CHAPTER – II
REVIEW OF RELATED LITERATURE

2.0 INTRODUCTION

First chapter deals with the conceptual frame work of the present research problem and primary matters regarding the research. It had the statement of the problem, terms defined, objectives of the study, hypothesis, importance of the study and the limitation of the study. But, for any specific research to occupy the place in the development of a discipline, the researcher must thoroughly familiar with both previous theory and research. To assure this familiarity a review of the research literature is done. It allows the researcher to know the amount of work done in the concerned area. The clarity of the problem is possible with the thorough understanding of the knowledge generation in the area of research. It provides the source for hypothesis. It avoids the replication. It suggests the method, procedure, sources of data and statistical technique appropriate to the solution of the problem. The review of the related literature provides some insight regarding strong points and limitation of the previous studies. It enables them to improve their own investigation and to arrive at the proper perspective of the study.

The review of related literature studied by the researcher is divided into following categories:-

- Review of the related literature conducted in India.
  - Review of the related literature in science.
  - Review of the related literature in general subjects.

- Review of the related literature conducted abroad

The studies have been analyzed by keeping objectives, methodology and findings of the study to draw the conclusion to strengthen the rationale of the present research.
2.1 REVIEW OF RELATED LITERATURE CONDUCTED IN INDIA

Review of the related literature conducted in India is broadly categorized into two categories. Review of the literature with regard to the use of computer and multimedia based instructions and methods in the science is taken initially and then general subjects.

2.1.1 REVIEW OF THE RELATED LITERATURE IN SCIENCE

Basu, M.K. (1981) conducted a study, “Effectiveness of Multimedia Programmed Materials in the Teaching of Physics”, with the following objectives (i) to develop instructional materials for the strategy of programmed class-teaching and to study its effectiveness, (ii)to develop the programmed learning materials on light in school physics in four different styles-semi-programme, linear programme, branching programme, and hybrid programme, (iii)to develop a multimedia programme package using each style of programme in conjunction with audio-visual media,(iv)to compare the relative effectiveness of different strategies of instruction employing multimedia programmed material and programmed class-teaching on the criteria of immediate achievement, retention and delayed retention, and (v)to study the interaction effects of instructional strategies, abilities and occasions (immediate learning, retention and delayed retention). The sample consisted of 400 learners of standard IX which comprised an equal number of boys and girls. The tools used were A Group Test of Intelligence B.E.P.R.T in Bengali, the Entry Level Tests, and criterion referenced Tests I, II and III. Five treatment groups were: (i)T-1 having programmed lessons, teachers' resource book and guide, students' study guide for classroom demonstration; (ii)T-2 having a semi-programmed text, tape-slide work-book, tape-transparency, auto- elucidation test, tape-filmstrip, tape-film, physics-kit, manual for performing experiments; (iii)T-3 with a linear programmed text, tape-slide work-book, tape-transparency, auto-elucidation test, tape-filmstrip, tape-film, physics-kit, manual; (iv)T-4 having a branching programmed text, tape-slide work-book, tape-transparency, auto-elucidation test, tape-filmstrip, tape-film, physics-kit, manual; (v)T-5 having a hybrid programmed text, tape-slide work-book, tape-transparency, auto- elucidation test, tape-filmstrip, tape-film, physics-kit, manual. The experiment was performed in schools for a pretty long time in three phases,
from March 1979 to December 1979. Some concepts and principles were first developed in the subjects through the respective programmed texts, which were then concretized and strengthened through the tape-slide work-book or tape-transparency or tape-film presentation. Concepts and principles illustrated through these written and media were then evaluated on a short auto-elucidation test. Feedback was then provided by involving the subjects in experimental work with the help of the physics-kit and manual. The experimental data were analysed by analysis of covariance and by $5 \times 3 \times 3$ factorial experiment with nesting and crossing. The following were the findings of the study: (i) There was a significant difference among the different strategy means on the criterion on overall achievement. It was found that on the criterion of overall achievement the multimedia semi-programmed instruction was better than the strategy of programmed teaching; the multimedia linear programmed instruction was better than the multimedia semi-programmed instruction; the multimedia branching programmed instruction was better than the multimedia linear programmed instruction; and the multimedia hybrid programmed instruction was better than the multimedia branching programmed instruction. (ii) The strategies of multimedia programmed instruction enabled learners to reach the level of mastery learning (mean score varied between 80.00 and 86.00 out of 100) (iii) It was found that a significant difference existed in the achievement through the different strategies due to differences in ability.

Varghese (1981) experienced the higher effectiveness of teacher assisted programmed approach over the conventional approach in teaching Biology in Kerala high schools.

Ravindranath (1982) in his study on development of multimedia instructional strategy for teaching science at secondary school level noted that the strategy was effective to the extent that 70 percent of the experimental group students obtained 60 percent and above on all unit tests.

Vardhini (1983) developed and tried out “A Multimedia Instructional Strategy for Teaching Science at Secondary Level”. The finding of the study was that visual projections with teacher explanation and those with taped commentary were equally effective in terms of achievement. Based on her efforts and experience
she concluded that for achievement of different instructional objectives, systematically validated multimedia strategy can be implemented at school level without having to spend too much money or time.

Bhadwal, S.C. (1984) conducted a study on, “Effects of Interim Tests on the Performance and Test Anxiety of High School Students Following Programmed Instruction Material in a Segment of General Science”. The major objective of the study was to compare the performance and test anxiety immediately at the end of instruction, and 20 days after the completion of instruction, of five groups of students-the group taught through the conventional method with interim tests with the knowledge of results; the group taught through the conventional method with interim tests without the knowledge of results; the group taught through the conventional method without interim tests; the group following programmed instruction material with interim tests with the knowledge of results and the group following programmed instruction material with interim tests without the knowledge of results. Methodology included five equivalent treatment groups, formed on the basis of subject-to-subject matching on the variable of intelligence from a pooled sample of 443 ninth grade students selected from three Hindi medium schools of Kangra district of Himachal Pradesh. Each treatment group finally consisted of 24 subjects. Programmed text, pre-test, criterion test, nine interim tests, and General Mental Ability Test were the tools used in the study for data collection. The data were analysed using analysis of covariance. The study revealed: (i) The use of interim tests during the course of instruction enhanced immediate as well as delayed performance of students on the summative test irrespective of the fact whether they were taught through programmed instruction or the conventional method of teaching. (ii) Immediate as well as delayed performance of the students was better on the summative test when the students were taught with interim tests along with the knowledge of results about these tests in comparison to: (a) those who were taught the content matter with interim tests but with no knowledge of results and, (b) those who were taught the content matter without using the interim tests, irrespective of the fact whether the students were taught through programmed instruction or the conventional method of teaching. (iii) When the interim tests were used along with the knowledge of results during instruction, programmed instruction seemed to be a
superior technique to the conventional method as far as the retention of content matter for a longer period was concerned. (iv) When the students were taught through the conventional method, they exhibited the same level of test anxiety, immediately as well as 20 days after the completion of instruction, irrespective of the fact whether (a) interim tests were used with the knowledge of results, (b) interim tests were used without the knowledge of results, or (c) interim tests were not used during the course of instruction. The same was true when students were taught through programmed instruction material. (v) When students were taught through programmed instruction, they exhibited a low level of test anxiety, immediately as well as 20 days after instruction in comparison to those who were taught through the conventional method, irrespective of the fact whether (a) interim tests were used with the knowledge of results, (b) interim tests were used without the knowledge of results, or (c) interim tests were not used during the course of instruction. The results of the study imply that the use of interim tests during instruction enhances students' performance on immediate as well as delayed attainment tests. Further, if the interim tests are used with programmed instruction material, the students exhibit a low level of test anxiety after instruction. Thus the use of interim tests in the classroom, specifically with the knowledge of results and using programmed instruction material may be helpful in increasing performance and reducing the level of test anxiety in the students.

Desai, K.V. (1985) in his study, “An Investigation into Efficacy of Different Instructional Media in the Teaching of Science to the Pupils of Class VIII in Relation to Certain Variables,” formulated the following objectives (i) to compare the achievement of pupils in science learning through different instructional media and the traditional way of teaching, (ii) to compare the achievement of pupils in science learning through the programmed learning approach and the traditional way of teaching, (iii) to compare the achievement of pupils in science learning through slides with discussion approach and the traditional way of teaching, (iv) to compare the achievement of pupils in science learning through the experimental approach and the traditional way of teaching, (v) to compare the achievement of pupils in science learning through the programmed learning approach and slides with discussion approach, (vi) to compare the achievement of pupils in science learning through the
programmed learning approach and the experimental approach, and (vii) to compare the achievement of pupils in science learning through slides with discussion approach and the experimental approach. The density, specific density of a solid, and the cell and its structure were selected for the preparation of the material for instructional media. The programmed learning material, slides and laboratory experiments were designed. The criterion test was prepared on the units selected for experimentation. The Junior Index of Motivation Scale and the Reasoning Ability Test were used for measuring motivation towards schools and reasoning ability of pupils. The experiment was carried out in two schools of Anand city. Four equivalent groups with respect to motivation towards schools and reasoning ability were prepared. In each group there were 25 students. One group was taught through programmed learning, the second group was taught through slides with discussion approach, the third group was taught through the experimental approach and the fourth group was taught through the traditional approach. The analysis of covariance was used to test the various hypotheses. The major findings of the study were: (i) The programmed learning approach was more effective than the traditional way of teaching science.(ii) The slide with discussion approach was more effective than the traditional way of teaching science.(iii) The experimental approach was more effective than the traditional way of teaching science.(iv) In the teaching of science, the experimental approach was the most effective of all approaches.(v) The programmed learning approach and slides with discussion approach were equally effective.(vi) The use of instructional media indicated the possibility of improvement in the methodology of science teaching, raising the standard of science education in secondary schools and development of taste and interest in the younger generation for the subject of science. The major educational implication of the study is that there is not one method of teaching science. The teacher should be experimental-minded and should use different approaches in the light of different objectives. Media are effective in science education.

Madhumohan (1990), Santhosh Kumar (1990), Mollykutty (1991), confirm the superiority of teacher study module over the traditional text book approach in teaching high school chemistry, high school Physics, Teacher Education at B.Ed. level, degree level Botany and ‘Identities’ for high school students respectively. Madhumohan also found that computer assisted instruction is more
effective than modular approach.

Jeyamani P. (1991) in his study, “Effectiveness of the simulation model of teaching through Computer Assisted Instruction (CAI)”, constructed the following objectives (i) To find the effectiveness of the simulation model of teaching as compared to the traditional method (ii) To utilize the growing use of computer in education. Jeyamani developed a Computer Assisted Instruction (CAI) package in physics for class XI students. The sample for the investigation consisted students of standard XI of the two schools selected. The pre test post test method used. Mean standard, deviation and t-test were used to treat the data. The major findings were (i) The experimental group obtained a higher mean than the control group. (ii) The sex wise comparison provides to be insignificant. (iii) There was no significant difference in learning level between Tamil medium and English medium students. (iv) On the basis of the research findings it was concluded that the experimental group performed significantly better than the control group.

Kalimuthu, T. (1991) developed a video programme on environmental pollution in biology for higher secondary students with the following objectives (i) to prepare a video programme on environmental pollution for instructional use for higher secondary students, and (ii) to find out whether the video method is more effective than the traditional lecture method in teaching the concepts of environmental pollution. The sample of the study constituted 60 students (30 males and 30 females) of Standard XI at K.R. Government Higher Secondary School, Ottanchatram and S.M. Girl’s Higher Secondary School, Chatrapatty. The pre-test-post-test equivalent –groups design was employed in the study. The experimental group was taught through video lessons on environmental pollution and the same topic was taught to the control group by the lecture method. A video lesson on environmental pollution, lasting for 36 minutes, was prepared for this study. Mean, SD, and‘t’ test were applied for statistical analysis. Major findings were (i) The higher secondary students taught through the video programme learnt more of the concepts on environmental pollution than those who were taught by the lecture method. (ii) The higher secondary students improved their achievement on environmental pollution after viewing the video programme.
Koul and Bhadwal (1991) indicated that instructions using linear programmed text on ‘Atomic structure’ effectively reduced test anxiety among students compared to conventional method of teaching irrespective of the use of formative evaluation tests.

Sinnathambi (1991) developed a video programme on energetics in chemistry for higher secondary students and Narayana Samy (1991) prepared a video programme to teach Tamil vocabulary for sixth grade students. Both of them concluded that the performance of experimental groups were superior to the control group.

Joshi C.L. (1992) in his study, “The construction and try out of networks for some topics of physics for standard XII Science stream”, made the following objectives (i) To increase the level of understanding of the pupil of higher secondary classes of standard XII science stream in the different topics of ‘Physics’ which are to be taught by using ‘network’ diagrams.(ii) To evaluate the effectiveness of the teaching using network diagrams compared to the teaching through the traditional method. Pupils were divided into two groups. They are constituted with the high achievers and low achievers group. These pupils are taught the different possible topics with the network diagram. The sample constituted of pupils of XII science. Pre-post test were administrated on the pupils. Main findings included (i) There is a significant difference on mean achievement post test scores of pupils belonging to group A and group B. (ii) There is no significant difference on mean of post test scores of pupils of high achievers of group A and high achievers of group B. (iii) No significant difference on mean post test scores of pupils belonging to the high achievers of group A and pupils belonging to low achievers of group B. (iv) Significant difference is obtained on mean post test scores of pupils belonging to the high achievers of group B and pupils belonging to the low achievers of group A.

Sindhi, N.O. (1996) in his study, “The construction and try out of multimedia package for the teaching of physics in standard XI”, formulated the following objectives (i) To develop multimedia package in Physics.(ii) To study the effectiveness of multimedia package in terms of achievement of students. (iii) To study the effectiveness of teaching physics through multimedia package and
conventional method of instruction. (iv) To check the retention of teaching through multimedia package. The findings were (i) There is a significant difference between mean of pre test and post test scores of the experimental group. This shows the effectiveness of multimedia package. (ii) There is a significant difference between mean post test scores of controlled group and experimental group. This proves that the teaching through multimedia package is more effective in comparison to conventional method of instruction. (iii) There is no significant difference between the mean post test score and mean scores of retention test of experimental group. This shows that if the teaching is done through multimedia package than student can remember it for a longer time.

Phoolwala R.N. (1997) in his study, “An inquiry into the utility and effectiveness of microcomputers in teaching science for standard X”, gave the following objectives (i) To know the utility of microcomputer for self learning on the unit ‘Carbonic Compounds’ of Science subject of standard X. (ii) To check the effectiveness of the used microcomputer for the selected unit. (iii) To study the effectiveness of teaching science through microcomputer and traditional method of teaching. (iv) To know the opinion of the students towards science teaching through microcomputer. The main findings were (i) The difference between the mean scores of pre test and post test of experimental group was significant. So it can be said that students can learn effectively through microcomputers. (ii) Students can learn science effectively through microcomputer than through traditional method. (iii) The students revealed highly favourable opinion towards science teaching through microcomputers.

Rangraj (1997) studied the, "Effectiveness of Computer Assisted Instruction (CAI) in teaching Physics at higher secondary level". He came to conclusion that mean of Computer Assisted Instruction (CAI) was found to be significantly different from and greater than that of Computer Assisted Instruction (CAI) as compared to conventional lecture method.

Reddy (1997) studied the effectiveness of multimedia instructional strategy in teaching science to slow learners and the result reveals that it enabled the slow learners to cope with normal students to a considerable extent.
Shoba (1997) studied the efficacy of learning contract as a self-instructional tool for learning biology at the secondary school level and arrived at the inference the learning contract approach is superior to the conventional teaching procedure in terms of students’ achievements.

Khirwadker, A. (1998) conducted a research on development of computer software for learning Chemistry of standard XI from M.S. University of Baroda. The objectives of the study were (i) To develop CAI package in subject of chemistry for standard XI Science students, studying GSTB syllabus. (ii) To study the effectiveness of the software package in terms of instructional time and achievement of student. (iii) To study the effect of the software package on student achievement in relation to student (a) intelligent level (b) motivations level and (c) attitude towards the package. (iv) To study the attitude of the student and teacher regarding the effectiveness of the CAI package with regard to aspects of the software such as content of the software, presentation of the software, examples and illustrations, graphs and figures, evaluation items, Utility of the software and instruction given in the instructional manual that are provided with the software. The three chapters were selected based on difficulty level. In the actual experiment design was pre test, post test design. The data was quantitative as well as qualitative including teachers and students’ opinion about the package. The data analysis was done by ANOVA, ANCOVA and content analysis. The sample for experiment was 30 students in experimental group and 30 students in control group randomly taken. The time duration was one month for both the groups. Investigator had collected data of achievement through pre and post test data about attitude towards package through structured and unstructured interview schedule. The main findings of the study were: It was found that the software package developed for teaching three units of standard XI Chemistry textbook of GSTB was effective in terms of students’ achievement. Also CAI was found to be time effective. The experimental group took 45 hour time in average to complete the three units of Chemistry. Later on the academic achievement of student of experimental group was found to be affected by variables like IQ, academic motivation and attitudes and lastly, majority of experimental group students had positive attitude about various aspects of software package especially regarding presentation of content logical sequencing and language used.
for understanding the content. The school subject teacher always held the positive attitude.

Kadhiravan, S. (1999) studied, “Effectiveness of Computer Assisted Instruction in relation to student’s use of Self-regulated Learning Strategies”, with the following objectives (i) To find out whether there is any difference among the three instructional strategies viz. Lecture Method (LM), Computer Assisted Instruction (CAI) as individualized strategy and Computer Assisted Instruction with peer interaction (CAIPI) in terms of their effectiveness in improving the performance in physics among the higher secondary student with different level of cognition, viz. Knowledge, Application and Understanding. (ii) To develop syllabus based computer software package for the selected units in physics at higher secondary level. (iii) To evaluate the developed computer software from technical and pedagogical points of view. (iv) To find out whether there is any difference among different instructional strategy and Computer Assisted Instruction with peer Interaction in terms of their effectiveness in enhancing the retention as revealed by the learners’ performance in the retention test. (v) To construct criterion referenced test (CRT) based on the content areas taught through different instructional strategies in the present study. (vi) To develop a tool to measure the students’ use of Self Regulated Learning (SRL) strategies. (vii) To find out whether there exists any relationship between the students’ performance in physics as measured by the post test and their use of self regulated learning strategies. The sample consisted of 105 students of standard XI (first year higher secondary course) studying in three different schools situated in Coimbatore and Harur in Tamilnadu. Tools used in the study included syllabus based computer software packages, in areas such as wave motion elasticity, a pre-test developed in physics was used to access the knowledge of students at class X level, five adjective based criterion-referenced tests in selected content areas were developed; and Self Regulated learning Scale (SRS) was developed to measure the students use of self regulated learning strategies. Statistical techniques like Quasi Experimental Design, S.D., ANOVA and t -value were used to analyze the data collected. The main findings were (i) Among the instructional strategies, viz. LM, CAI and CAIPI, CAIPI was the most effective instructional strategy in terms of realizing the instructional objectives in physics at
higher secondary stage. (ii) Among the three instructional strategies, CAIPI is the most effective one in terms of its effectiveness in realizing the instructional objectives in the context of content with low difficulty level. (iii) There was a significant difference among different instructional strategies, viz. LM, CAI and CAIPI in enhancing the students’ use of SRL strategies. (iv) CAI and CAIPI had some influence on students’ use of SRL strategies while lecture method had not. (v) There was significant difference among the instructional strategies viz. LM, CAI and CAIPI in terms of their effectiveness in enhancing the retention of what was already learnt in physics. (vi) There was a differential effect on the cognitive development of the students in physics due to their use of self-regulated learning strategies. The study cites 193 reverences.

Meera, S. (2000) in his study, ‘‘Relative Effectiveness among Different Modes of Computer-based Instruction in Relation to Students’ Personality Traits’’ gave the following objectives (i) To find out whether there is any significant difference between the Conventional Lecture Method and the Computer Assisted Instruction (CAI) as an individualized Instructional strategy in terms of their effectiveness in realizing the instructional objectives in Biology at Class XI; (ii) to find out significant difference among the different modes of Computer-based Instruction viz. Tutorial, Drill & Practice and Simulation in realizing the instructional objectiveness in Biology at Class XI; (iii) to find out whether there is any significant difference among the different modes of Computer-based Instruction (CBI), viz. Tutorial, Drill and Practice and Simulation in terms of their effectiveness in enhancing the retention of cognition as revealed by the learners’ performance in the retention test; (iv) to develop syllabus based CAI package; (v) to assess the personality of the subjects of the control and experimental groups using Cattell’s 16 P.F Inventory with a view to study whether it has any influence on the media effectiveness in realizing the instructional objectives. Quasi-experimental method as well as qualitative and quantitative approach was adopted for the study. The sample was taken four groups of each having 35 students selected through probability sampling method. Cluster sampling technique was adopted in the study. The tools were used in the study such as Cattell’s 16 P.F inventory for students, CRT developed by Raymond B and Achievement test. The main findings were (i)
Different modes of Computer based Instruction, viz. Drill, Practice and Simulation were more effective than conventional lecture method in realizing the instructional objectives in Biology at Class XI. (ii) Effectiveness of the conventional lecture method and the different modes of the Computer-based Instruction, viz. Tutorial, Drill and Practice and Simulation were not influenced by the learner’s personality. (iii) There was significant difference among the different modes of CBI (Computer-based Instruction), viz. Tutorial, Drill and Practice and Simulation in terms of their effectiveness in enhancing the retention of cognition as revealed by the learner’s performance in the retention test. There was significant difference among the different modes of Computer-based Instruction in enhancing retention of what have already learnt. Seventy five references were included in the study.

*Dalwadi, N. (2001)* conducted a research on development and try out of Computer Assisted Instruction in Science. With the following objectives (i) To develop CAI in Science for standard IX. (ii) To study the effectiveness of the CAI in terms of achievement of students. (iii) To study the opinions of the Science teacher and students regarding the effectiveness of the developed CAI. The main findings were (i) CAI was found to be effective individualized instructional technique for teaching science to standard IX students. It helped the student to learn the topic of ‘Light’ and clarified the concepts. (ii) Students’ were found to have a positive opinion towards the developed CAI. (iii) Students’ opinion towards the CAI was found to be favourable as far as the statement related to the interest, mode of presentation, content clarity and the question asked in the CAI. (iv) A Science teacher was found to have a positive opinion towards developed CAI. Also, the data analyzed revealed that teacher has given favourable statements regarding content, language clarity and mode of presentation, clarity in graphics and evaluation procedure in developed CAI.

*Patel, R. (2001)* conducted a research on a study of learning through Computer Assisted Learning Material in relation to selected production variable and contiguity with the objectives as given (i) To analyze CALM in relation to production variables and contiguity. (ii) To study the effectiveness of CALM in terms of mean achievement of students. (iii) To study the learning through various
message items in relation to production variable and contiguity. The research is an experimental type. In order to study the effectiveness of the developed CALM pre test post test single group design was used. A single group of thirty students was selected purposely as a sample for the present study. Findings of the study were: There has been found significant gain through interaction with the Computer Assisted Learning Material on Solar system and Magnet -Standard VIII through the computed correlated t values. The status of the CALM in terms of production variable and contiguity vis-à-vis achievement has been found quite higher, except on a few teaching points where there was need to improve upon graphics, mode of presentation, spatial contiguity of text and animation and temporal contiguity of animation and narration.

Joy, B.H.H. and Manickam, L.S.S. (2002) studied, “Computer Assisted Instruction: Attitude of Teachers and correlates”, with the following objectives (i) To assess the knowledge in computer, attitude to computer Assisted Instruction and teacher competency of Science teacher and (ii) To assess the effect of training on these variables. The sample consisted of 50 high school science teachers of the Thiruvananthpuram revenue district, Kerala randomly selected with the help of purposive sampling. Of these, only 35 teachers formed the experimental group. While the control group consisted of 26 primary school teachers who were undergoing B.Ed. Course selected randomly with the help of purposive sampling. Tool constructed by Helen Joy, Samasanandaraj and Manickam, 1996 on knowledge and attitude. Computer Assisted Instruction Questionnaire was used. Main findings were (i) There was no significant difference on the teacher competency in the pre and post scores or between the experimental and control group. But teacher competency was positively related to post knowledge in CAI of the experimental group. (ii) There was a significant difference between the groups in their attitude towards computer education. As a result of training in Computer Assisted Instruction (CAI), the attitude of the experimental group became more favourable towards computer education. (iii) There was correlation between age and attitude towards use of computer. (iv) There was significant difference in the pre and post scores of the experimental group on knowledge in CAI and attitude towards use of computer.
Vasanthi, A. and Hema, S. (2003) in his study on effectiveness of teaching Chemistry for 1 year B.E. students through Computer Assisted Instruction found that (i) There is significant difference between the mean gain score of the control group taught through TTM and the experimental group administrated by the CAI in all units put together. (ii) There is no significant difference between the mean scores of pre test of control group taught through TTM and experimental group administrated by CAI in all units together (Electrochemical and bonding). (iii) There is no significant difference between the mean scores of post test of control group taught through TTM and experimental group administrated by CAI in all units put together. The study cites 15 references.

Singh, B. (2005) conducted a study, “Effectiveness of Computer Assisted Instruction for teaching Biology”. Experimental method was used for conducting this study. Pre test, post test, experimental group and control group design was used for the study. The sample selected 28 students (14 in control group and 14 in experimental group) of class IX by random sampling from the student studying in Ramanujan Public School. An achievement test was constructed to measure students’ learning about cell and tissues. It consisted of 60 items designed to measure knowledge, understanding and application. Students were taught cell and tissues by lecture method. Through CAI, CD-Rom for science standard class IX was used for teaching. Mean, S.D. and t-ratio were calculated to analyze the data. The main findings were (i) Both the methods were effective in enhancing the learning about cell and tissues. (ii) While lecture method was more effective than CAI for the teaching cell, CAI was more effective then lecture method for teaching tissues.

Anshu, (2006) conducted a study, “Comparative Effectiveness of Single medium and Multimedia on Learning Gains of 9th Graders in Chemistry at Different Levels of Academic Achievement and Intelligence. The objectives of the study were (i) to compare academic achievement in Chemistry of the Students of various abilities, taught through multimedia and single medium; (ii) to compare learning gains in Chemistry of the students of various abilities, taught through multimedia and single medium. Sample survey method was adopted in the study. The sample
comprised of 100 students of Class IX from five Hindi medium Government recognized inter colleges of Merrut city. Single medium was defined as oral medium occasionally supported by print medium. Multimedia meant oral, print and electronic media collectively. Ojha and Choudhary’s Verbal Intelligence Test and Achievement Test were used as tools. The main findings were: Multimedia is as effective as traditional method of teaching in Chemistry to develop the knowledge and understanding domain of the students, all kind of students, i.e. having different and varied abilities.

Dange, J.K. and Wahab, S.A. (2006) in his study effectiveness of Computer Assisted Instruction on the academic achievement of Class IX student’s Physical Science gave the following objectives (i) to find out the effectiveness of teaching physics for class IX through conventional method; (ii) to find out the effectiveness of teaching physics for class IX through computer-assisted instruction; (iii) to find out the effectiveness of teaching physics for class IX through computer-assisted instruction over conventional method; (iv) to prepare a computer-assisted instructional package on “universe”. The present experimental study involved parallel or equated group experimentation, which was more complete and accurate than the one group experimentation. The sample of 32 students was divided into two equated groups of 16 students each. They are studying in IX Class of Sri Aurobindo High School, Shimoga. The control group of another 16 students who were taught the same content by conventional method. Mean, Standard Deviations and ‘t’ test were computed the data for finding results. The main findings were (i) There were no significant differences between mean gain scores of experimental and control group of pre-post test. (ii) There was no significant difference between mean gain scores of pre-test and post-test of control group. (iii) There was significant difference between mean gain scores of pre-test and post-test of experimental group. (iv) There was significant difference between mean gain scores of post-test of control and experimental group.

Vellaisamy (2007) conducted a study, “Effectiveness of Multimedia Approach in teaching science at upper primary level”, with the following objectives (i) To find the status of learning achievement in science among upper primary
pupils. (ii) To study the effectiveness of multimedia elements such as audio, text, images, sound, animation, graphics and video, and multimedia materials such as projected media, non-projected media, print media and mass media on learning achievements. (iii) To examine the scientific attitude of pupils taught through multimedia. (iv) To establish relationship between scientific attitude and achievement in science of the learners. The results of the study can be summarized with this statement that the pupils of experimental group achieved more than the pupils of the control group in science at upper primary level. The pupils of the experimental group have improved in the scientific attitude than the pupils of the control group.

Patel, Kinnary (2008) studied, “Computer Assisted Instruction in Physics for the students of standard XI: An Experimental study”, with the following objectives (i) To develop Computer Assisted Instruction package on two units of physics for XI Science student studying GSTB syllabus. (ii) To study the effectiveness of the CAI package in terms of achievement of students of experimental group. (iii) To study the relative effectiveness of teaching Physics in terms of two methods of teaching Physics i.e. conventional method of instruction and CAI package for students of traditional group and experimental group. (iv) To study the relative effectiveness of CAI with reference to the sex of the students of the experimental group. (v) To know the opinions of the students of the experimental group regarding the effectiveness of used CAI in Physics. (vi) To know the opinions of the teachers of the experimental group regarding the effectiveness of used CAI in physics. Multistage sampling technique was used by the researcher in the study. The pre-test post-test control group design was employed. Two schools, one in rural and another in urban area was selected to conduct the experiment. The sample for the experiment consisted 30 students each in traditional and experimental groups. Time duration was 28 days for both groups with two chapters of class XI Physics text book for the experiment of the study. The tool used was an opinionnaire for students of both groups. Opinions of the expert and subject teacher were invited by an evaluation sheet. For the analysis and interpretation of the data the statistical technique such as mean, S.D., t -test and chi square test was employed. The study revealed that (i) The study has resulted in the
development of a CAI program on ‘motion in one dimension and two dimensions’ and ‘Laws of Motion’ for teaching physics to the students of Class XI. (ii) The package was found significantly effective for the students of class XI of both the groups. (iii) Comparative effectiveness of the CAI method and the traditional method was measured by the experiment and CAI method was found more effective in terms of achievement scores. (iv) In relative effectiveness of the package was equally effective in teaching boys and girls. (v) Students and teachers both revealed a favorable opinion towards CAI program. The study sites 74 references.

2.1.2 REVIEW OF THE RELATED LITERATURE IN GENERAL SUBJECTS

Shah (1979) states that the teachers who were exposed to the treatment of self instructional multimedia course on effective questioning showed significant improvement in all the skills except one, in the context of micro teaching.

Golani, T.P. (1982) studied, “The Use of Audio-visual Aids in the Secondary Schools of District Thane”. The objectives of the study included (i) to create awareness among teachers and headmasters of secondary schools about the importance of audio-visual aids, (ii) to help in raising the academic standard in secondary schools of Thane district, (iii) to know the existing situation regarding audio-visual materials in the secondary schools of Thane district, (iv) to elicit the opinion of the headmasters, and concerned teachers about the measures for providing better and improvised materials on audiovisual education, and (v) to present the above measures in the form of concrete proposals and their implications for secondary schools as well as for the professional courses in training of teachers and preparing materials for audio-visual aids in education. The tools of investigation were questionnaires to schools, headmasters and teachers to assess the availability and use of audio-visual aids in schools, interviews to supplement the information available through questionnaires, and visits and observations. Some of the important findings of the study were: (i) Schools that were situated in urban areas and the ones which were conducted by rich societies possessed audiovisual aids. (ii) Only a few teachers used audio-visual aids in teaching. (iii) Teachers who were trained in the use of audiovisual aids were inadequate in number. (iv) At many places the audiovisual aids were in a broken down condition and awaited repairs. (v)
At many places the hardware was purchased. However, it was not used as proper software was not available. (vi) Audio-visual aids were useful in teaching. (vii) Audio-visual aids were not used due to lack of properly trained personnel and lack of accommodation in the schools. (viii) There were no incentives to teachers who used audio-visual aids. (ix) The state institute for audio-visual education could not provide training to personnel and could not supply proper learning materials.

Krishnan, S.S. (1983) in his study, “Development of Multimedia Package for Teaching a Course on Audio-Visual Education”, constructed the following major objectives (i) to develop a multimedia package for teaching a course on audiovisual education for the instructor training programme, (ii) to find the effectiveness of the multimedia package in terms of achievement of trainees and change in attitude of the instructor trainees towards the multimedia package, and (iii) to study the feasibility of the multimedia package in terms of time and cost for the instructor training programme. To attain the above objectives, a single group design was evolved. As many as 127 instructor trainees enrolled during the year 1981-82 at the Central Training Institute for Instructors, Madras were treated as the sample of the study. The instructional strategy was prepared in modular form. There were five modules containing the full course units. The components of the modules were programmed slides, programmed instructional materials, non-projected visual aids, self-instructional materials with a manual for practical exercises, self-evaluating unit tests with answer keys, discussions, feedback, etc. The strategy was implemented for one academic session. The tools used for data collection were criterion 'tests, comprehensive course tests and an attitude scale prepared by the investigator, and an English language ability test designed at the matriculation level. The main findings of the study were (i) Ninety-eight per cent of the trainees obtained more than 80 per cent of the marks on the final post-test. (ii) The mean percentages of the post-test scores varied from 81.41 to 90.46. (iii) The mean gain in the total scores for all the modules was found to be significant at 0.01 level. (iv) The mean gain scores of knowledge, comprehension and higher mental abilities were found to be significant at 0.01 level. (v) The mean attitude change was found to be significant at 0.01 level. (vi) The achievement of trainees and their language ability were found to be positively related at 0.01 level of significance. (vii) The feasibility of the multimedia
package was established in terms of cost involved in reproduction of the various resource materials and the time scheduling in an actual institutional set-up. The implication of the study was that multimedia packages in modular form could be used for training programmes in vocational institutions.

Seth (1983), describes that educational television programme increases the language development, higher acquisition of information and learning efficiency in children.

Singh, U. (1983) in his study, “Effectiveness of Media with reference to Classroom Ethos”, found that (i) The underlying basic pattern of congenial group educative life for 'actual' classroom before and after the treatment of PLM in book-format, tape-slide format and traditional treatment by teacher revealed the obvious differences between the top and bottom clusters of their pre and post situations. (ii) The different groups perceived differently the 'actual' post-classroom situations after getting treatment. The group during instruction through PLM in book-format gave more emphasis to the authenticity aspect of the ethos. The group felt highly authentic during treatment, in comparison to other groups. Other groups gave top priority to the productivity aspect of the ethos. The experimental group II which underwent tape-slide treatment gave second preference to the legitimacy aspect whereas the experimental group III, which had audio-tape treatment, gave second preference to the authenticity and then the legitimacy aspect of ALP ethos. (iii) All the groups and their replicates, except the PLM in book-format group, gave top priority to the productivity aspect of the ethos for 'actual' and 'ideal' classroom situations. All the groups, except the PLM in audio-tape format group, had perceived an 'actual' post-ALP ethos nearer to their perceptions of an 'ideal' classroom. The audio-tape as an instructional medium was not found effective in creating an 'ideal' classroom ethos with special reference to the legitimacy and authenticity aspects.(iv)

Both traditional and tape-slide treatments were found to be significantly better in achieving mean gain scores than the PLM book or the audio-tape treatments. (v) If use of any media treatment in the teaching-learning process is capable of creating ideal classroom situations, it would be also helpful in achieving high scores. (vi) The study indicated some relationship between media and classroom ethos.
Menon, M.B. (1984) in his study, “Evolving a Multimedia Approach to Teaching at Post-graduate Level”, included the following major objectives (i) to develop a multimedia strategy in organizing a course in educational technology for postgraduate and research students, (ii) to validate the strategy in terms of students' performance in criterion tests and discussion sessions, and their attitude towards the strategy, (iii) to study the relationship between achievement and intelligence, and achievement and English reading comprehension, and (iv) to study the feasibility of the strategy. A single group design was worked out for carrying out the investigation over a long period of time. The sample for the validation study consisted of 21 M.Ed. students, 15 M.Sc. Home Science students and eight research students of Education during the 1977-78 session and a combined group of 22 students from M.Ed. and M.Sc. (Home) students of the 1978-79 session. The instructional inputs of the strategy were PLM, structured lecture, team teaching, seminar, slide-tape commentary, work-book presentation, discussion, library work, assignment, feedback session, practical work and summary. The tools used for the study were the criterion test, an observation schedule, and an attitude scale prepared by the investigator, Govinda's English Reading Comprehension and Raven's Standard Progressive Matrices. Descriptive statistics, F-test, partial correlation and product-moment correlation techniques were used for analysis of data. The findings of the study were: (i) In the initial year, around 90 per cent Ph.D. students and M.Sc. students scored 60 per cent and above marks on the Comprehensive Criterion Test, and more than 50 per cent M.Ed. students scored 60 per cent and above marks. (ii) In the subsequent year around 90 per cent students scored 75 per cent and more marks. (iii) An improvement trend was witnessed with regard to discussion sessions. (iv) At different stages of implementation of the strategy, the students' attitude towards the multimedia approach went on increasing in a favourable direction. (v) During the period of try-out of the strategy for two years, the relationship between intelligence and academic achievement was found not significant. The relationship between English comprehension and academic achievement was found significant at 0.01 level. (vi) The unit cost varied from Rs. 47/- to Rs.32/- for a range of 25 to 50 students if software suitable to be presented through hardware was to be incorporated. The strategy worked within prescribed
periods of time. The educational implication of the study is that the validated multimedia strategy, with suitable software material can be used to provide instruction in 'educational technology' of one semester duration to postgraduate students in education and related disciplines.

Rao, L.N.(1984) conducted a study of factors influencing the effective use of audio-visual equipment and materials in classroom teaching with the following objectives (i) to find out the present position of the audio-visual equipment and materials in the secondary schools of East and West Godavari districts of Andhra Pradesh, (ii) to determine the factors hindering the effective use of audio-visual equipment and materials in classroom teaching, and (iii) to ascertain the attitude of the respondents towards the factors influencing the effective use of audio-visual equipment and materials in classroom teaching. The study was conducted on a sample of eight schools by mailing four types of questionnaires for the availability of audio-visual equipment and materials and their effective use in classroom teaching. The following tools were developed by the investigator for the purpose of data collection: (i) questionnaire on the availability of audio-visual equipment, (ii) questionnaire on the availability of audio-visual materials, (iii) questionnaire on the effective use of audiovisual equipment in classroom teaching, (iv) questionnaire on the effective use of audio-visual materials in classroom teaching. The major findings were: (i) The position of the audio-visual equipment in the schools was poor. (ii) There was a significant relationship between the availability of the equipment and the type of the management of the school. (iii) There was association between the availability of the equipment in the schools and their locality. (iv) There was a relationship between the availability of the audio-visual equipment and the age of the schools. (v) There was a relationship between the availability of the audio-visual equipment and the type of school. (vi) There was no positive association between the availability of audio-visual equipment and the strength of the school. (vii) There was no positive association between the effective or ineffective use of audiovisual equipment in classroom teaching and the type of management. (viii) There was no significant relationship between the effective use of audio-visual equipment in classroom teaching and the locality of the schools. (ix) There was no relationship between the effective use of audio-visual equipment in classroom teaching and the
strength of the schools. (x) Most of the respondents checked the factor, 'Absence of sufficient equipment and materials' as the first and foremost hindering factor for the effective use of audio-visual equipment and materials. The other factors hindering the effective use of audio-visual equipment and materials, given in order of importance, were: 'Heavy work load on the part of the teacher', 'Lack of accommodation', 'Lack of funds', 'Lack of trained personnel', 'Lack of time for the teacher' and 'Very expensive.'

Dhamija, N.(1985) studied, “A Comparative Study of the Effectiveness of Three Approaches of Instructions- Conventional, Radio-vision and Modular Approach on Achievement of Students in Social Studies” with the following objectives (i) to compare the achievement of students of class VII in social studies when taught through three different approaches, viz. radio-vision, modular and conventional, (ii) to compare the achievement of students in geography when taught through these three approaches, (iii) to compare the achievement of students in civics when taught through these three approaches, (iv) to compare the achievement of students in history when taught through these three approaches, (v) to compare the retention of students in geography when taught through these three approaches, (vi) to compare the retention of students in civics when taught through these three approaches, (vii) to compare the retention of students in history when taught through these three approaches, (viii) to compare the students' involvement in geography when taught through three approaches, (ix) to compare the students' involvement in civics when taught through three approaches, (x) to compare the students' involvement in history when taught through three approaches, (xi) to compare the self-confidence of students in geography when taught through these three approaches, (xii) to compare the self-confidence of students in civics when taught through these three approaches, and (xiii) to compare the self- confidence of students in history when taught through these three approaches. The findings of the study were: (i) The students achieved highest knowledge achievement scores in geography when taught through radio-vision. (ii) High intelligent students scored highest knowledge achievement scores in geography when taught through radio-vision. (iii) The achievement of students was the highest in comprehension scores in geography when taught through the radio-vision approach. (iv) High intelligent
students got the highest comprehension achievement scores when taught geography through the radio-vision approach. (v) The students achieved the highest total achievement scores in geography when taught through the radio-vision approach. (vi) Students, having high intelligence, attained the highest achievement scores in civics when taught through the radio-vision approach. (vii) The achievement of students was the highest in knowledge achievement scores in civics when taught through the modular approach. (viii) Students having high intelligence got the highest knowledge achievement scores in civics when taught through the modular approach. (ix) The achievement of students was highest in comprehension achievement scores in civics when taught through the modular approach. (x) Students with high intelligence got the highest comprehension achievement scores in civics when taught through the modular approach. (xi) The students achieved highest total achievement scores in civics when taught through the modular approach. (xii) Students having high intelligence scored the highest total achievement scores in civics when taught through modular approach. (xiii) The students achieved the highest knowledge achievement scores in history when taught through the conventional approach. (xiv) Students of high intelligence got the highest knowledge achievement scores in history when taught through the conventional approach. (xv) The students' achievement was the highest in comprehension achievement scores when taught history through the conventional approach. (xvi) High intelligence students attained the highest comprehension achievement scores in history when taught through the conventional approach. (xvii) The achievement of the students on the total achievement scores was the highest in history when taught through the conventional approach. (xviii) Students having high intelligence got the highest achievement scores when taught history through the conventional approach. (xix) The retention on knowledge, comprehension and total achievement scores was the highest in that group of students who were taught geography through the radio-vision approach. (xx) The retention on knowledge, comprehension and total achievement scores was the highest in that group of students who were taught civics through the modular approach. (xxi) The retention on knowledge, comprehension and total achievement scores was the highest in that group of students who were taught history through the conventional approach. (xxii) The involvement of students in the class-room was
maximum when they were taught through the radio-vision approach. (xxiii) Self-confidence among the students increased the most when they were taught through the modular approach.

Kothari, R.G. (1985) investigated a study, “An Investigation into Efficacy of Different Instructional Media in the Teaching of Mathematics to the Pupils of Class. The objectives of the study were: (i) to investigate the efficacy of instructional media I (visual projection) over instructional media II (activities and experiment) in terms of achievement, (ii) to investigate the efficacy of visual projection over programmed learning material, (iii) to investigate the efficacy of activities and experiments over programmed learning material, (iv) to investigate the efficacy of visual projection over the traditional method of teaching, (v) to investigate the efficacy of activities and experiments over the traditional method of teaching, and (vi) to investigate the efficacy of programmed learning material over the traditional method of teaching in terms of achievement. Factorization of the type $a^2 - b^2$ and expansion of $(a + b)^2$ were selected for preparing transparencies for projection through the overhead projector. The same topic was selected for the preparation of materials for activities and experiments as well as for preparing programmed learning material. The criterion tests on both units were prepared. The pre-test post-test control group design was adopted for the purpose of studying the efficacy of different media. The experiment was carried out in two schools. Four groups of class IX pupils having 30 pupils in each group were selected for implementing the instructional media while the other four groups were treated as control groups. The Junior Index of Motivation (JIM Scale) and Test of Reasoning Ability were used for collecting necessary information about the variables. The analysis of covariance was used to draw conclusions. Some of the major findings of the study were: (i) Visual projection and activities and experiment were equally effective for Unit I while visual projection was superior to the activities and experiment approach for Unit II. (ii) Visual projection was superior to programmed learning material for Unit I, while they were equally effective for Unit II. (iii) The approach of media activities and experiment was superior to programmed learning material for Unit I but they were equally effective for Unit II. (iv) Visual projection was superior to the traditional method of teaching for Units I and II. (v) The activities and experiment approach
and the traditional method were equally effective for both units. (vi) Programmed learning material and the traditional method of teaching were equally effective for Units I and II. (vii) The results clearly indicated that the instructional media I, namely visual projection, was comparatively.

**The National Policy on Education (1986/1992)** has rightly observed, “The media have a profound influence on the minds of children as well as adults; some of them tend to encourage consumerism, violence, etc., and have a deleterious effect. Radio and TV programmes, which clearly militate against proper educational objectives, will be prevented. Steps will be taken to discourage such trends in films and other media also.

**Antonysamy, L. (1989)** in his study on teaching environmental concepts to school drop-outs through video and charts prepared the following objectives (i) to prepare a video programme on environmental concepts, and (ii) to find out experimentally whether the video method is more effective than using charts in teaching the environmental concepts. Some of the major findings of the study are (i) the school drop-outs taught by the video method learned more concepts on environment than those who were taught by using charts. (ii) the working children improved their achievement on ‘Environmental Concepts’ after viewing the video programme.

**Choudhary, Mira. (1990)** studied, “Khilte Phool—an audio-intervention study at Kota (Rajasthan) with the objectives as follows (i) to promote cognitive skills in children such as sequential thinking, problem solving, concept formation, (ii) to inculcate in children an awareness of their immediate environment, (iii) to develop in teachers/Anganwadi workers the skills to use the ‘play-way’ activity method in teaching young children, and (iv) to develop in teachers/Anganwadi workers a positive attitude towards disadvantaged children and also help them to interact with children more actively. Out of the eight ICDS sectors of Kota, four sectors formed the experimental group and four formed the control group. A hundred Anganwadis each, formed the experimental and control groups. Similarly, twenty—five morning-shift government primary schools were selected for the experimental groups and twenty-five afternoon-shift schools formed the control
group. Audio programmes were prepared keeping in view the developmental level and the abilities of children, and the needs of the community. A guidebook for each programme was prepared, containing details of each programme. Radio sets were supplied to the 100 experimental Anganwadis and to Classes I and II of the primary schools. Major findings of the study were (i) the evaluation indicated that the children of the experimental group in the Anganwadis outshone their counterparts in the control group in listening comprehension, sequential thinking, recall and vocabulary, concept of colour and shape, awareness of immediate environment, awareness of cultural heritage and verbal expression. (ii) the girls did as well as the boys in the Anganwadis and in Classes I and II of the primary schools, (iii) no significant difference was found between the experimental and the control group children belonging to primary schools.

**Goel and Mahajan (1990)** in their study on computer-based question bank at B.Ed. level observed that Science group scored significantly higher than Arts group but no significant difference existed between males and females, Maths and non-Maths students on their achievement in computer education.

**Idayavani, S. (1991)** in her study developing a video programme on weathering and work of rivers in physical geography for higher secondary students gave the following major findings (i) the higher secondary students improved their learning of the concepts on ‘Weathering’ and ‘Work of the Rivers’ after viewing the video programme. (ii) the higher secondary students taught by the video method performed better than the students taught by the traditional lecture method.

**Singh, R.D.; Ahluwalia, S.P.; and Verma, S.K. (1991)** in their study highlighted upon the problem of the effectiveness of Computer Assisted Instruction and of the conventional method of instruction in teaching mathematics, in terms of achievement of mathematics and direction of change in attitude towards mathematics of male and female students. The following objectives were planned (i) To study the difference in mathematics achievement which occurs as a result of the difference in instructional strategy among boys and girls separately and as a group. (ii) To study the direction of change in attitudes of male and female students separately and as a group towards mathematics as a result of two different
instructional strategies. (iii) The sample of the study consisted of 220 students from four selected higher secondary schools, covering the good, average and poor schools of the Bhilai steel plant, Bhilai (M.P.). Some of the major findings of the study were (i) The students who used the computer scored significantly higher than those taught mathematics through the conventional method. (ii) The students who used the computer showed significantly highly favourable attitude towards mathematics than those who did not use the computer. (iii) Achievement in mathematics and change in attitude towards mathematics were found to be independent of the sex factor.

**Singh R.D. (1992)** discussed the relative merits of teaching Mathematics through Computer Assisted Instruction and conventional method of teaching. Computer Assisted Instruction was always found superior, but the gains were more in the case of good students and there was a definite positive change of attitude towards learning Mathematics on the part of both boys and girls due to the use of computers.

**Das A. (1998)** in his study exploring effectiveness of Computer Assisted Learning materials on rhymes in different modes found that: Graphics text mode has been found comparatively weaker than the other modes in learning word meaning on rhymes in different modes. The one of the seven rhymes text mode has been found most effective in developing language ability. In the same rhymes, Graphics text music and graphics text mode in developing language abilities of the pupils has been used. In five out of seven rhymes no significant difference has been found in different modes for developing language ability of the pupils. In three out of seven rhymes text mode largely has been found comparatively weaker than other modes for comprehensive understanding, where as in one rhymes text mode has been found most effective for comprehensive understanding.

**Madanakumar (1998)** found that media based instructional strategy is more effective in creating environmental theory and application awareness than conventional text book approach among primary school pupils of Kerala.

**Rajaswaminathan (1998)** conducted a study on “Impact of Multimedia
Package on the Teaching of Commerce with performance to select variables”. The study found that the use of multimedia package was more effective than conventional method of teaching.

**Varma (1998)** in his study conducted a study to examine the effectiveness of instructional media in modifying the cognitive and effective behaviour in prevention and control of Acquired Immuno Deficiency Syndrome (AIDS). The findings of the study were: (i) Instructional media was effective in achieving the instructional objectives in AIDS awareness programmes, (ii) Different instructional media viz. video, audio, slides and lecture method were not effective in changing the attitude towards AIDS epidemic except posters as an instructional media.

**Zyoud, M. (1999)** in his study, “Development of Computer Assisted English Language Teaching for VIII standard students, formulated the following objectives (i) To develop a Computer Assisted English language teaching program for standard VIII Gujarati medium students. (ii) To study the effectiveness of the Computer Assisted English language teaching program on students achievement in terms of Vocabulary grammar and comprehension by taking pre test and IQ covariate. (iii) To study the effectiveness of the Computer Assisted English language teaching program on the experimental group students’ achievement of all above mentioned with respect to their intelligence, motivation and attitude. For the development of the software package four lessons were selected based on opinion of teachers and students regarding difficulty level of these lessons and the difficulty of teaching them. After selecting lessons, content analysis was carried out. Students studying in standard VIII Gujarati medium were taken from two schools to serve as the sample for the study. Students of one school i.e. Rosary School, Baroda formed the experimental group and student of the other school i.e. GEB school, Baroda formed the control group. The tools used in the pilot study were also used in the final experiment namely pre test, Raven’s progressive matrices sets A, B, C, D and E (Raven, 1960). Junior Index of motivation by Frimer (1970) and translated into Gujarati by Dr. Desai (1970) and post test. To study attitude of the students towards the package the researcher developed and administrated an attitude scale on the experimental group only after the final experiment. The findings show that when the
computer is used to its full potential it can create an atmosphere where the students can learn and interact with the computer without being afraid of the teacher’s presence. The computerized exercise can help the student become familiar with a significant amount of vocabulary, grammar and comprehension because it provides effective individualized instruction.

**Dharmappa et. al. (2000)** states that the use and implementation of multimedia based resources in a teaching and learning environment can greatly improve the effectiveness and efficiency of learning by engaging students at a deeper level. This is particularly true in situations where real world phenomena and unseen processes are being taught.

**Das, I. (2003)** in his study on Computer Education in the Secondary Schools of Assam found that (i) Students have a positive attitude and outlook, towards computer education received in their respective schools. Some students have suggested a revamping of the traditional modes of teaching by introducing computers in teaching which they think will make their education more exciting and interesting. (ii) Teachers are confident about their knowledge of the subject; they are not devoid of anxiety. Majority of the students’ teacher recognition the important role that computers play in today’s society. (iii) The English medium student found to display higher level of confidence a sense of competences in their approach to and use of computers than the Assamese medium students. (iv) In spite of funding and all other infrastructural facilities provided by the North Eastern council in a collaborative venture with the Board of Secondary Education, Assam, nothing fruitful or lasting evolved from the course of computer education imparted to the students of government schools. (v) Girls have a positive attitude towards computer as being more users friendly and express less anxiety about the use of computers.

**Jothikani, N and Thiagarajan, A.P. (2004)** studied, “Effectiveness of Computer Assisted Instruction in Mathematics among B.Sc., Degree students”. The objectives of the study were (i) To analyze the efficiency of teaching Mathematics to B.Sc. degree students through CAI over conventional method for knowledge, comprehension and application objectives; (ii) To compare the effectiveness of teaching Mathematics through CAI to B.Sc. degree (Mathematics) students over
conventional method in terms of the level of achievement; and (iii) To study the effectiveness of teaching Mathematics through CAI to B.Sc. degree (Mathematics) students over conventional method in terms of objectives of teaching Mathematics and their level of achievement. Two equivalent groups each in I year, II year and III year of Mathematics students were formed based on their achievement score in the previous year. The investigator taught the control group and the experimental group were taught through CAI. ‘t’-test was applied in order to test the significance difference between the mean scores of pre test and post test of conventional and experimental group and to test the significance of CAI over conventional method for the mean gain scores of control and experimental groups. The study revealed the following objectives (i) There is no significant difference between the mean scores of pre test for the control and experimental group in all six units with reference to the objectives such as knowledge, Comprehension and application and their level of achievement such as Low, Average and High achievers. (ii) The mean scores of post test of control group are significantly higher than that of the experimental group in all six units with reference to the objectives and their level of achievement in both the years 1999-2000 and 2001-2002. (iii) The mean gain scores of the control group are significantly greater than that of experimental group in all six units with reference to the objective and their level of achievement in both the years 1999-2000 and 2001-2002. Hence, it is concluded that the conventional method is more effective and efficient than CAI method.

**Joy, B.H.H. and Shaiju, S.L. (2004)** in his study Development of Computer Assisted Teaching Material in History at Higher Secondary Level and its effectiveness found that the CAT (Computer Assisted Teaching) method was found superior to the lecture method. It is interesting to note that there is no gender difference in the scores obtained.

**Suwana, R. (2004)** conducted a study, “Effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental study”. The objectives of the study were (i) To know the effectiveness of Computer Assisted Instruction developed by ONPEC for primary school students to learn English language. (ii) To develop Computer Assisted Instruction for primary student to learn
Thai language. (iii) To know the effectiveness of Computer Assisted Instruction in learning Thai language developed by the investigator for primary school students. (iv) To know the relative effectiveness of Computer Assisted Instruction developed by ONPEC and by the investigator. (v) To evaluate the both types of Computer Assisted Instruction on the basis of the collected opinion of experts and primary school students. (vi) To provide suggestion to ONPEC for improving Computer Assisted Instruction Program on the basis of obtained data. The following major findings were reported (i) The study has resulted in the development of Computer Assisted Instructional Program on selected five units of Thai language learning for the students of Pratom-3 and five units of Thai language learning for the students of Pratom-6. (ii) The Computer Assisted Instruction developed by the investigator was found significantly effective in learning five topics of Thai subject to the student of Pratom-3 of experimental group – I belong to Buriram Kindergarten (t-value 8.62). (iii) The Computer Assisted Instruction developed by ONPEC was also found significantly effective in learning five topics of English subject to the students of Pratom - 3 of Experimental group - I belong to Buriram Kindergarten (t-value 8.60). (iv) On comparison of mean gain scores obtained for CAI developed by ONPEC in English language with CAI developed by the investigator in Thai language, the obtained t-value is 1.18. (v) The Computer Assisted Instruction developed by the investigator was found significantly effective in learning five topics of Thai subject to the students of Pratom-6 of experimental group-II belong to Buriram Kindergarten. (vi) It was evaluated by teacher as a successful attempt. (vii) Opinion of students was found effective in presenting all the five topics of English and Thai language.

Kumar (2006) in his study, “Comparative study of the effectiveness of three instructional systems for teaching information technology” found that (i) Multimedia Instructional System was found to be best Instructional System than two instructional systems i.e. Audio-Video Instructional System, and Conventional Instructional System. Audio-Video Instructional System was better than the Conventional System. (ii) The relative comparison of three instructional systems on their retention by using the assumptions that a method lower on mean score i.e. mean score of Multimedia instructional system would be termed as more effective
on retention as compared to a method having higher mean scores i.e. Audio-Video instructional system and Conventional system on retention.

Subramanian (2006) exposed the experimental group to CAI instructional material and the control group received instruction through conventional teaching method. The objectives of the study were (i) To develop a software package for teaching the topic triple column cash book to the students of +1. (ii) To find out whether there is any significant difference between the mean gain scores of the control group and the experimental group in the academic achievements. (iii) To find out whether there is any significant difference between the mean gain scores of male and female students in their academic achievements while teaching through CAI and conventional method of teaching. (iv) To find out whether there is any significant difference between the mean gain scores of male and female students in their academic achievements after teaching through CAI. Main findings of the study were (i) Computer Assisted Instructions (CAI) significantly improve the performance of the students, learning Accountancy at higher secondary level. (ii) The combination of the colour, text, music and animation of the CAI package was well received by the students and the positive effect of the same is perceptible from their female counterparts in their achievement scores. (iii) Male students do not differ much from their female counterparts in their achievement, even after exposure to CAI.

Mehra, Vandana (2007) conducted a study, “Teacher’s Attitude towards Computer use Implications for emerging Technology Implementation in Educational Institutions”. The purpose of this study was to determine the attitudes of school teachers of Chandigarh towards use of computer technology for instructional purpose. The main objectives of the study were (i) To study the attitudes of high school teachers towards computer use; (ii) To study the perceptions of school teachers with respect to computer attributes, level of computer competences and their access to computers. The study was conducted on 200 government senior secondary school teachers of Chandigarh to explore the teachers’ attitudes of computer use. The findings revealed the teachers possessed fairly positive attitude towards computer uses but majority of the teachers needs to be provided training for
using computers in instructional settings.

Patel, J. A, (2009) in his study, “Development and Implementation of CAI to teach English grammar to standard VIII student in different modes”. The objectives of the study were (i) To develop the CAI to teach English Grammar to Standard VIII Gujarat Secondary and Higher Secondary Board (GS&HSEB) students in different modes (only CAI, CAI with repetition and CAI with discussion). (ii) To study the effectiveness of the developed CAI in different modes in terms of students’ achievement in English Grammar. (iii) To study the effectiveness of the developed CAI in terms of the reactions of students. (iv) To study the relative effectiveness of the developed CAI in different modes of presentation (only CAI, CAI with repetition, CAI with discussion) in terms of differences in the adjusted post-test mean achievement of the student in English Grammar. The sample of the present study was selected purposively. For it two schools of Vadodara namely, Bright day school and Kelvani school during the academic year 2008-09 were selected. From the selected schools 26 standards VIII students of only one division VIII-A of Kelvani School were taken as the Control group and 62 standard VIII students of Bright day school were treated as the experiment group. The required data were collected with the help of pre-test, post-test and reaction scale which were constructed by the researcher. In between pre-test and post-test the researcher implemented the intervention program in the form of CAI package for ten days for two hours per day on the experiment groups and control group was taught the same topics by their teacher. After the implementation of that the researcher administrated the post-test after the span of fifteen days and the reactions of the students, based on teaching with CAI and the developed CAI itself were taken. The data were collected in three phase. Major findings of the study included (i) The achievement of the students in English Grammar taught through CAI was found significantly higher than that of the students taught through traditional method. (ii) The achievement of the students taught through only CAI was found significantly higher in English Grammar than that of the students taught through traditional method. (iii) The achievement of the students taught through CAI with repetition and CAI with Discussion was found significantly higher than the achievement of the students who were taught through traditional method. (iv) From the three modes of the presentation of this CAI, the mode i.e. teaching through CAI with discussion was found significantly superior in comparison to other two modes.
(v) CAI was also found to be effective in terms of the students.

After going through the educational research done in India, the researcher found the varied research studies done with regard to multimedia and multimedia based packages with Science. These studies also reveal that teaching-learning become more interesting, joyous and prolonged when newer technology based intervention programmes were used. These observations can be summarized as follows:

(i) Teachers used different media ranging from PSI, ISI, School broadcasts, Video method and PLM. (Dasgupta, 1988; Mehra, 1988; Mohanty, 1988; Sudama and Goel, 1988; Antonyswamy, 1989; Debi, 1989).

(ii) Teachers used school radio programmes and found that audio intervention broadcast programmes were helpful to the students in their learning. (Mishra, 1989; Chowdhry, 1990; Giri, 1990; Biswal, 1992; Harjal, 1992)

(iii) Teachers used video programmes both in languages as well as in sciences and found that video method was more effective than the lecture method (Hubbard, 1991; Idayavani, 1991; Kalimuthu, 1991; Mishra, 1991; Narayansamy, 1991; Sinnathambi, 1991; Biswal, 1992; Ghosh, 1992; Kapadia, 1992; Kaur, 2005)

(iv) From the reviewed literature it is clearly seen that CAI is an effective approach and has a great concern regarding learning in Science. It is found that the effectiveness of CAI is compared with traditional method in Science. CAI is superior to the traditional method is supported by the studies of Jeyamani, P. (1991), Khirwadkar, A. (1998), Kadhiran, S. (1999), Meera, S. (2000), Dalwadi, N. (2001), Vasanthis, A. and Hema, S. (2003), Dange, J.K. and Wahab, S.A. (2006), Patel, Kinnary. (2008) etc. These research studies were related with topics from the branches of science like Physics, Biology and Chemistry at higher secondary as well as secondary level and it shows that well designed CAI is profound in learning.

(v) Researches by Joshi C.L (1992), Sindhi, N.O. (1996), Phoolwala R.N. (1997), Patel, R. (2001), were conducted to see the effectiveness of the different method in science. These researches have been based on network diagram,
microcomputer, multimedia package and CALM.

(vi) Researches by Singh, R.D.; Ahluwalia, S.P.; and Verma, S.K. (1991), Rose, A.V. (1992), Zyoud, M. (1999), Jothikani, N and Thiagarajan, A.P. (2004), Suwana, R. (2004) were conducted to see the effectiveness of CAI in different subjects like Mathematics, English History at different level. Out of these researches only one research conducted by Das, A (1998) was found measuring the effectiveness of the CAI presented in different modes and that too was for teaching Rhymes at lower standard.


(viii) Both the methods i.e. CAI and Lecture Method were effective in enhancing the learning. But, on different topics relative effect were shown by both the method. Singh, B. (2005).


(x) Girls have a positive attitude towards computer as being more users friendly and express less anxiety about the use of computers. Das, I. (2003)

(xi) CAI is effective in comparison of two methods as well as it is found to be effective in different mediums of teaching Jeyamani, P. (1991).

2.2 REVIEW OF THE RELATED LITERATURE CONDUCTED ABROAD

Allison, R.W. (1966) studied “The effect of three methods of treating motivational films upon attitudes of fourth, fifth and sixth grade students toward science, scientists and scientific careers”. Ten motivational films were shown to 450
randomly selected fourth-, fifth-, and sixth-grade students to determine if changes in attitude towards science, scientists, and scientific careers could be produced. Attitudes of students in all experimental groups changed favourably from pre-test to post-test, but only in treatment groups having follow up discussions or questions were changes significantly greater than those exhibited by the control group. No significant relationships were found between attitudes and grade level, mental age, science achievement, sex, parents’ science background, or economic status.

Allen, W.H., Sweet, B., & Cooney, S. M. (1968) evaluated five experimental treatments using sound –slide presentations. A pre-test-post-test design using a specially prepared attitude inventory was used to test hypotheses. All experimental groups made positive attitude shifts compared with a control group, but only the treatment that included the option for the subject to select the next format to be viewed coupled with active participation produced significantly greater attitude change than the control group. It was concluded that attitude changes can be produced by audiovisual stimulus materials and that such changes are most likely when subjects are provided an opportunity to participate actively by responding to the content of the message. Students of lower mental ability were most susceptible to attitude change.

Atkinson (1968) showed that computer assisted instruction students performed significantly better in their achievement in reading at Stanford’s CAI programme than their peers in normal classrooms.

Carmigani (1973) found that learning activity modules are effective in enabling high school students to learn cognitive and psychomotor skills.

Windell (1975) shows that the self-instructional teacher training modules are effective to produce reliable changes in trainees’ knowledge and skill in the use of techniques for determining reading level of the exceptional children.

Pereira (1982) found that audio-laboratory method is more effective than formal method of teaching in science and it is superior in the attainment of higher objectives like understanding, application and skill in primary school children.
Kulik, Bangert and Williams (1983) found one study that recorded a 39 percent savings in learning time with computerized instruction (135 minutes) versus classroom instruction (220 minutes).

Greenberg (1984) compared the effectiveness of computer assisted videocassette lessons with that of videocassette lessons and paper-pencil practice. The findings revealed that there was no significant difference existed between the post test performances of the two groups.

Wad (1984) investigated the scope of media based communication using documentary analysis and library research and opines that scope of media is restricted because lack of participation of students, teachers and parents in these programmes.

Ginapp (1985) studied that the influence of teacher assessment module tapes on student teachers’ performance showed that students in the experimental group received higher overall ratings by groups of student teachers, supervising teachers and cooperating teachers indicating the effectiveness of module tapes.

Lowerbraun and Thomson (1989) have described research designed to discover the relative efficacy of the new and old approaches and to make recommendations for further research as well as regulatory and policy changes. They also stressed the need to study the effectiveness of use of new media and technology such as captioned films, transparencies, programmed instruction sequences, computer software etc. in education of deaf.

Amthor (1991) also provided favourable findings for multimedia. When interactive video instruction was compared to more traditional methods of instruction, achievement was improved by over 38 percent while the time needed to teach subject matter decreased by 31 percent.

Haley, Mary Lewis Purnell (1991) in his study Effects of Computer-Assisted Instruction in Macroeconomics Education: An Experimental Course Design. The major findings of the study were: Results of the regression analysis
showed no significant positive relationship between students' cognitive achievement in Principles of Macroeconomics and their use of computer-assisted instruction. The only independent variable that was consistently positively related to students’ cognitive achievement in Principles of Macroeconomics was college grade point average. Males were shown to be superior to females in terms of cognitive achievement in macroeconomics.

Lamazares and Ivonne Mercedes, (1991) in their study the effects of Computer-Assisted Instruction on the writing performance and writing anxiety of Community College Developmental Students (Community College Students) found that: A statistical analysis of holistic scores revealed no significant differences between the CAI and comparison groups in writing performance, and no significant differences in the overall performance of the CAI group when writing on the computer as opposed to using paper and pencil. Analytical scores revealed that the content of the computer essays produced by the CAI group was rated significantly higher than the content of paper-and-pencil essays produced by the same group. Analysis of grammar and spelling, diction, organization and sentence structure did not yield significant differences between the handwritten and computer essays. The CAI group’s writing anxiety became significantly lower than that of the comparison group. Observations by the researcher indicated positive student retention and attitudes toward the computer, and limitations in the study due to lack of technological training and resources. Developmental students did not seem overwhelmed by the new technology or unable to benefit from it, as demonstrated by the significantly reduced writing anxiety of the CAI group, and the significantly higher rated content of the computer essays. These results, though limited in generalizability, warrant further experimentation with developmental writing instruction that integrates computer networks.

Smith and Jones (1991) found that present recent changes in technologies, expansion of courseware, and distribution of courseware as a significant part of the undergraduate chemistry curriculum at the University of Illinois since 1986.
Toet, Joyce Anne. (1991) conducted a comparative study of two instructional modalities on the achievement level of under prepared Community College Students. The objectives of the study were (i) This study was undertaken to determine if an Integrated Computer Assisted Instructional system would show superior results measured by increased cognitive gain, when compared to Traditional Instruction methodologies. (ii) A determination of the successful student based on gender, ethnicity, age and prior special education history was undertaken to develop a profile of the successful student in each modality. Findings: Analysis of final data showed that the experimental groups achieved greater cognitive gains, only Math 021 (basic math) showed differences of a statistically significant level. The analysis showed no possibility of developing a prescriptive instrument for use as a guide for future students to choose either ICAI or traditional classroom instruction based on demographic information and resulting mean cognitive gains. No trends are evident from the analysis of these data. One finding of significant import is the retention rates for ICAI and Traditional classroom methodologies. The results show that students remain in the Computer Assisted Instructional methodology at an increased number to a statistically significant level of alpha .05 in all classes studied (Math 101, beginning algebra, English 098, basic writing, English 020, reading improvement) with the exception of Math 021, basic math.

Welsh & Null (1991) suggested that advanced technologies, which often involve introducing or enhancing the visual aspects of class presentations, are indeed beneficial to students.

Gao, Yong Qiang, (1992) in his study on factors affecting use of Computer-Assisted Instruction by selected Chinese University educators found a significant development of CAI in China in recent years. Most educators had positive attitudes toward CAI and more than half of them used CAI in their teaching. The study also found statistically significant differences between use of CAI and age and English level; age, rank, and computer experience were also correlated to use of CAI; all 5 factors examined in this study were statistically significant related to use of CAI.
Based on the findings of the study, recommendations were made for improvement and future research on CAI in China.

Katz and Pyryt (1992) describe a project that focuses on improving students self-image, self motivation and decision making skills by using technology like audio cassette, microphone, video animation and computer software package, for sixth grade students.

Litchfield (1992) identified different factors such as the nature of investigation, advantages of the programme over a laboratory investigation, number and types of higher order thinking skills required, concepts related to inquiry are the evaluation criteria that may be used to determine the usefulness of Science education computer software.

Yang (1992) and Crain (1994) found that computer based instruction provides better opportunity for creativity, sustained motivation and immediate recall of learnt facts.

Couch (1993) gives the importance of visual literacy along with scientific literacy among middle school students in the teaching of earth and life science classes.

Park, Insun Hwang (1993) in his study co-operative Learning and Individual Learning with Computer Assisted Instruction in an introductory University level Chemistry course found that, “Subjects who participated in cooperative learning performed their achievement better than subjects in the individual learning groups with Computer Assisted Instruction (CAI) in an introductory university-level chemistry course. High-ability level students and low-ability level students in cooperative learning group improved their performance more than high-ability or low-ability level individuals who worked alone with a computer in an introductory university level chemistry course. There was no significant difference on students' attitude between students who worked in the group use of computers and individual use of computers in an introductory university-level chemistry course. The majority of the students in the university
level class showed positive co-operation on group work and positive attitude toward using computers in the classroom.

Roberts (1993) studied, “A comparison in the effectiveness of the delivery of an interactive computer assisted instruction module to a traditional lecture delivered module”. The study found that the learner on the experimental group (ICAI) test scored <3 or 37.3% (19151) on the pre-test had a significantly high or adjusted mean post-test score than those of the learners in the control group.

Arbour (1994) developed a multimedia package that includes video cassette, a guide, six posters to provide a teaching outlines on great lakes Fisheries for middle and high school. The package was found effective in both formal and informal school settings.

Beichner (1994) examined the cognitive and affective impact of a multimedia editing to promote science learning. He also found that students were highly motivated to work cooperatively and without teacher supervision in such environments.

Chen (1994) conducted a study on “A meta-analysis of effectiveness of Computer Based Instruction (CBI) in Mathematics”. The results indicate that CBI had significant effect on students of Mathematics but no significant effect on their problem solving ability.

Kanning (1994) describes that the multimedia approach is most successful in helping students to reach existing curricular goals.

Khoo Cheng Choo (1994) states that innovative interactive multimedia usage should only be applied to content material whom traditional audiovisual media techniques have failed to communicate the complexity or richness of the materials in a teaching-learning environment. Thus if potential interactive multimedia developers follow these guidelines, there will be better and more relevant interactive multimedia programs in future.
Lindstrom (1994) stated that, "Multimedia provides a means to supplement a presenter's efforts to garner attention, increase retention, improve comprehension, and to bring an audience into agreement." In the light of this, educators can take advantage of the multi-sensory environment created by the multiple digital media elements to create multimedia education materials that would not only stimulate a variety of senses from the audience, but also elicit high attention and retention rates from them.

Burton, Beatrice Spencer, (1995) in his study found that (i) The type of instruction had an influence on the academic performance of adult students on the math and reading sections of the TABE. (ii) Adult students' age had no effect on their total scores on the TABE. (iii) Male and female adult students had similar scores on the total section of the TABE. (iv) Ethnicity had some influence on the academic performance of adult students on the total section on the TABE. (v) The more formal education adult students had obtained, the higher their scores were on the total section of the TABE.

Fante and Cheryl, H. (1995) conducted a study in which they took a total of 180 community college students and they were enrolled in one of six sections of developmental English. Two full-time instructors each conducted one traditional lecture/discussion section and each facilitated one section of the computer-assisted program using the INVEST software and one section of the computer-assisted program using the PLATO software. Analysis of the data indicated that the computer-assisted groups, INVEST and PLATO, integrated with traditional lecture/discussion, were the most effective instructional method for teaching developmental English. When degree type (Associate of Arts or Associate of Science) was considered in conjunction with the instructional method, no statistically significant difference was found. Improvement was evidenced in both groups. The results of this study support the research on the effectiveness of the computer-assisted instructional method for developmental English students.
Heimann and others (1995) suggest that interactive child initiated software packages can stimulate reading and communication but a detailed planning and monitoring from teachers, parents and clinicians are required in the case of children with autism.

Sewell, Stevens and Lewis (1995) found that the overall response of undergraduate students using multimedia computer packages were favourable. The study concluded that multimedia computer technology presents a powerful aid in the teaching and assessment of Biological science.

Tway (1995) found that Multimedia offers an excellent alternative to traditional teaching. By allowing the students to explore and learn at different paces, every student has the opportunity to learn at his or her full potential.

Zachariah & Sajit (1995) conducted a study to examine the effects of multimedia-based instruction on undergraduate students' academic performance in economics and attitude towards economics. The study made a comparison between students who receive instruction using a multimedia-based format and one that receives a traditional lecture format. Significant effects were found in the academic performance of students and students liking towards economics. However, students did not demonstrate any difference in their frustration or insecurity towards economics.

Agnew, Kellerman & Meyer (1996) stated that multimedia technology has been shown to affect students' motivation and self esteem levels, as well as allow them to be creative and self directed thinkers.

Callaway (1996) identified that effectiveness if an interactive multimedia computer package designed to accommodate a number of cognitive and learning style is much higher for learning difficult topic such as ‘photosynthesis’ for high school students than the typical class room method.

Ebert and Strudler (1996) found that creativity, interest, performance and work habits of the students increased tremendously using low cost multimedia.
Edmundson (1996) showed that computer assisted instruction students performed significantly better in their achievement of intermediate English.

Hardy and Jost (1996) found that the inclusion of music can stimulate and operate in the mental processing of computer-supported instructional messages in ninth grade lessons on physical science topics.

Lopez and Brad (1996) conducted a study to determine student’s preference for media presentation in large group instruction. The intent of the study was to assess student preferences and perceptions that involve media presentation by comparing multimediated instruction and traditional analog presentation. Of the five components or factors measured: learning, attendance, preference for media, recommendation to other students, and class organization; the factor learning explained students' preference for multimediated instruction greater than any other factor. These findings and the written comments indicated that students consider multimediated instruction to be more beneficial to their learning than traditional analog presentation in large group instruction. The findings in this study clearly demonstrate that students preferred multimediated instruction over traditional analog presentation.

Mc Donald (1996) in his study, “The impact of Multimedia Instruction upon student attitude and achievement and relationship with learning styles”, found that (i) The use of multimedia instruction had a positive impact upon student attitude. (ii) Approximately 73% of the students believed multimedia added to the overall value of the class. (iii) There was significant difference for achievement by class between sophomore and freshman students and between senior and freshman students. (iv) There was no statistically significant difference for achievement by preferred learning style. (v) A negative correlation was found between final exam score, final course grade and student attitude toward multimedia instruction and achievement.

Steyn, Alexander and Rohm (1996) established the learning outcome of the computer-aided lessons for the first year analytical chemistry by comparing the results of students obtained for an assignment. Although results of the students who
did the course were significantly better only at 80% confidence level, they responded positively and wanted more exposure to computer.

Cavender and Rutter (1997) describe some of the multimedia techniques that address the difficulties in teaching both large introductory and small advance level classes in the life Science.

Crosby and Iding (1997) examined high school students’ performance on an interactive multimedia computer tutorial for learning Physics concepts in conjunction with their individual differences and indicated that this approach is more effective.

Hedberg and others (1997) developed a package incorporating high quality visual materials in the form of graphics, sound, text and video for high school students, which challenges the students to become active participants and investigators in the learning process.

Lafronza (1997) examined the effects of different software formats on learning process by varying the degree of structure employed in a computer assisted learning environment and arrived at the conclusion that cognitive styles play significant role in adult learners, performance.

Lalley (1997) compared the effectiveness of textual feedback to video feedback that included sound during computer assisted learning and indicated that video feedback resulted in superior learning and comprehension than text and students preferred video to text as feedback.

Murphy and Theresa Pesl (1997) developed a cross-cultural module for delivery by two different instructional methods: traditional classroom instruction and computer-based instruction. Three instruments were developed to collect data: pre-test, post-test, and post post-test. He found that Computer-based instruction was more effective in facilitating learning regarding cross-cultural education than traditional classroom instruction and Computer-based instruction was perceived by students to be a valuable teaching tool when used in association with traditional classroom instruction.
Schnackenberg (1997) showed that a relatively full version of computer-based instructional program is more effective for improving student achievement and learner control in an instructional program is more appealing for students than program control.

Watts (1997) opined that to realize the high potential for interactive language-learning multimedia, designers must develop a more learner-based orientation as the primary features of designing.

Ayres and Melear (1998) found that there is an increased learning of physical Science concepts via multimedia when compared to the traditional hands-on exhibit in a Science museum.

Emerson and Mosteller (1998) concluded that computer technology can support good teaching and can provide active participation. Also, found that multimedia has advantages using multiple senses and can accommodate varying needs of students and enhance learning efficiency.

Mehryar (1998) conducted a survey on the effectiveness of a web-based interactive multimedia system in tertiary education. The results of the survey conducted during the course indicated that students were enthusiastic towards the new multimedia packages.

Yasmin et. al. (1998) designed a project on collaborative educational multimedia and the findings indicated that students improved significantly in their Science understanding programming skills.

Nagar and Subha (1999) in their study revealed that: (i) The experimental group which used self-learning instructional materials recorded a high achievement score than the control group, indicating that the learning strategy of using self-learning instructional material was effective in improving the level of achievement. (ii) Self-learning instructional material was found effective in enhancing the performance of students as the experimental group scored significantly higher in their post-test than that of the pre-test scores.

Bates (2000) stated that modern education theory is moving beyond the recall of facts, principles, or correct procedures and into the areas of creativity,
problem-solving, analysis, or evaluation (the very skills needed in the workplace in a knowledge-based economy, not to mention in life in general). Learners need the opportunity to communicate with one another as well as with their teachers. This of course includes the opportunity to question, challenge and discuss issues. Learning is as much a social as an individual activity.

Panda and Cadbury (2000) for their study on, “Effect of Computer Assisted Learning (CAL) in achieving higher cognitive skills”, selected the experimental design. Two randomized groups of same school between the age group of 15-17 from Class XII. The experimental group was treated with computer using interaction approach and the controlled group was treated with traditional approach lecture method. The objectives of the study were: (i) To determine the degree of attainment of cognitive skills through (CAL) compared to traditional approach to teaching, (ii) To compare the effect of CAL on the learning achievement of boys and girls. The results can be summarized in one statement that indicates the superiority of CAL over traditional approach. The effect of gender on learning outcome in Physics in the face of it indicates its level of significance only at 0.05 levels but not at 0.01 levels.

Jeffries (2001) while comparing lecture/videotape with multimedia CD-ROM methods for teaching oral medication administration observes higher satisfaction and greater cognitive gains for the multimedia group.

Mai, N. & Ken Neo, (2001) concluded that the use of the PC and digital multimedia technologies has given rise to new modes of learning and enabled new and innovative ways to deliver instructional materials to the learners. Furthermore, with the advent of the Internet and the World Wide Web (www), in the mid-90s, a revolutionary transformation is taking place in our educational methodologies and delivery. This will extensively widen our scope of learning into a global perspective and connect our learners to educational resources and information worldwide, which were hitherto not accessible by them. Web-based learning and distance learning over the Internet are now available to those who want them.

the objective of the study was to examine changes in student achievement in middle school Mathematics on operations involving Fractions when computing two instructional strategies. The research questions in the study address the issue of student achievement, retention and cost effectiveness. It was found that in spite of variability in performance in individual types of fraction operations, the overall improvement scores were significantly greater in Computer Assisted classrooms than in the traditional classrooms. Further, in spite of the achievement difference between schools, the Computer Assisted classrooms performed better than the traditional classrooms at each school. Although the statistical analysis conducted revealed that there were no statistically significant difference rates between Computer Assisted Classrooms and traditional classrooms, in spite of marginally lower attendance rates in the Computer Assisted classrooms, overall improvement scores were significantly greater in Computer Assisted classrooms than in the traditional classrooms. In this study, students in the traditional classrooms on average improved 3 points on the 30 points post test while students in the Computer Assisted classroom on average improved 4 points. This signifies a 33% achievements benefit. Thus, 33% increase in student achievement was gained in classrooms utilizing Computer Assisted Instruction as opposed to those utilizing traditional instructional technique.

Wilson and Mires (2001) investigated the effectiveness of Computer Assisted Learning (CAL) for medical and midwifery students, the purpose of the study was: (i) To test the hypothesis that it is possible to use our improved Computer Assisted Learning (CAL) as an effective and enjoyable teaching tool for staff and students. (ii) To determine if the following factors affected learning outcome: (a) Attitude towards computers (b) Experience with computers (c) Enjoyment with Computer Assisted Learning (CAL).The study found that: (i) There is improvement in the mean scores of students. (ii) Knowledge gain was independent of the factors investigated. There was no significant relationship between knowledge gain and enjoyment of the programme, the computer expertise of the student or the attitude of the student.
Hodge, J. E. (2002) conducted the study find out the effect of Math anxiety, Math self-efficacy and Computer Assisted Instruction on the ability of undergraduate nursing student to calculate drug dosages. Although data analyses indicated that Math anxiety was a factor in nursing students’ ability to calculate drug dosages, it was not statistically significant. On the other hand, Math Self Efficacy and Computer Assisted Instruction showed statistically significant relationships with undergraduate nursing students’ ability to calculate drug dosages. Nursing educators must be aware of factors that affect drug dosage calculation abilities.

Hsu, Yung-Chen (2003) studied, “The effectiveness of Computer Assisted Instruction in Statistics education: A meta-analysis”, with the following objectives: To investigate the effectiveness of Computer Assisted Instruction (CAI) in statistics education at the college level in the United States. This study employed meta-analysis to integrate the findings from 25 primary studies, which met a specific set of criteria. The primary studies were selected from journal articles, ERIC documents and dissertations. Results of the meta-analysis indicate a small to medium positive effect of applying CAI in teaching college level introductory statistics on students’ achievement. The result of the analogous analysis of the variance showed that different modes of CAI program produced significantly different effects on students’ achievement in learning statistics. Expert systems and drill and practice programs were the most effective modes and were followed by multimedia, tutorials and simulation. Computational statistical packages and web-based programs were the least effective modes. The teacher made CAI programs were significantly more effective than the commercially developed CAI programs. The effectiveness of CAI program in teaching statistics did not differ significantly according to the study characteristic of the publication year, the publication score, the educational level of participants, the level of interactivity of CAI program, the instructional role of CAI program and the sample size.

Malliga (2003) in his study, “Relative effectiveness among different strategies of Computer Mediated Multimedia Presentations in teaching and learning
of chemistry at higher secondary stage” found that (i) Interactive Individualized Learning supported by Multi Media Presentation (IILMMP) was found to be the most effective strategy among all the three different instructional strategies, viz. PBL, ILMMP and IILMMP in term of cognitive skills such as knowledge, understanding and application in realizing the instructional objectives in Chemistry at Class IX. (ii) PBL was found to be coming between IILMMP and ILMMP in enhancing the retention of what have already been learnt. (iii) It was inferred that irrespective of the difficulty level of the content, IILMMP was to be most effective one while ILMMP was the least effective one. (iv) It was found that while the subjects of all the three experimental groups were identical in terms of their scientific attitude, the same was found to be non-identical in terms of their computer attitude. (v) The results of the study indicated that the enhancement of the learning Chemistry was only due to media effectiveness. Computer Mediated Multi Media Based Instruction can be introduced in education at all level for the successful realization of instructional objectives. One hundred two references were cited in the study.

Mayer (2003) in his study made an experiment with four instructional design methods (strategies) that were aimed at the issue of methods across media-how to design multimedia message that promotes understanding and whether design principles that work in one media environment also work in a different media environment. The answer was that effects seem to work across media. The following principles were drawn: (i) Multimedia effect (Students learn better from pictures and words than pictures alone): With text-in-a-book-and-illustrations and narration-and-animation was compared to text only and narration only. (ii) Coherence effect (students learn better when extraneous materials are excluded.): Two situations, i.e. text-in-a-book-and-illustrations and narration-and-animation either included extra seductive details or not. (iii) Contiguity effect (students learn better when text is close to illustration or animation): Learners exposed to either with text-in-a-book-and-illustrations and text-and-animation situations were divided into 2 groups with information either close or far. (iv) Personalization effect (students learn better when
words are presented in conversational style). The effect was tested in 4 groups with animation-and-narration and animation-and-onscreen-text. Narration or text was either conventional or “personal”

**Cannon, T. R. (2005)** conducted a study, “Student success: A study of Computer -base Instruction versus lecture based instruction in developmental Mathematics at a Tennessee Community College” with the following objectives (i) To examine the effects of incorporating Computerized Instruction developmental Mathematics courses. (ii) To study examined achievement, retention, persistence and success of students who began in elementary algebra, progressed into Intermediate Algebra and subsequently obtained their goal of completing an initial college level Mathematics course. The major findings of the study was that among achievement, retention, persistence and success, the only area in this study that showed a significant difference was among the achievement rates. The lecture students’ achievement rates were significantly higher than the students who received computerized instruction. Retention, persistence and success did not show any significant difference between the two groups.

**Rosales, J. S. (2005)** studied the effect of Computer Assisted Instruction on the Mathematics achievement of ninth-grade high school students in the lower Rio Grande valley. The objectives of the study was to describe the effect of a Computer Assisted Instruction program had on the Mathematics achievement of ninth grade high school students in the lower Rio Grande Valley as measured by the state assessment. The major findings of the study was that, there is a statistically significant difference between the Mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who have participated in Computer Assisted Instruction and the Mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who did not participate in Computer Assisted Instruction. The resultant analysis indicated that there was statistically significant difference between the Mathematics achievements of the two groups.

**Ang and Wang (2006)** in his study, “A case study of engaging primary school students in learning science by using Active Words” reported that Underachiever students often have difficulties in focusing attention on learning and
easily lose their interest. The purpose of this study was to explore how the three-dimensional (3D) Virtual Learning Environment (VLE), Active Words, could engage underachiever students in learning the scientific concept of the Solar System. Online gaming in a virtual learning environment (VLE) has great potential in motivating students in learning Science. This new technology enables the teacher to present scientific knowledge in a way more appealing to students than traditional textbooks.

**Barnett, L. (2006)** conducted a study, “The Effect of Computer Assisted Instruction on the reading skills of emergent readers” with the following objectives (i) To examine the effect of Computer Assisted Instruction (CAI) in the reading skill of emergent readers in Kindergarten classes at select Reading First schools in the School District of Palm Beach Country, Florida. (ii) To analyzed teacher attitude towards the computer affected student reading achievement. The measure used to compare treatment and non treatment schools were the Dynamic Indicators of Basic Literacy Skills (DIBELS), which tested letter naming ability, initial sound identification, phoneme segmentation ability and nonsense word decoding. The Word Recognition and Reading Running Record assessments form the School District of Palm Beach Country Reading and Writing Assessment System Grades K-1 protocol booklet tested identification of 25 sight words and ability to read continuous text. The findings revealed that: Students using Destination Reading (Riverdeep, 2001) did not benefit significantly from the use of the program compared to nonuser. The CAI group scored significantly lower on the initial sound fluency measure. Factorial ANOVA were used to compare DIBELS scores for effectiveness of the treatment, pre and post test comparisons and interaction of treatment with test scores for the CAI compared with the nonuser group. T distributions were used to analyze data from the Reading Running Record and Word Recognition assessments. There were no significant differences between the CAI and comparison schools on these two measures. Teacher attitude toward computer did not affect students’ acquisitions of reading skills, as survey responses were in the positive range for all participants.
Cranmer (2006) studied young people’s use of the Internet for homework, undertaking a qualitative longitudinal study with 17 families and suggesting that “learning at home is either unproblematic or socially-neutral”.

Hennessy and colleagues (2006) carried out case studies to examine the different ways in which multimedia was used within secondary science classrooms. They found that over structuring of tasks and curriculum constraints led to students not achieving the full value of the activity. This has clear implications for the benefits of students’ studying at home in a more independent manner and being able to gain the full potential of the interactive media – it is important to balance structure with freedom for experimentation.

Zheng & Zhou (2006) states that multimedia is now penetrating the education field and changing the way teachers teach and students learn. With the advent of multimedia and technology in the classrooms, teachers can equip themselves with these technological skills and become better communicators of their content materials, thus enabling the students to learn in a more productive way.

Adulserance, R. & Lockard, P. (2007) conducted a study, “The Effects of Using Different types of Multimedia presentations on Thai Seventh-grade learner’s Understanding of a Social Studies Text”. The objectives of the study was to investigate and compare Thai seventh graders’ comprehension of a social studies text under four different multimedia presentation formats—a written text (W), a written text with graphics (WG), an audio text with graphics (AG) and a written text with audio and graphics (WAG). Findings indicated that W group scored higher than the other groups on an immediate post-test. However, the WAG and WG groups outperformed all others on a delayed post-test. This adds to previous research that shows multimedia may help students recall information better over time. Additional findings confirm that time to complete the learning task depends on the cognitive load and that low-prior-knowledge students learn more effectively with multimedia.

Neo, Neo and Tai (2007) concluded that the incorporation of a multimedia project allowed students to become multimedia designers and exercise their
creativity in using various combinations of multimedia elements in the project design. Thus, this multimedia mediated, constructivist based learning environment allowed students to gain increased understanding of their work and their project topic. By designing an authentic learning environment where students had an active interest in the outcome of the task at hand, they were more apt to pay attention to the information presented, and in doing so, enhanced their understanding of multimedia as well as their topic, making them more likely to become lifelong learners. Multimedia technology became an enabler for them to become actively involved in their learning process and experience high motivation levels.

Nicholas Vernadakis et. al. (2008) conducted a study on “Student attitude and learning outcomes of multimedia computer-assisted versus traditional instruction in basketball”. The purpose of this study was to examine the effect of multimedia computer-assisted instruction (MCAI), traditional instruction (TI), and combined instruction (CI) methods on learning the skill of shooting in basketball. Additionally, a comparison of the students’ attitude towards the MCAI and TI methods was made. Post-test results indicated no significant differences between the groups concerning the written test. Nevertheless, the attitude test scores of the CI group were more favourable to MCAI method than the TI method. Retention test results showed that groups retained the knowledge acquisition. However, the combine method of instruction tended to be the most effective on cognitive learning.

Ambasana (2009) studied on “Utilization of computer technology in remedial instruction”. The purpose of the study was to found the effectiveness of Computer Assisted Instruction program as a remediation treatment by comparing the mean achievement scores of pre-test and post test. The study found that Computer Assisted Instruction program in remediation task was found to be successful as the students were able to overcome the difficult points in content. Hence, they were able to increase their achievement significantly. Utilization of computer technology in remedial instruction was found effective.

Calandra, Laurie, Lee and Fox (2009) in their study Using video editing to cultivate novice teacher practice The purpose of the study were: (i) The purpose of
the research concerned with the effective use of video editing to help cultivate novice teachers’ reflective practice. (ii) To find out the difference between the first group debriefed with a teacher educator immediately after teaching their lesson and in the second group had no debrief edit their video for two critical incidents, and reflect on the incidents in written from using the same rubric as the first group. The finding revealed that both groups used the same reflection guide; we found that the students who developed video vignettes produced longer and more multifaceted reflections.

Choy, Doris, Wong, A.F.L. and Gao (2009) studied on “Student teachers’ intentions and actions on integrating technology into their classroom during student teaching: A Singapore Study”. The purpose of the study is to explore student teachers’ intentions and actions in technology integration in their classrooms. The results suggested that student teachers in Singapore showed positive intentions to integrate technology facilitate student-centered learning in their future teaching. However, they reported that they were more likely to use technology as a supporting and instructional tool during their student teaching rather than using technology to promote student-centered learning. The results of the study helped to better exemplify the student teachers’ intentions and their actions in integrating technology into their classrooms.

Guan, Y.A (2009) conducted a study on “A Study on the Learning Efficiency of Multimedia-Presented, Computer-Based Science Information”. He investigated the effects of multimedia presentations on the efficiency of learning scientific information (i.e. information on basic anatomy of human brains and their functions, the definition of cognitive psychology, and the structure of human memory). The speed of self-running on-screen text was synchronized with that of the auditory text, it seems that the processing of visual and auditory text did not interfere with each other but was harmonized or even reinforced.

Nicola Whitton (2009) in his study he conducted a report for the BBC on Review of the Research Literature on the Impact of Multimedia Revision Web
This document focused on two questions: (i) What literature exists regarding school students’ use of online curriculum support and revision resources? (ii) What are the recommendations for a longer-term, in-depth piece of field research in this area? The findings of the study were (i) Most children use the internet daily or weekly (with only 16% as occasional or non-users). The study also found that among the daily or weekly users, 90% of the children surveyed use the Internet for homework. (ii) There is little real evidence in the literature on the comparative effects of using multimedia and traditional teaching methods (possibly because of the difficulty and ethical issues associated with setting up studies of this nature). (iii) Technologies and online resources can help overcome learning difficulties in three specific ways: by providing a platform for training or rehearsal; through the use of assistive technologies; and by using technologies to make learning possible.

Akbiyik et. al. (2010) conducted a study on “Different Multimedia Presentation Types and Students’ Interpretation Achievement”. The main purpose of the study was to determine whether students’ interpretation achievement differed with the use of various multimedia presentation types. Four groups of students, text only (T), audio only (A), text and audio (TA), text and image (TI), were arranged and they were presented the same story via different types of multimedia presentations. Inference achievement was measured by a critical thinking inference test. Findings of the study can be seen as a sign of the importance of learning situations and learning outcomes in multimedia-supported learning environments and may have practical benefits for instructional designers.

Anboucarassy (2010) in his study, “Effectiveness of multimedia in teaching biological science to IX standard students” framed the objectives as: (i) To study the effectiveness of multimedia approach over the conventional method in teaching Biology to IX standard students. (ii) To develop a multimedia package to teach Biology for IX standard students. The study found that: (i) There is significant difference in the achievement of the experimental group over control group. (ii) There is significant retention power of experimental over control group.

Ogobchukwu (2010) conducted a study on “Enhancing student’s interest in mathematics via multimedia presentation” In this study; student preference of
multimedia presentation in mathematics education as opposed to traditional instruction was investigated for high school students learning mathematics. The survey instrument presented a 5-point Likert scale with students rating 17 statements associated with acceptance of the presentation. Results from the survey carried out indicate that multimedia presentations can improve students’ understanding, enthusiasm, class attendance and satisfaction.

Most of the studies conducted in abroad were related to the integration of the CAI with various subjects and technology either at school level or university level. Many researchers found experimental design and quasi experimental design most suitable for their studies. The findings can be summarizing as follows:


(ii) The teacher made CAI is more effective than the commercially developed CAI programs. Hsu, Yung-Chen (2003).

(iii) Analysis of the experiment showed that the experimental groups achieved greater cognitive gains. Even the students remain present in more number in CAI class room. Toet, Joyce Anne. (1991), Males were shown to be superior to females in terms of cognitive achievement. Haley, Mary Lewis Purnell. (1991). Most educators had positive attitudes toward CAI and more than half of them used CAI in their teaching. Gao, Yong Qiang, (1992). The majority of the students in the university level class showed positive co-operation on group work and positive attitude toward using computers in the classroom. Park, Insun Hwang (1993). The type of instruction had an influence on the academic performance of adult students on the math and reading sections Burton, Beatrice Spencer, (1995).

(iv) The overall improvement scores were significantly greater in Computer Assisted classrooms than in the traditional classrooms. The Computer
Assisted classrooms performed better than the traditional classrooms at each school. Rivet, J.R. (2001).

(v) Computer Assisted Instruction showed statistically significant relationships with undergraduate nursing students’ ability to calculate drug dosages. Hodge, J. E. (2002).

(vi) The meta-analysis indicates a small to medium positive effect of applying CAI in teaching college level introductory statistics Hsu, Yung-Chen (2003). The lecture students’ achievement rates were significantly higher than the students who received computerized instruction. Cannon, T. R. (2005).

2.3 IMPLICATIONS FOR THE PRESENT STUDY

The advances we are witnessing in the various fields of scientific endeavour are truly spectacular. Underlying this progress is the all out commitment of modern industry to research as the foundation for growth and indeed for survival. Progress in education has been far less impressive and the question is whether we can equip the students we are now teaching to live in this rapidly moving world. Over the last few decades we have attained a much better understanding of the child as a developing organism, of the learning process, and of the role of the education in promoting his/her maximum growth. We have made a definite worthwhile progress and no longer in the sea of ignorance but can locate area of knowledge and can explore the fair idea to grow.

This research was developmental cum experimental hence it’s an effort to find out efficacy of the multimedia packages. With the advancement of the technology and fast growing information highway many multimedia programs are commercially available. Such packages do not suite all the requirements of the students and moreover they also do not cater to the content of the book which remains unexplained. Furthermore, the internet which is a source of all types of information also does not provide exhaustive and comprehensive information on one web-link. Rather students have to waste a lot of time in finding meaningful
information related to the prescribed syllabus. By considering all this, the present research to develop and to check the effectiveness of Interactive Multimedia Packages has been carried out.

In India and abroad various mediated programs are developed. These programs are in majority for the subjects like Physics, Chemistry and Mathematics or in Languages but very few in Biology. Secondly comparatively very few experimental comparative researches with development of packages are done. Specifically in abroad such experiment work done for college students and they are mostly in mathematics. The research done in India in biology with CAI is for the student of Secondary level (for class XI). The researches done before are for the old syllabus without formative and summative assessments. After implementation of the CCE in science for class IX not a single research work was found particularly in the state of Haryana. This research work also provides the insight to the student to think or to have a concept regarding other abstract topics. It makes possible of transfer of knowledge in the same and other subject and provide conceptual frame work.

Thus it reveals the importance and need of the present study. The present study will further explore the effectiveness of the Multimedia approach on the academic achievement and retention of the students at the secondary school level in the state of Haryana in comparison with the tradition method of teaching. As no study was found related to teaching of Biology-Fundamental Unit of Life to English medium students with the help of Multimedia Packages for class IX Science students, therefore the present study carries its own importance.