CHAPTER – 1

ABOUT THE PRESENT STUDY

1.1.0 Introduction
1.2.0 Instruction Media in Education
1.3.0 Educational Arena of Computer
1.4.0 Computers in School
1.5.0 CAI a brief overview
1.6.0 Rationale
1.7.0 Statement of the problem
1.8.0 The terms defined
1.9.0 Objectives of the study
1.10.0 Hypothesis
1.11.0 Importance of the study
1.12.0 Limitations of the study
1.13.0 Scheme of chapterization
1.14.0 Conclusion
“Nothing is constant in the world but change…”

Heraclitus of Ephesus (c.535 – 475BC)

1.1.0 INTRODUCTION

Rapid scientific and technological developments along with changes in the structure of the society influence the educational system in general and instructional method in particular. Such a trend brings about new attempts and needs in terms of the teaching learning processes. Among these new attempts is the use of computers in instructional endeavour as they are considered as effective communication and individual learning tools.

The integration of technology in education is a growing phenomenon. A tremendous amount of time and money has been devoted to making technology accessible to students with the promise of increased student achievement. Computers are used as teaching tools and a means for creating work product. A closer look at the connection between students’ use of technology and the resultant learning is needed. Parallel to the development of these devices, which represent the most important components of the information and communication technologies, science education in general and physics instruction in particular do make use of such tools to improve learning practice.

When the Indian education system is examined, it is observed that face-to-face instruction is the most commonly used instruction practice. This system is mostly based on a teacher centred learning atmosphere where the focus of the instructional activities is learning. Thus the student can have problems in assigning meaning to information, understanding the content as a whole, locating new information in their schema and transforming this information to knowledge. Concept used in the physics class room are mostly abstract making the information hard to grasp, which make the class quite boring and difficult.

In order to remove the barrier streaming from the abundance of abstract knowledge several cognitive strategy are assumed. Many of them seem ineffective to sustain higher level of teaching experience. In this respect Computer Assisted
Instruction can be considered as a fruitful endeavour to integrate science and technology and improve the quality of learning experiences. Integration of Computer-Assisted Instruction in physics instruction might help some instructional problem experienced in face-to-face instructional settings. Since they require learner to actively participate in learning process and interpret the content matter of the application to pursue further activity.

The main purpose of Computer Assisted Instruction is to deliver the content of the course through computer and relative instruction endeavour through the help of computer applications. In this respect several software program with different specification might be used to deliver the subject matter. The Computer Assisted Instruction package used in a four mode namely tutorial, drill and practice, simulation and gaming. It can deal the problem of quality in education more effectively. Possibly the greatest strength of the Computer Assisted Instruction is that enables high degree of learner participation to be built in to the instructional process.

1.2.0 INSTRUCTION MEDIA IN EDUCATION

A medium is a channel of communication. Media forms are useful for information and motivational purpose. Their value extends beyond the instructional intent. Wager (1982) argued that “the education technology that can make the biggest difference to school and student is not the hardware, but the process of designing effective instruction” at a same time Bernauer captured a significant insight, he stated that “It is not technology per se that has resulted in improved student outcome, but rather how the technology was used and integrated into instructional processes”

In education imparting instruction is an important function. It can be done through so many materials. Our senses-eyes, ears, tongue; nose and skin are gateway to knowledge. We acquire all knowledge through instruction. The senses are used for instruction. More is the senses are used, better is the instruction. Most of the experiences are gained through hearing and seeing. It is said that 85% of the total experiences are gained through eyes and ears. The materials that are used for imperative information are audio-video aids-Multimedia presentation.

Instructional materials are used to enable the learner to achieve the learning objective effectively and interestingly. Briggs (1970) defines instructional media broadly as all means through which stimuli are presented to provide the events of instruction. The instruction material like computer, audio-video program comes in a
big way and are apt to influence not only communication and education but also the manner and behaviour, life style, attitudes and interest of the learner. These media and materials provide directly as well as vicarious or improvised learning experiences to the learner at all level of education.

Learning becomes effective when student are actively involved in the process. To the extent their different senses are related, their learning become successful to the extent. For using various senses in the teaching-learning process, different materials are utilised. The learning experiences are thus made quite relevant, meaningful and effective. That is why the materials are called “Multi sensory material” Multimedia or instructional aids or instructional material. These instructional materials have various connotations.

In present education system various instructional media are used as per various purposes. Very straight, various aids can arrange from no-control to high control by the learner. The basic need of the media is to take the student from concrete to abstract, but science education in general and physics in particular have more abstract concept and not only that the concept can not be explained through experiment or learning by doing in higher education. Under the circumstances Multi media is considered as a boon for presenting all these and many such conceptual matter.

Due to advancement of the Science & Technology and application of it in to the practice, the learner can use the high control multi media presentation nowadays. CAI is immensely useful in providing individualised, repetitive or analogous practice to learner in problem solving exercise as well as activities for developing a variety of skill. This approach is of uttermost important because it’s a time of the century in which the learner came to class with that information which might not handy to teacher. He use to work on virtual technology, playing on play station and surfing on net is common. Teacher cannot vomit out book content but something more than that is required. Present education system is rejuvenating and change is of the caterpillar fashion. Computer technology is also transforming, within the duration of three days new invention surge the market and hit the mind of the people to walk with it.

Now, it’s a huge responsibility of the teacher to allow the student not only to sit into the classroom but also to make learning participative interesting, joyful and everlasting. This approach of CAI and computer might fetch the learner for better tomorrow.
1.3.0 EDUCATIONAL ARENA OF COMPUTER

The past years has brought an explosive growth in both the number and variety of application of computers and relevant technology used in the classroom. Computer has improve-teaching and learning, strengthen teacher professional development, support broad educational reform, enhance school community partnership and improve school management.

Around 1980 computers were used primarily for three tasks: to teach student about computers, to teach programming and for rote learning through drill and practice program. In mid of that decade, teachers reported using computers primarily for enrichment and variety and rarely to provide student with instruction in core academic subject. In the beginning the coverage of school under the CLASS project was modest with 2,598 schools; it generated increasing awareness of computer literacy among the stakeholders. During the year 1984-85 CLASS project was introduced initially as a pilot project. A total of 12,000 microcomputer distributed to secondary and senior secondary school. The provision under the NPE-1986 and POA-1986 remained intact in the NPE-1992 but more emphasis was given in the latter on computer education. The project was subsequently adopted as a centrally sponsored scheme during the 8th plan (1993-94). But as reported in POA (1992 p. 101) “a close scrutiny of the implementation strategy and achievement of the project school that the project has not met with the desired degree of success mainly on account of shortcomings in the implementation strategy”

In July 1998 Prime minister constituted a IT Task Force with Vidyarthi Computer Scheme, Shikshak Computer Scheme and School Computer Scheme with attractive packages. In between during 1999 Mitra put a hole in the wall project at private level in New Delhi the drastic come out proves penetrating effect and need of the computer in classroom. The CLASS project was modified during 2001-02. A provision of 74.00 Crore has been made. Prof. M. Mukhopadhyay has appositely observed that in the class project computers were provided with a few CAI Software while colleges were provided with computers without any software. The CAI is almost absent and lack of provision of suitable software has led to under or no utilization of computers.

World links India program was launched in January 2002 to provide school connectivity, basic computer literacy and teacher professional development program.
initiated with Intel Corporation (Bhatacharjee, 2005). The existing centrally sponsored scheme "Information and Communication Technology (ICT) in Schools" is being implemented through the State Governments and UTs since 2005-06. Sanction has been given so far to more than 53,000 Government and Government aided secondary and higher secondary schools for establishing and using enabling infrastructure for ICT based teaching learning processes. A need has been felt to expand the outreach of the scheme. The revised scheme focuses on coverage of more schools, development and sharing of appropriate e-content and capacity building of teachers. On September 30, 2008 under the same scheme a round table discussions and consultation was organised to promote and reenergizes. In 2009 Government of Gujarat take initiative and provide computers and software in all primary and secondary school at cost of 500 Crore.

In XI\textsuperscript{th} plan the implementation of the two broad objectives of the scheme (a) ICT enabled teaching and (b) computer education and literacy in about 1.08 lakh Government and Government aided secondary and higher secondary schools would help to bridge the digital divide. About 80,000 schools are proposed to connect on Internet through wireless broadband and 28000 with broadband terminal aperture. An amount of Rs. 5000 Crore is being provided for ICT infrastructure in school during XIth plan. In addition educational content on CDs for embellishing classroom teaching will also be made available.

Above scheme and earnest effort of the central Government, State Government, NGO and almost at all the school level bring forth the fruitful result. Computers are starting to use as a personal productive tools, bring a new way of knowing researching and using in schools. It has shrunk our world and this transformation has fuelled by rapid progress in computer related technologies. The computer role as a “mind” tool has further fuelled change in the information age. The information age has challenged our education system. It has complicated the functions of teacher education and curriculum development. It has affected decision-making process that determines how school resources are allocated. The result is that student with stakeholder start to put step with the demanding pace. A new paradigm is evolving in the educational arena and changing how teaching is delivered and learning is processed.
1.4.0 COMPUTERS IN SCHOOL

Education systems around the world face formidable challenges that are taxing conventional strategies. Now after more than two decades of unfulfilled promises to revolutionize education, computer and communication technologies are finally able to offer opportunities to significantly improve teaching and learning, strengthen teacher professional development and support broad educational reforms. One hallmark example is of the 10 year long Apple Class-room Of Tomorrow (ACOT-1996) examined the effect of computers in teaching and learning shows that ‘students’ behaviour and attendance improved along with their attitude toward themselves and toward learning, such as-clearly performing better than before, student wrote more effectively and with greater fluidity and finished whole unit quickly.’

Computer is an efficient and effective for verities of purposes in school. It is a modern tool for improving the quality of teaching and learning. Schools are expected to provide the opportunity to students not just to complete school successfully, but also to empower them to be successful in the 21st century. Educational technologist are advocating computer skill into the content areas, proclaiming that computer skill that should not be taught in isolation and separate computer class do not apply computer skill in meaningful ways. If we see in schools, computer literacy means not only know how to operate computers but also to use computer as a tool for organisation, communication and problem solving. Following are the points that enhance the use of computers in the school.

i. Availability of computers to the learner is more frequent in comparison to teachers.
ii. Computer are patient teacher, they never tired and never loose their temper.
iii. The computer can employ various teaching techniques that may be otherwise difficult to use in a classroom.
iv. Student can learn at his or her own pace through computer.
v. Learners may less frighten by computers than teacher. So they can learn through computer without any hesitation.
vi. Learning with computer is personalised process, so it suitable for average intelligent student as they can learn at their own pace and conveniences.
vii. Computer is very effective in teaching Physics, Biology, Mathematics and history.
viii. Computer can overcome the legibility of handwriting, coaching occur rather than lecture and recitation.

ix. It allow teacher to perform the other task more effectively by using their time for other activity, which are not possible through computers, the teacher can extend his or her role beyond the class room.

x. Future demanding high technocrat competitive global environment develop.

Usage of computer brings the entire world into the classroom. It is very clear that computer is useful and versatile tool. It can be used to help solve the problem and accomplish the tasks. Computers are used in different context…

Using computer as a tutor can be effective way of infusing thinking skill into subject area teaching and learning. This is because with the right teacher input and software design around computers can turn the use of reasoning skill into learning outcome. Software can be designed to initiate, resource and frame a discussion just as a teacher can.

Computer can be used as a mindtools. It is an application in which student to represent what they know, necessarily engage themselves in studying. Mindtools scaffold different forms of reasoning about content. That is they require students to think about what they know in different, meaningful ways. For example using database to understand student. It is not the computer that directly teach thinking but after working in partnership with computer, the student will internalise the way that computer think as a cognitive tool for their own use.

It can allow students to engage directly in knowledge creation with others who are not present physically. In absence it is more motivating and can stimulate a higher quality of thought. The computer can be used as a support and resource for the communicative processes of teaching and learning.

Computer mediated interaction with the students, used in the right way can move us beck to a basic one student working with a teacher to learn. Thus computers in the school are shifting paradigm of bullock cart wheel to the Mouse wheel.

1.5.0 CAI A BRIEF OVERVIEW

CAI as the name suggest, is the use of a computer to provide instruction. It refers to the application of computer software to address student needs. CAI is a type of educational program designed to serve as a teaching tool. By abbreviation it is a Computer Assisted Instruction. It can be immensely useful in providing
individualised, repetitive or analogous practice to learner in problem solving exercise as well as activities for developing varieties of skills. Here the learner interacts with the computer rather than with a text besides proceedings at his own pace. It is a flexible as well as powerful device which can cater to these needs by storing processing and retrieving information. The format can be from a simple program to teach a typing to a complex system that uses the latest technologies that teach a new keyhole surgery. CAI draws on knowledge from the field of learning, cognition, Human Computer Interaction.

1.5.1 THE ORIGIN OF CAI

The concept of CAI is not new. According to Wang and Sleeman (1993) the origin of CAI can be traced back to the invention of small multiple choice item scoring machine by Sidney L. Pressy in 1924 and B. F. Skinner’s work to improve and expand the concept of Programmed Instruction started in late 1960s. The first true CAI system, the "IBM Inquiry Station," was developed at IBM by the "Teaching Machine Project" in the late 1950s. Two major developments occurred in the early 1960s. The IBM 1500 and PLATO were developed. These were developed specifically for CAI and both greatly contributed to its development.

The Greek philosopher Socrates is also said to be the first programmer who developed a program in geometry which was recorded by his disciple Plato in the dialogue Mano.

1.5.2 HISTORIC OVERVIEW OF CAI

CAI started in late 1950 (Suppes & Macken, 1978) mainly in the USA. The first true CAI system, the "IBM Inquiry Station," was developed at IBM by the "Teaching Machine Project" in the late 1950s. This machine, which taught binary arithmetic, consisted of a typewriter and console capable of transmitting typed information to a computer, and receiving information from the computer. In 1963, the Institute for Mathematic Studies in the Social Sciences (IMSSS), under the direction of Patrick Suppes, Richard Atkinson, and IBM Corporation, developed the IBM-1300 Instructional System. Professor Patrick Suppes led an extensive research and developed CAI at Stanford University in 1966. Suppes predicted that this technology would transform education. Pioneers such as Kemeny and Kurtz for BASIC-1960s and Don Bitzer for PLATO-1965 University of Illinois were among the first to use a
computer as part of the learning process. The Early CAI programs were rudimentary by today’s standards, with mainly text based interfaces. Bitzer was one of the first to realise the importance of graphics and sound in the learning process. Initially, CAI programs simply tried to teach a particular topic without a basis on any particular educational philosophy.

In 1970, CAI was used to teach chemistry (Castleberry & Lagowski, 1970), pre calculus mathematics (Judd, Bunderson, & Bessent, 1970, cited in Suppes & Macken, 1978), and computer programming (Homeyer, 1970) at the University of Texas. In 1972, C. V. Bunderson and the MITRE foundation began development of TICCIT (Time-shared, Interactive, Computer-controlled Information Television) at Brigham Young University. TICCIT was a CAI system on a 32-terminal minicomputer. Also developed in the early 1970s was CARE (Cartwright, Cartwright, & Robine, 1972) which identified children with mental handicaps. Beginning in 1977, fully assembled microcomputers appeared on the market such portable units greatly promoted CBE both directly and indirectly.

This thunderstorm strike Indian education system in 1984 with the generosity of BBC microcomputer. Which in turn with the time resulted into CLASS project and many such and globalization changed the entire phase of the Computer Instruction in India.

1.5.3 TYPES OF COMPUTER ASSISTED INSTRUCTION

There are many types of Computer Assisted Programs. Each of the CAI program is appropriate under different instructional circumstances and therefore takes a different pedagogical approach.

Although the beginning of CAI was presentation of programmed instruction through compute and initial forms of CAI i.e. tutorials, drill and practice and games were oriented to behaviourist theories of learning. But with the advancement of the computer technology and software no type of CAI solely associated with the specific learning theory. Geisert and Futrell (1995), Maddux, Johnson and Willis (1997) and Bitter and Pierson (1999) have mentioned and explained the following types of CAI

- Drill and Practice
- Tutorials
- Instructional Games
• Simulation
• Microcomputer based Laboratories
• Integrated Learning System
• Problem Solving
• Reference Software

A table given below summarize the functions/uses and theoretical foundations of various common type of CAI as mentioned above.
<table>
<thead>
<tr>
<th>Program</th>
<th>Functions/Uses</th>
<th>Theoretical Foundation</th>
</tr>
</thead>
</table>
| Drill and Practice              | ➢ Provide repetitive exercise for rote skills.  
➢ Provide reviews of basic content.  
➢ Provide feedback on accuracy of answer.  
➢ Useful for sustaining, refining and perfecting performance of certain task.                                                                 | Behaviourist                         |
| Instructional Games             | ➢ Increase learners’ motivation by adding game rules to learning activity.  
➢ Provide learning in a competitive environment.  
➢ Provide opportunities to user to compete each other or against the computer.                                                                 | Behaviourist                         |
| Tutorials                       | ➢ Deliver instructional activities, quiz and feedback.  
➢ Allow learner to actively interact with the program.  
➢ Tutorial are categorised as linear and branching.  
➢ Incorporates graphics animation to illustrate concepts.                                                                                     | Behaviourist  
Cognitive Constructivist           |
| Problem Solving Software        | ➢ Present problems relevant to learning objectives.  
➢ Provide necessary directions, hints and assistance to solve problem according to the learners’ need.  
➢ Promote a reflective learning environment, stress thinking process by encouraging learners to think about various options to solving the problem.  
➢ Let student work together in pairs or small groups.                                                                                          | Cognitive                             |
| Simulation                      | ➢ Present a computerised model of a real or imagined system to teach how a system works.  
➢ Give a clear instruction how to proceed with simulation.  
➢ Learner can manipulate parameters of the simulated environment, make choice and see consequences.                                              | Cognitive Constructivist             |
| Integrated learning system      | ➢ ILS is a network, a combination of instruction and management system.  
➢ Provide a multilayer comprehensive collection of CAI.  
➢ An ILS is a combination of Drill and Practice, tutorial, Simulation and problem solving.  
➢ It can collect and record results of student progress.                                                                                       | Behaviourist  
Cognitive Constructivist           |
| Micro computer Based Laboratories| ➢ Enable the experimenters to automate the process of gathering data from experiment conduct relevant analysis and produce meaningful reports.  
➢ Enhance speed and ensure precision of data collection.  
➢ Quick processing and analysis of data save time.                                                                                             | Cognitive Constructivist             |
Chambers and Sprecher (1983) examined the major theoretical representations of learning, ranging from low-level to high-level learning. They noted that conditions agreed by most theorists as necessary for learning to occur are contiguity, reinforcement, and repetition. Regarding contiguity and reinforcement, most theorists agree on the importance of reward (i.e., positive reinforcement) immediately following a student’s correct response to a problem in a learning situation. Regarding repetition, theorists generally agree that repeated occurrences of the response followed by reinforcement are necessary for learning and retention. Apart from knowing where common ground exists, it is also important to understand the different perspectives of these theories that have produced the schism in educational research. The behaviorist, cognitive or higher order thinking skill is the theories that work in CAI.

1.5.4 CHARACTERISTICS OF CAI

Computer Assisted Instruction can be characterized by many attributes suitable to enhance learning. Some of the special characteristics of the Computer Assisted Instruction include:

**Individualization:** A computer can provide multiple paths to proceed; every student proceeds according to their needs i.e. according to previous knowledge of the subject, ability, interest and intellectual capacity. Concept can be presented in tutorials with the aid of illustrative animation, dynamically creating illustration and interesting verbal explanations. Simulation can provide new insights into relationship, or experiences that would otherwise not be possible.

**Flexibility:** Flexibility means access to teaching material at a wide range of time or locations. Computer offer great flexibility in type of resources available to a student as well as increasing flexibility of access to information. Greater flexibility in education is one strategy for dealing with increased number and diversity of students. A student who does not learn with a particular approach can be presented with material using an entirely different and unique approach.

**Self-Pacing:** Self pacing lets students proceed at a pace appropriate for their individual learning levels. Self pacing can help to individualise instruction for those students who have used the program before or have prior knowledge of the subject. Students own pace helping them to meet personal learning objectives. Imparted knowledge prolong when students move with their pace.
**Graphics and Sound:** Graphic representation plays an important role in instruction. In addition to picture, computer graphics also include the use of screen formatting feature such as arrows, boxes and illustration to emphasize the concept. This nonverbal mode of instruction helps to build comprehension in areas that are difficult to teach by other instructional techniques. Sound can prompt, focus or reinforce students and thus enhance instruction. Computer graphics and sound infuse movement, excitement and animation into a program.

### 1.5.5 ADVANTAGES AND DISADVANTAGES OF CAI

Perhaps the most widely accepted value of CAI is that it involves the individual actively in the learning process. It is impossible for the student to be a totally passive member of the situation, and this very activity and involvement facilitate learning (McKenzie, J., Elton, L., and Lewis, R. 1978). Another much touted value is the ability of the learner to proceed at his own pace, which has strong implications for both the slow learner and the gifted person. Reinforcement of learning in such situations is immediate and systematized, which should result in more effective learning, according to established theories of instruction. In addition, the computer in a simulation mode permits students to explore time and space, to mix explosive chemicals together in a simulated laboratory without destroying themselves and the lab, and to investigate complex problems using instruments and methodology which would be excessively costly or not possible at all without the computer. In addition, the use of computers in this manner frees faculty members or training coordinators to devote more time to the personal, human considerations of their students. Time thus spent with students has been found in a nationwide study of university faculty and students to be the most important factor, in students' opinions, in the development of their creative abilities. Thus the use of the computer in these modes should result in an educational environment in which individuals learn more and in which their potential for innovative and creative professional work is more fully developed. Similarly, there should be a greater acceptance of the computer as a helpful tool after the student has used simulations, games, or tutorials. A final comment regarding the benefits of CAI relates to remedial education. The problems of handling remedial training for students have increased, because the problems of bilingual and disadvantaged students are being recognized. Computer tutorials, especially in these areas, appear to be both educationally sound and reasonable in
cost, if approached in an appropriate manner. Similar cases can be made for the use of CAI to support continuing education and in industrial training programs.

The disadvantages of using CAI in the learning process can be divided into three main categories. In order of importance, these are: (1) the need for teachers and training directors to move from accepted methods that work to a new and relatively untried method in which most individuals have little expertise and which arouses considerable fear and antipathy owing to its heavy technological base; (2) the primitive state of the art, in which a diversity of computing hardware and CAI languages compete with little apparent coordination from professionals in the educational world; in which the majority of available CAI course materials are poorly constructed, largely undocumented, and able to be run on only select computers for which they were written; and in which there are relatively few "experts" to whom CAI users can turn for assistance; and (3) the cost of hardware, CAI course materials (courseware), and individuals to help implement the process—especially since computer vendors initially touted CAI as an ultimate cost saving device. When used as a substitute or replacement method for learning, CAI can be cost saving; however, in actuality CAI is used today mainly as a supplement to enrich learning in the educational scene, and therefore costs should be considered as add-ons.

1.5.6 SCOPE OF CAI IN FUTURE

India shows enormous geographic and demographic disparity in ICT use. India has one of the largest ICT workforces in the world. One can find intense ICT use in technology clusters such as Bangalore and Gurgaon or amongst the upper middle brackets of incomes. The other side of the story is that large parts of the country lack even telephone connectivity.

Shah and Agrawal (2008) reviewed that approximately 33% of the monthly income of the 300mn-strong Indian middle class is spent on the education of their children. One-third of this amount is spent on school education while the balance two-thirds is spent outside the school for private tutoring.

Sooner or later everyone have to walk on the path of advance technology. Recently Government of Gujarat in contract with EDUCOMP start to install a computer program for standard 8, 9 and 10 at cost of 27,000/- rupees. Central government has been funding this initiative under the Sarva Shiksha Abhiyaan (SSA) and ICT@Schools programmes. In the past three years, some 16,000 schools have
become involved. With planned government outlay for education expected to increase substantially in the next five years (per Planning Commission data), it is expected that by March 2013 about 200,000 public schools will offer computer training to a material number of students.

Above efforts are all in the direction to provide education through Multi Media technology. Predictions of the future of CAI have become optimistic, the cost reduction due to mass production and consumption for learning will permit cost effective uses of CAI in traditional classroom and in other settings.

1.6.0 RATIONALE

CAI is one of the important devices of IT, which has great importance in the field of education. It provides more freedom to teacher and student and freedom to make mistake without the fear of ridicule or personal embarrassment. It is a significant tool to provide education.

The discussion of the review of related research given below will make the things more clear. In foreign countries, many computer programs are developing especially in mathematics. But, in India very less work had done in this field. Very few experimental researches are carried out in India.


More over very few studies are carried out in the subject of physics. Most of the researches are done in the field of Chemistry, Mathematics and English. The researcher from the review of the related literature as briefly discussed above did come across only two studies conducted for teaching physics on CAI; Jeyamani
(1991), Kadhiravan S (1999), Patel (2008) and Barad (2008) and therefore the present study has been undertaken by the researcher.

The superstitious teacher often leaves the student in such a drastic condition that they ever lived in dilemma. As far as physics is concern it is an important subject in life as well as in study of higher education. So to find out the effectiveness of teaching physics with the help of computer this research work is undertaken.

1.7.0 STATEMENT OF THE PROBLEM

The statement of the problem could be stated as

**Computer Assisted Instruction in Physics for the Student of Standard XII: An Experimental Study**

The statement of the study problem chosen by the researcher indicates the clear concept of the study problem. This experimental study was designed to check effectiveness of traditional method with learning through CAI package in physics. Development of Computer Assisted Instruction program was also a prerequisite part of the study.

1.8.0 THE TERMS DEFINED

Each word has meaning, but in study it is necessary to mention meaning of every word. Due to which the meaning become clear and understanding become easier. Thus the researcher decided to give classical and operational definition of the terms used in the title of the study.

**Computer Assisted Instruction (CAI)**

Henry Ellington, Fred Percival and Phil Race defines CAI as,

“Use of computer as an integral part of an instructional system, the learner generally engaging in two way interaction with the computer via a terminal.”

For the present study, CAI is an interactive instructional technique whereby a computer used to present the instructional material and monitor the learning take place. It allows the student to direct their own progress. It uses a combination of text, graphics and sound in the learning process.

The CAI will be prepared in physics for the student of standard XII of Gujarati medium.
Experimental Study

George G. Mouly define this method as,

“Experimentation can be considered a technique of deliberately staging a situation designed to force nature to provide a ‘yes’ or ‘no’ answer to specific hypothesis concerning the phenomenon under discussion.”

For the present experimental study, pre test, post test control group design with replication was used for the student of standard XII science studying unit of wave optics in Physics through CAI.

1.9.0 OBJECTIVES OF THE STUDY

Objectives of the present study were considered as follows

1. To develop CAI package in a unit of wave optics for standard XII science students studying GSTB syllabus.
2. To study the effectiveness of CAI Package in a unit of wave optics for standard XII science students.
3. To compare the corrected means of achievement of controlled groups and experimental groups by considering pre test score and IQ as a co-variable in a unit of optics for standard XII science students.
4. To study the influence of gender, teaching method and their interaction between corrected means of achievement of post test of control group and experimental group by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.
5. To study the influence of area, teaching method and their interaction between corrected means of achievement of post test of control group and experimental group by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.
6. To study the influence of area, gender, teaching method and their interaction between corrected means of achievement of post test of control group and experimental group by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.
7. To compare the corrected means of achievement of the boys of experimental group of urban and rural area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.
(8) To compare the corrected means of achievement of the girls of experimental group of urban and rural area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(9) To compare the corrected means of achievement of the girls and boys of experimental group of urban area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(10) To compare the corrected means of achievement of the girls and boys of experimental group of rural area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(11) To compare the corrected means of achievement of the boys and girls of experimental groups by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(12) To compare the corrected means of achievement of the experimental groups of rural and urban area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(13) To study the opinions of the students of experimental groups regarding effectiveness of used CAI in optics.

(14) To study the opinions of the boys and girls of experimental groups regarding effectiveness of used CAI in optics.

1.10.0 HYPOTHESIS

A hypotheses is an informed of shrewd guess of inference or superposition or tentative generalization as to the existence of some facts, condition or relationship relative to some phenomenon which serve to explain such facts as already are known to exist in a given area of study and to guide the search for new truth.

In words of Goode and Hatt,

“A hypotheses states what we are looking for. A hypothesis looks forward. It is a proposition which can be put to test to determine its validity. It may prove to be correct or incorrect.”

In this experimental type of study, the researcher has formulated following null hypothesis

(1) There will be no significant difference between corrected means of achievement of control group and experimental group of rural area by
considering pre test score and IQ as a co-variable in a unit of wave optics for standard XII science students.

(2) There will be no significant difference between corrected means of achievement of control group and experimental group of urban area by considering pre test score and IQ as a co-variable in a unit of wave optics for standard XII science students.

(3) There will be no significant difference between corrected means of achievement of control groups and experimental groups of rural and urban area by considering pre test score and IQ as a covariate in a unit of wave optics for standard XII science students.

(4) There will be no significant influence of gender, teaching method and their interaction between corrected means of achievement of post test of control group and experimental group by considering pre test score and IQ as covariate.

(5) There will be no significant influence of area, teaching method and their interaction between corrected means of achievement of post test of control group and experimental group by considering pre test score and IQ as covariate.

(6) There will be no significant influence of area, gender, teaching method and their interaction between corrected means of achievement of post test of control group and experimental group by considering pre test score and IQ as covariate in a unit of optics for standard XII science students.

(7) There will be no significant difference between the corrected means of achievement of the boys of experimental group of urban and rural area by considering pre test score and IQ as covariate in a unit of optics for standard XII science students.

(8) There will be no significant difference between the corrected means of achievement of the girls of experimental group of urban and rural area by considering pre test score and IQ as covariate in a unit of optics for standard XII science students.

(9) There will be no significant difference between the corrected means of achievement of the girls and boys of experimental group of urban area by considering pre test score and IQ as covariate in a unit of optics for standard XII science students.
(10) There will be no significant difference between the corrected means of achievement of the girls and boys of experimental group of rural area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(11) There will be no significant difference between the corrected means of achievement of the girls and boys of experimental groups by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(12) There will be no significant difference between the corrected means of achievement of the experimental groups of rural and urban area by considering pre test score and IQ as co variable in a unit of optics for standard XII science students.

(13) There will be no significant difference between opinion of Boys and girls of Experimental group.

1.11.0 IMPORTANCE OF THE STUDY

CAI is considered to be a virgin field in the study of education technology. Education Technology is used these days with the objective to make both the teaching and the learning process interesting, efficient and effective. In view of the unprecedented explosion of knowledge in various discipline and fields of education it is found necessary to make teaching as well as learning less time consuming and less laborious. It is also felt imperative on the part of educator to make the teaching leaning process motivating, interesting and exciting. Educational technology does not mean only some machineries or equipment, but it consists of various means and methods as well. All the systematic approaches and technique are put into educational practices as a part of educational technology in order to achieve instructional objectives with economy of time, money and efforts.

Naik (1969) mentioned that

“One of the most important problems facing education is to make learning not merely time consuming and more efficient, but also mere interesting and exciting and this objective have to be achieved within the limited resources available.”

By keeping such concept in to mind importance of the study will be as follows:
1. Students can learn with intuition, self experience and enthusiasm. Education become interesting, joyful and permanence as they learn themselves.

2. Today’s educations chief aim is to make student self learner. This CAI package prepared in optics makes learning more individual and productive.

3. It can make learning more immediate through narrowing the gap between the worlds inside and outside the classroom by means of the experience Which CAI package can provide because in physics, optics is such a branch where visual graphics can clear the concept thoroughly.

4. It can assess to education more equal learner wherever they are, through CAI package. As physics is considered as dry and hard subject.

5. It can give instruction more scientific base through providing a frame work for systematic instructional planning. While self learning material can be more broadly refereed to as educational media or educational technology. This is prepared by well planning design implementation and evaluation of instructional program.

6. Even in the absence of the teacher the student can learn through such packages.

**1.12.0 LIMITATION OF THE STUDY**

Limitations of the present study can be stated as follows:

1. The present study is limited to the Gujarati medium school of Surat district only

2. This CAI package contains only those topics of Optics which are there in Chapter 11 of the XII Science text book published by GSTB.

3. In this present study CAI package, Desai verbal and nonverbal IQ test, criterion test opinionnaire has been used as a study tool.

4. In the sample from the mentioned population only two schools, one from urban and another from rural have been selected.

**1.13.0 SCHEME OF CHAPTERIZATION**

Chapter 1 deals with the conceptual framework for the present research work, Statement of the problem, the terms defined, Rationale of the study, Objectives of the study, Hypothesis, Importance of the study, Limitation of the study.
Chapter 2 deals with the review of the related literature and significance of the present study.

Chapter 3 contemplate on the methodology of the study origin of the study, design of the research, variable of the research, population of the research, sample of the study, tools for data collection, development of the CAI package, stages for development of CAI package, procedure for data collection

Chapter 4 have details of Analysis and interpretation of the collected data

Chapter 5 is about findings, discussion, implication of the present study and suggestion for the further study.

1.14.0 CONCLUSION

In this chapter the researcher had discussed computer as an instructional media its arena and role to play in school. A brief overview of CAI has been discussed over here. After that the terms defined according to statement of the problem. Latterly objectives and hypothesis of the study were given. At last importance of the study with limitation was discussed. The chapter concluded with scheme of chapterization.