c. To develop a scientific attitude towards phenomenon related to chemistry.
2. To develop skills required in chemistry such as manipulative skills in the proper handlings of apparatus and chemicals.
3. Expose the students to various emerging new areas of chemistry and appraise them with the relevance in their future studies and their application in various spheres of chemical science and technology.
4. Appraise students with interface of chemistry with other disciplines of science such as physics, biology, geology, engineering etc.
5. Acquaint students with different aspects of chemistry used in daily life.
6. Developing an interest in students to study chemistry as a discipline.
7. Understands and appreciates the joint enterprise of science, technology and society.

1.5 Methods of Teaching Chemistry

Teaching method is nothing but a way of imparting knowledge to the student.” **Method is defined as the scientific way of presenting the subject matter keeping in mind a psychological and physical requirement of the children.**” Following are the different methods of teaching chemistry.

Discussion Method

This method can be followed in two ways depending upon the time and resources available in a particular institution

- (i) The teacher give brief introduction of the topic for discussion .This is followed by supervised study by the pupils in groups or individually. The references are given by the teacher by putting some key questions or problems in logical sequence the topic is covered through discussion.
- (ii) The teacher gives a brief introduction of the topic and explains some new terms. The class is divided into as many convenient groups as there can be. One group leader is assigned to each group. The group leader initiates the discussion on the part of the topic assigned to them.

Problem Solving Method

In this method the student is required to solve a problem by an experimental design making use of his previous knowlegde.It is similar to scientific method.

Inductive Method

In this method, the pupils are led particular instances to general conclusion. Concrete examples are given and with their help students are helped to arrive at certain conclusion.

Deductive Method

This method is reverse of inductive method. In it the rules, generalizations and principles are provided to the students and then they are asked to verify them with the help of particular examples. We proceed from general to particular and from abstract to concrete.

Project Method

This method consists chiefly of building a comprehensive unit around an activity which may be carried on in the school or outside. The curriculum, content and techniques of teaching are considered from child's point of view and demand that the students should think." **Learning by Doing**" and "**Learning by Living**" are the two cardinal principles of this method. Children learn through association, cooperation and activity.

Heuristic Method

The basic idea of the method is that the student should discover everything he learns about from his own observations and experiments. Instead of imparting facts the teacher should provide activities in which the students work independently and by this means get training in scientific method.

Demonstration Method

When science teaching was first introduced into the curriculum of secondary school, it was felt necessary to carry out a number of series of demonstrations in order to arouse interest and wonder in the pupils and to convince them that the statement of the teacher is true. This method is in accordance with the maxim of teaching "from concrete to abstract". The students observe the demonstration critically and try to draw inferences. Thus; their powers of observation and reasoning are also exercised.

1.6 What is CAI?

CAI stands for **Computer Assisted Instruction**. It is a term that refers to a learning situation in which the students interact with and is guided by a computer through a course of study at achieving certain goals. It is an instructional technique in which the computer must actually instruct the students and the computer contains a stored instructional program designed to inform, guide and test the students until the prescribed level of proficiency is reached. It is a two-way interaction between the learner and a computer.

1.7 Importance of CAI

The technology-based teaching is a new way of thinking in educational theory. It acts as a powerful enabling device to promote active learning and open new learning approaches. The use of new techniques that involve two-way student-teacher interaction, student-student interaction and interdisciplinary approaches is gradually replacing the one-way information flow typical of traditional classroom where a teacher

addresses a group of passive learners.

I.T, Multimedia and CAI based packages have changed the pattern of teaching where the learner uses technology through critical thinking, to manipulate and query data in newer ways instead of just lecturing or reading activity.

1.8 Guidelines of NCF 2005

The vast potential of ICT (Information and Communication Technology) in the field of science education has been well organized, it still remain largely unexplored. The efforts have been piecemeal largely sporadic. A beginning for introducing computer in the school system was made there. The Computer Literacy and Studies in School (CLASS) project in the early 1980's. However school faced problems of infrastructure, appropriate software and lack of trained man-power.

Today the scenario has changed with the increasing use of PC in schools, homes and workplaces and internet connectivity, ICT shows renewed promise as a powerful tool for education, but only if these developments are complimented by making available quality software in different disciplines of science. Two way interactivity is possible through telephones lines. In particular production of software is relatively easy and cheaper to produce satellites radio can prove to be an important tool for science.

1.9 Use of CAI in Teaching Chemistry

Chemistry is an experimental science. It is a collection of experiments, observations and inferences as compiled by various scientists, researchers and philosophers scattered all over the world. The

development of science and technology is more or less dependent upon the advancement of chemistry. Its applications are spread over not only to earth sciences, but also to life science. The CAI provides information, presents question and problems and also provides hints if help is requested just as the student in the classroom poses any query to the teacher. A dialogue between a student and a teacher exists in the CAI system.

Chemistry is an experimental science; therefore computer assisted instruction must provide experience to familiarize the students with various experimental techniques and also to develop theoretical and manipulative calculations. Actually chemistry is not a precise and a mathematically "finished" discipline, but requires new experiments based upon law of probability rather than or the law of singularity. Instruction involves teaching and learning.

A number of CAI lessons are available nowadays comprising atomic structure, bonding, periodic trends, descriptive chemistry, analytical chemistry, structural techniques, physical chemistry, numerical analysis etc. Another important feature of CAI is the simulation programmed which may be displayed graphically without being burdened with detailed numerical calculations. CAI is developed on the principles of programmed learning, it also utilizes the concepts of audio-visual education, communication theory, system analysis, data processing and learning theory.

CAI produces learning experiences effectively and efficiently. A good amount of information stored in the computer is made available to the learner more readily than by any other media. The interaction between the student and instructional programmed is made more dynamic and more individualized in CAI than in any other system. It is extremely

expensive and more mechanical and deprived of human touch therefore it is criticized on the ground that this innovation will dehumanize the educational system and the teaching-learning process will be lifeless and mechanized.

1.10 Operational Definitions of Variables

Before proceeding further in any research the researcher should have clear understanding of the problem. The terms like Achievement, Attitude, Study Habits and Traditional Approach. This may results in ambiguous understanding of the terms, therefore to overcome this problem, the researcher made an attempt to define the terms operationally so as to avoid confusion.

Achievement

Achievement is a general term for successful attainment of some goal requiring:

- (i) A certain
- (ii) The degree of success attained in a Test.
- (iii) The result of certain intellectual activities.

Attitude

Attitude is a mental and neutral state of readiness organized through experience exerting a directive or dynamic influence upon the individuals response to all object with which it is related

-By Allport

Study Habits

Study Habits refers to systematic study which is related with school and college work and some other academic activities to achieve the desired academic goals. These habits involve attentiveness, concentration, love for reading, procedure of taking notes, laboratory work, intelligent reading of the learning material, systematic work, reading for comprehension, making the study plan and following the same, reserving the time for emergencies, punctuality and regularity in attending the classes.

Traditional Approach

The traditional approach contained the different methods like lecture method, observation method, discussion method etc. The traditional approach is practiced in school teaching. In this method, text book occupies an important role.

Table 1.1 : Variables of the Study

Variables	Independent	Dependent	Covariate
1.	Teaching methods	Achievement in Chemistry	Science Achievement of class VIII
	1.CAI Package	1.Attitude towards science 2.Study Habits	1. Pre-test scores of Attitude towards science. 2. Pre-test scores of Study Habits.
	2.Traditional Approach	1.Attitude towards science 2.Study Habits	

1.11 Rationale of the study

The main function of educational research is to improve the educational procedures, existing process of teaching and system through the refinement and extension of knowledge. The researcher in this study wants to see the effectiveness of computer in science teaching. It is well accepted fact that today a single teacher is not capable of giving up-to-date and complete information in his own subject. Computers provides better technology to present content, which helps learner in concentrate and better understanding and long retention of information, which is not possible otherwise.

The technology based teaching is a new way of thinking, it acts as a powerful enabling device to promote active learning and open new learning approaches. The CAI based teaching is helpful in making active learner than passive. The student can develop the quality of interaction with teacher as well as computer system. I.T, Multimedia and CAI packages have changed the pattern of teaching where the learner uses technology through critical thinking to manipulate and query data in newer way instead of just lecturing and reading activity.

A number of efforts have been initiated for bringing about quality improvement in education. As a result of consistent efforts one idea emerged that education should be treated as an individualized activity. This concept led to the involvement of new instructional strategies i.e. Computer Assisted Instruction (CAI). A learner can at his own pace with the help of computers. ()

The relevant studies conducted in India, are few in number in this field and these conducted by Prabhakar and Sansanwal(1989), Bhardwaj(1990), Jeyamani(1991), Mahapatra(1991), Reddy and Ramau(1999), Shah and

Agrawal(1999),The studies which are conducted aboard is by Paul (1985), Barbara (1986), Henry (1986), Eric (1987), Calvin (1988), Moore(1988), etc. All these studies, primarily aimed to asses the effectiveness of Computer Assisted Instruction in terms of student's achievement in various subjects.

1.12 Statement of the problem

The researcher in this study aspires to measure the effectiveness of the Computer Assisted Instruction in terms of student's achievement in Chemistry, Attitude towards Science and Study Habits. Title of the study is:-

“Effectiveness of Computer Assisted Instruction (CAI) Package for Teaching Chemistry to Class IX in terms of Achievement in Chemistry.”

1.13 Objectives of the study

1. To study the effectiveness of CAI package in terms of :
 - (a) Achievement in chemistry of class IX students, and
 - (b) Reaction of the students towards the package.
2. To study the effect and interaction of treatment and gender on the Achievement in chemistry of class IX students by taking their scores of Achievement in Science scores of class VIII as covariate.
3. To study the effect and interaction of treatment and gender on Attitude towards Science of class IX students by taking their pretest scores of Attitude towards Science as covariate.
4. To study the effect and interaction of treatment and Gender on Study habits of class IX students by taking their pretest scores of Study habits as covariate.

1.14 Hypothesis of the Study

1. There is no significant effect of treatment on the Achievement in chemistry of class IX students when their scores of Achievement in Science of class VIII were taken as covariate.
2. There is no significant effect of Gender on the Achievement in chemistry of class IX students when their scores of Achievement in Science of class VIII were taken as covariate.
3. There is no significant effect of treatment and Gender on the Achievement in chemistry of class IX students when their scores of Achievement in Science of class VIII were taken as covariate.
4. There is no significant effect of treatment on Attitude towards Science of class IX students when their pretest scores of Attitude towards Science were taken as covariate.
5. There is no significant effect of Gender on Attitude towards Science of class IX students when their pretest scores of Attitude towards Science were taken as covariate.
6. There is no significant effect and interaction of treatment and Gender on Attitude towards Science of class IX students when their pretest scores of Attitude towards Science were taken as covariate.
7. There is no significant effect of treatment and gender on Study habits of class IX students when their pretest scores of Study habits were taken as covariate.
8. There is no significant effect of Gender on Study habits of class IX students when their pretest scores of Study habits were taken as covariate.
9. There is no significant effect and interaction of treatment and Gender on Study habits of class IX students when their pretest scores of Study

habits were taken as covariate.

1.15 Delimitations of the study

Depending upon the focus of the study the present study was conducted under the following constraints:

1. The study was conducted only in schools of the Bhopal city.
2. The study was conducted in the private school of Bhopal.
3. The study was conducted in the to the class IX student of specified school of Bhopal.
4. The treatment was given for only ten days.
5. The Achievement comparison was confined to Achievement in Chemistry only.