CHAPTER II

REVIEW OF RELATED LITERATURE AND RESEARCHES

Review of related literature and Researches is first and foremost pre requisite of any research work. Any research can not be a single step in research fields; but it is a link in a stream of research; every research should be based on all the relevant thinking and the research that has preceded it. It is the abstract or a brief summary of previous researches, which provides evidence for researcher what is already known and what is still unknown and untested. So any new research is built upon or adds to what is known up to that print of time.

“A literature review is a systematic explicit and reproductive method for identifying evaluating and interpreting the existing body of recorded work produced by researchers scholars and practitioners.”

Fink, 1998

According to Ary et al; (1972). Organizing related literature is like proposing an expedition, by mapping out the known territory and pointing the way to the unknown territory one proposes to explore. If the study has several aspects or is investigating more than a single hypothesis this is done separately for each facet of the study. One should avoid the temptation to present the literature as a series of abstracts. Rather, it should be presented in such a way as to lay a systematic foundation for the study (P.67)

J.W. Best in his book ‘Research in Education’ says that, “ Review of the literature and research provides and background for the development of the present study and brings the reader up to date since
good research is based upon everything that is known about problems this part of the report gives evidence of the investigations knowledge of the field.”

**Objectives of related literature and researches**

1. To avoid unnecessary duplication.
2. To know suitable and appropriate research methods and techniques.
3. To aware the status of the issue.
4. To acquaint himself/herself with the current knowledge in the area in which he/she is going to conduct research and thereby select suitable problem.
5. To know about the tools and instruments, which provide to be useful and promising in the previous studies and to provide in to statistical methods.
6. It helps to know about stating objectives, assumptions and hypothesis.
7. It helps to understand about the theories and procedure.
8. To know about the use of statistical measures and interpretation.
9. It helps to enrich our knowledge of research.

**Importance of related literature and researches**

1. It helps to find out ‘research gap’ and to plan research to fill up the existing research gap.
2. It helps to inculcate the skills necessary for conducting research
3. It helps to enhance the knowledge of research
4. It helps to understand the plan and procedure of research
5. It helps to fix the limitations and delimitations of the research.

6. It helps for economy of the time and effort.

7. It enhances researchers confidence.

8. It helps to eliminate the duplication of what has been done and provides useful hypothesis and helpful suggestions for significant investigation, listing studies that seem to present conflicting conclusions help to sharpen and define understanding of existing knowledge in the problem area provides a background for the research project and makes the reader aware of the issue.

It is challenging task for the researcher to carry out the suitable/appropriate/relevant review of related literature and researches. It is not only just listing the researches from selected specialized area. But also create the insight in to the research.

The researcher has reviewed the literature for this study to find out what others have found in their study, for review purpose researcher visited different institutions and also surfed internet.

THE REVIEW OF RELATED LITERATURE AND RESEARCHES DIVIDED IN TO TWO CATEGORIES

A) Review of related literature

B) Review of related Researches

A) REVIEW OF RELATED LITERATURE

Bloom, Benjamin and others have classified the educational objectives into three domains. They are the cognitive, the affective and the Psychomotor domains. The cognitive domain includes the objectives
dealing with recall or recognition of the knowledge as well as development of intellectual abilities and skills. The affective domain deals with objectives related to interest, attitudes and appreciations. The skills at bodily levels comes under the Psychomotor skills. The Directorate of Extension Programs for Secondary Education, Government of India has stated in its report on Evaluation in General Science that one of the objectives of teaching General Science in Secondary Schools as the pupils should adopt the scientific attitude in making statements accepting information and forming beliefs.

The central Science workshop, established under the NCERT suggested to develop low-cost kits for the primary and the middle school stages.

The Secondary Education Commission (1952-53) recommended a ‘general science’ course for the middle stage and a reoriented specialized science course with Physics, Chemistry and Biology as independent subjects at the high school stage. The commission studied the secondary educations through different angles and made important suggestions. It suggested that, ‘Teaching of General Science, as a compulsory subject should be taken up in secondary and higher secondary school’. After 1952-1953 the science subject began to be taught as a compulsory subject at various levels of school education including primary level.

The Indian Education Commission (1964-66) stated that there is an urgent need to raise the quality of Science teaching to promote the deepening of understanding of basic principles, to develop problem solving and analytical skills and to promote the spirit of enquiry, experimentation and accurate observation.

State Institutes of Science Education have been set up in all the states to improve the quality of Science Education in the schools. These
institutes are aimed to provide in service training to science teachers, to prepare instructional materials in science, to conduct research studies in Science Education to schools, to take up innovative programs in Science Education.

Jean Piaget proposed the developmental stages of an individual. According to him, there are four stages of development of an individual. These developmental stages are sensorimotor stage, pre-operational stage, concrete operational stage and formal operational stage. The peculiar characteristics of these stages are different. The sensorimotor stage lasts from birth to about the age of two. At this stage, the principal task of the individual is, to construct a world of permanent objects. The preoperational stage lasts for 2 to 6 or 7 years. In this period the child acquires the language, discovers symbolic play and experiences his first dream. The age group 7 to 12 comes under the stage concrete-operational stage. During this period, interrelationship of classes, relations and members gets established. The concrete operational stage is also called as ‘stage for searching for relations’. The formal operational stage is the last stage of development and is characterized by the own thinking of the individual. This stage is also called as ‘stage of searching for comprehension’. These stages can be paralleled with the stages that characterize the development of any Science. They are observation may be paralleled with the sensorimotor stage naming and labelling (pre-operational stage) formal classification and quantification (concrete operational stage) controlled experimentation and theory building (formal operational stage). Thus, the Science teacher should consider the stages of development of the individual learner during Science teaching in the classroom.
The technological instruments should be used during the Science teaching - learning process. This will help to change the monotonous environments in the classroom created due to the lecture method used by Science teachers. Programmed Learning Materials (PLMs) developed on the basis of Skinner’s Theory of Operant Conditioning may be useful in Science classroom.

Now-a-days, various audio-visual aids like television, print media film strips, tape recorder, computer etc. are being used in Science classroom. But the pace of their use is very slow.

Alpern (1946) reported that, there was no significant relation between the Science courses, a student had taken and his ability to select sound procedures to test hypotheses.

Hurd, Paul H. (1954) noted that, the objectives of Science teaching were the teacher’s first consideration in planning curriculum. Objectives strongly influenced the organization of the curriculum and at the same time they provided the guidelines on the selection of teaching techniques.

Curtis et al, found that, direct teaching does modify the attitude of young peoples and the pupils who engage in wide reading in General Science develop scientific attitude more than those who study only single subject.

Taylor proposed suggestion for planning of learning experiences to build desirable attitudes such as (1) Increase the degree of consistency of the environment. (2) Increase the opportunities for making satisfying adjustments to attitude formation. (3) Provide opportunity for the analysis of problem situations.
Klausmeier suggested eight steps, that the teachers can take to facilitate the learning of attitudes. These may be interpreted in terms of Science teaching as (1) The attitude to be taught must be identified. (2) The meanings of the vocabulary used to describe attitudes or the behaviours related to them must be clarified for the learner. (3) Informative experience about the attitude object should be provided. (4) Desirable identifying figures for the learners should be provided. (5) Pleasant emotional experiences should accompany the teaching learning process. (6) Appropriate context for practice and confirmation should be arranged. (7) Group techniques should be used to facilitate understanding and acceptance. (8) Deliberate cultivation of the desired attitude should be encouraged.

John, Jawarski, Harry Mcmohan and David, Hawkridge conducted a two year international co-operative study funded by the Harold Macmillan Trust of computers in African, Asian and Arabic speaking schools. At the end of the research study, it was suggested that all the 23 third world countries should bring computers to the schools. The governments in the third world countries should seek international co-operation of industrial countries to develop educational soft-ware and suitable hard-wares. The number of computers in the schools should be increased which will lead to national development. Industrial countries need to improve their provision of aid to the third world countries. Developing countries need to formulate policy. All countries need to know more about how to exploit computers in education, to their mutual advantage.

Now-a-days, along with developed countries, the computers are entering the schools as instruction tool in developing countries including India. Subject wise computer soft-ware are being developed by different
government and non-government agencies. It is necessary to guide the parents which soft-ware should be used for effective learning, which criteria should be fixed while purchasing computer soft-ware. The most important aspect attributed to the software is that, the educational software should be research based. This is because as it has been proved that, computers improve student’s skills in academic subjects at all levels of education and create a new environment in schools helping students to enhance their knowledge.

Macfarlane (1997) have talked about inclusion of computer and multimedia in the classroom. He opines that multimedia gives learner, the power to explore and manipulate the information and enables individuals to construct their own ‘knowledge base’. About multimedia, Tyack and Cuban (1995) have said that ‘Teachers will continue to use technologies that fit familiar routines and classroom procedures. They use technologies like computer and multimedia to enhance their instruction.

Davis (1965) had prepared a teaching model where in the computers were used in place of teachers. In this model, he propounded that low level objectives pertaining to cognitive domain could be achieved smoothly by employing the computer.

Shayer (1970) and Swetman (1972) in their studies regarding the use of computers in instructional process at schools level, found that computer enhanced the learning process of children.

Easten, M.J., Johnstone, A.H. and Reid N. (1978) found that computers may be used effectively for teaching chemistry for secondary and tertiary students.

Jones (1980) studied teaching of chemistry by means of video cassettes by employing computer graphics. The results indicated that, the
instructional videotapes, employing computer animated graphics could be used to teach chemistry, if presented under conditions which are conducive to learning and if subjected to developmental testing to assure student learning.

_Koltz (1980)_ evaluated the effectiveness of several CAI programmes in General chemistry. The Analysis of covariance indicated that, there was no significant difference in student’s performance in chemistry through CAI.

_Tauro (1981)_ conducted a study of academically superior student’s response to particular computer assisted programme in Chemistry. The study revealed that the students exposed to the CAI method of instruction scored higher in the university final chemistry examinations. It was also found that, the students exposed to CAI had a greater positive attitude towards the study of chemistry. The other findings of this study included (1) CAI programmes in chemistry was an effective mode of instruction. (2) CAI programmes in chemistry increased their enthusiasm for the study of chemistry. (3) Drill and practice with CAI helped them to solve numerical problems in chemistry.

_Wells (1981)_ studied the relationship between the processes involved in problem solving and the processes involved in computer programming at higher secondary level. It was found that, same processes were used in computer programming and in problem solving. Computer programming was found as an effective problem solving process and was more effective way than the use of traditional problem solving situation.

_Bobbert (1983)_ studied the effects of interactive computer simulated laboratory experiments in college chemistry courses. It was found that, the interactive computer simulated experiences were as effective as an instructional activity as actual laboratory experiences.
Most of the students considered interactive simulated exercise as an acceptable learning methodology.

Joseph (1984) examined the use of feedback with spelling instructions on microcomputers in an intact classroom. The results found a significant difference in the feedback conditions on the maintenance test data only, which was not strong enough to allow major conclusions to be made. Weekly spelling errors improved at the start of the study remained steady through the middle of the study but declined during the last phase and after completion. Attitude also showed a similar declining trend.

Paul (1984) studied the effect of computer based instruction using a variety of techniques. The results of this study showed that the effect of computer Managed Instruction (CMI) was trivial (ES=0.03) in comparison to the effect of Computer Assisted Instruction (CAI) (ES=0.45). Younger, lower achievers, male and exceptional students appear to profit most from exposure to CAI.

Carrier (1985) studied Microcomputer programmed remediation of specific reading and writing skills deficiencies in secondary school students. The results of this study showed that the microcomputer treatment evoked significantly greater gains than the non-reinforcing treatments.

Choi (1985), Barbacci (1992), Rivers and Vockell (1987), Woodward (1988) conducted different studies to find out the effectiveness of computer simulated experiments at secondary level. Through these studies, it was found that; (1) Computer simulated experiments were found to be as effective as hands on laboratory experiences and there was no significant difference in the retention scores of computer simulate experimental group and control group students. (2)
Students had favourable attitude towards computer simulated instruction (CSI). (3) CSI was found to be effective for learning problem solving situations.

Joseph (1985) found that due to significant capacity of Computer Assisted Televised Instruction (CATI) to deliver high resolution pictures and to provide the user with Interactive Instruction, CATI was found to have considerable potential for art making instruction.

Parry, et al (1985) reported that, there were five main areas of contribution of Computer Based Instruction (CBI) in education. They were (1) As measured by student’s achievement, CBI was best used as a supplement to the regular curriculum. (2) CBI resulted in saving of instructional and learning time. (3) When CBI was used alone, students achievement was almost equal to that achieved with traditional instruction mode. (4) Teacher’s and student’s attitude towards CBI was positive. (5) CBI was particularly effective with low achievers.

B) REVIEW OF RELATED RESEARCHES

A number of researchers have undertaken research studies in the area of academic achievement. Many of them have emphasized the effect of use of computer on the academic achievement of students. The research studies conducted in Abroad on Academic Achievement are presented as -
1) REVIEW OF STUDIES CONDUCTED ON ACHIEVEMENT IN ABROAD

Seetha, B.C., (1975) inquired into the psychological and social factors affecting academic achievement’. Her study revealed that the high achievers possessed superior intelligence when compared with low and non achievers. Study habits had a positive relationship with academic achievement in that high achievers possessed good study habits while low achievers had poor study habits. But in case of achievers and non achievers, there was no significant relationship between academic achievement and study habits. Greater need achievement was found in case of high achievers than low and non achievers. No significant relationship existed between interest and academic achievement. No significant relationship existed between social adjustment and academic achievement. 6. Out of sixteen personality factors, three factors, namely A, B, and L had significant relationship with academic achievement.

Mathew, T. (1976) for his Ph.D. on ‘Some personality factors related to underachievement in science found that the mean scores of normal achievers exceeded significantly the mean scores of underachievers for variables like Sense of personal worth, sense of personal freedom, with, drawing tendencies, social standards, etc., and the mean scores of normal achievers were significantly, less than the mean scores of underachievers in test, anxiety and maladjustment. The mean scores of overachievers were significantly greater than those of the normal achievers in cases of sense of personal freedom, social standards and family relations. The mean scores of overachievers significantly exceeded the mean scores of underachievers in cases of self reliance, sense of personal freedom, freedom from, withdrawing tendencies, freedom from nervous symptoms, social standards, social skills, freedom
from anti-social tendencies, family relations and community relations. A higher number of overachievers were in the high intelligence, low age group', amongst boys, and among the parents with higher education than their respective counterpart. Greater number of overachievers were found amongst high income urban subjects. Four factors-total adjustment, anxiety orientation, group adjustment and self-esteem -accounted for total variance of the overachieving group, and five factors -personal adjustment, social adjustment, social facilitation, leadership, and self acceptance -accounted for the total variance of the normal achieving group.

**REVIEW OF STUDIES CONDUCTED ON ACHIEVEMENT IN INDIA**

**Thakur, T (1974)** had undertaken a research study entitled, “The Academic Achievement of high school boys”. This research study was funded by SIE Assam. The main purpose of this study was to find out how far the school had been able to help the boys to keep up their level of achievement through out their high school career. This research study was conducted on 97 students of class VIII studying in ‘The Best Higher Secondary School, Jorhat Town’. A questionnaire was used to collect personal data and the ability and aptitude of the students for a particular study. The tetrachoric correlation was used to study the student’s ability and aptitude for school subjects and ‘t’ test was used to find to the significance of difference between the means.

The major findings of this study included that, (1) Academic achievement, as a whole was not quite satisfactory. (2) In language, there had been satisfactory progress of all the groups but mathematics presented in unsatisfactory picture. A downward trend of the achievement was observed. (3) Boys with less aptitude for a subject failed to achieve
satisfactorily in that subject. Those who had aptitude but disliked a subject did not show significant achievement. (4) Students who liked a subject found it easy, some found the subject difficult though they liked the subjects. (5) None of the groups gained in the subject through three years of teaching. (6) There was a positive correlation between aptitude and ability in mathematics.

Das, N.C. (1975) had conducted a research study for the Degree of Doctor of science in Psychology at Calcutta University. The study entitled “A Psychometric study of Low Achievement of School Final Candidates in General Science”. Some of the major objectives of this study were; (1) To find out factors responsible for low achievement in general science in school final examination. (2) To compare the intelligence and anxiety of the school final candidates who succeeded and who failed in general science in school final examination and determine the interrelationship among these variables in order to see to what extent intellectual and emotional factors affected scholastic achievement in general science at this stage of education. (3) To analyze the syllabus and the question items of the general science question paper and to suggest measures for the improvement of teaching and learning of general science in high schools.

This study was conducted on 985 students from 61 high schools belonging to six districts of west Bengal. The sample of science teachers both male and female was drawn from 567 high schools. The method of systematic sampling was adopted to collect the samples of teachers and students. The marks obtained by the students in mathematics and general science in school final examination ‘1968’ were also collected. The tools used to collect the data included. The IPAT culture- Free intelligence Test (scale 3-Form B) of cattell and cattell, and the IPAT Anxiety scale
questionnaire of Cattell and Scheier, as adopted by Rao and Roy, were used to measure the intelligence and anxiety of students. A questionnaire seeking information regarding different aspects of low achievement of students in general science in school final examination was also developed. The statistical techniques used to analyze the data included, the centroid method and the method of principal components along with varimax rotation for identifying the factors were applied.

The major findings of this study were; (1) The syllabus for general science of the school final examination was inadequate, Physics was over emphasized, chemistry and botany were neglected; astronomy and geology were not included in the syllabus. There was no scope for practical work by the students. Out of 37 concepts included in the syllabus of general science, only 19 were covered by the question-paper. The knowledge aspect was tested, but the application aspect was neglected. (2) Students who passed in general science, possessed higher IQ than those who failed in the subject. A positive correlation existed between intelligence and achievement in general science. (3) There was no significant difference between anxiety scores of those passing in general science and those failed in the subject. (4) Pupil personality turned out to be the most powerful component responsible for performance in general science. (5) Students who passed in general science obtained higher marks in mathematics than those who failed in the subject. (6) IQ marks in mathematics and general science showed highly significant inter-correlation. (7) Students’ personality was considered by the teachers as contributory to low achievement. (8) Pupils’ personality; teachers’ incompetence and socioeconomic factors were the primary factors responsible for low achievement in general science.
Kohli (1976) has studied the characteristic behavioral and environment correlates of Academic Achievement of over and under achievers at different levels of intelligence. The findings of this study were: (1) The single factor, combination of factors and factors constellations were not capable in themselves of clearly separating over achievers and under achievers. (2) Certain factors were common to those groups, which differed widely in achievement.

Prasad, B.A. (1977) for his Ph.D. level work on ‘A study of the impact of social reinforcement of academic achievement found that experimental group was significantly higher in academic achievement than control group, which showed that social reinforcement was favourable to academic achievement. Experimental group was always superior to control group in individual tests also. Socially reinforced group was also superior significantly in comparison to non-reinforced group in week to week progress.

Barua, U. C. (1981) had undertaken a Ph.D. level research study in Education, entitled, “Influence of capacity of Memorization on Scholastics Achievement” at Calcutta University. The objectives of this study were: (1) To determine common relations if any among different kinds of memory, (2) to ascertain the nature of sex differences if any in memory abilities, (3) to obtain the relation between memory and intelligence, (4) to find out the relative influence at different kind of memory on scholastic achievements, (5) to consider the position of memory and intelligence as determiners of academic performance. This research study was conducted on a sample of 200 students i.e. 100 boys and 100 girls of age 9-11 years of class VI of two high schools. The tools used to collect data were a test of memory for story, sentence, design and digits, the intelligence test developed and standardized by G.B. Kapat and
Socio-Economic status scale by Kuppuswamy. The statistical techniques used to analyze the data included factor analysis with varimax rotation and regression analysis.

The major findings of this study were: (1) Boys and girls were not different with respect to memory for story, sentence design, digits and total memory. (2) Memory for digits had a definite but small relationship with memory for a story. (3) Memory for digits had a very low relationship with intelligence also memory tended to be independent of intelligence. (4) Boys and girls were not different with respect to intelligence and total scholastic achievement. (5) If learning materials were so presented as to appeal both to intellective and non-intellective aspects of the educands, they would engender better learning and achievement. (6) Children of age-group 9-11 years understood design more meaningfully than stories. (7) Meaningful learning occurred through meaningful visual aids or iconic signs.

Sarah, Shanta Kumari, Williams (1983) for her Ph.D. thesis on ‘A study of the attitude of high school pupils towards general science and its relationship with achievement in the subject’ found: (1) The pupils' achievement was poor, in general, in respect of understanding and application, compared to their achievement in respect of the skills and knowledge objectives of teaching general science in high schools. (2) The attitude of the high school pupils towards science and science education in Tamilnadu was generally favourable but there was a wide disparity in their attitudes. (3) When the effects of pupils’ attitude towards science and their attitude towards science education were studied, the coefficient of correlation between their achievement and socio-economic status was found to be 0.1164 and it was significant at 0.01 level. (4) When the effects of pupils' attitude towards science as well as their socio-economic
status were studied, the coefficient of correlation between their attitude towards science education and achievement was found to be 0.4062 and it was significant at 0.01 level. (5) When the effects of the pupils' attitude towards science education and their socio-economic status were studied, the coefficient of correlation between their attitude towards science education and their achievement was found to be 0.07661 and it was not significant. (6) It was found that about 30 per cent of the variance in science achievement was accounted for by one's attitude towards science, one's attitude towards science education and one's socio-economic status.

**Doctor, Z.N. (1984)** had conducted a Ph.D. level study in Education, entitled “A study of classroom climate and the Psyche of pupils and their Achievement.” Some of the major objectives of this study were; (1) to find out the classroom climate and Psyche scores of classes. (2) to study the profiles of the classrooms of high and low climate, (3) to have an in-depth study of teacher behavior in classrooms of high and low climate. (4) to compare the master profiles of classrooms having high climate and low climate and (5) to study the socio grams of classes having high and low classroom climate.

The study was conducted on 1279 pupils from all types of schools belonging to Valsad and Surat districts of Gujrat State. The researcher used classroom climate scale, Junior Index of Motivation scale, students Expectancy, Adjustment, classroom Trust, and Dependency scale as tools to collect the data. Besides this, a scale to measure the behavior of the teachers and the pupils and the Ohio sociometry scale was used to measure the sociability of the pupils.

The major findings of this study were; (1) Each classroom had its own individuality. A classroom with high classroom climate had high pupils Psyche. (2) Classroom climate had consistency with academic
achievement. (3) Academic achievement was highly dependent on independency of pupils. (4) Adjustment was closely linked trust and expectancy. (5) Classroom climate and pupils’ psyche were more connected with independency and dependency. (6) Academic achievement was dependent in teachers and pupils’ behaviour, pupils’ psyche and classroom climate. (7) From the cinematography, it was found that in independency, academic motivation, and legitimacy etc, the scores of most of the schools were less than the scores on other variables taken in the study.

Ghosh, G.P. (1985) carried out a study for Ph.D. Course in Education, entitled, “A Study of Achievement of the Students in Chemistry and Finding Relationships with Some of its Determinants.” The major findings of this study were - (1) Urban Students did not show better performance in Achievement Test in Chemistry (ATC) than Rural Students. (2) Boys did not show superiority in ATC over girls.

Sahani, Kadambini (1985) for her M. Phil. Dissertation at DAVV, Indore on ‘A study of effectiveness of non-directs model in pupils achievement in comparison to traditional teaching’ found:

(1) Relationship between intelligence and non-verbal creativity was negligible. (2) Relationship between intelligence and non-verbal creativity was negative and non significant even at .05 level.

(3) Relationship between intelligence and academic achievement was positive and highly significant.

Patel, S. (1986) had undertaken a Ph.D. level study in Education, entitled, “A Psychological study of high achievers” at Gujarat University. The main purpose of this study was to find out whether there was any relationship (positive or negative) between the high achievement on one
side and study habits, intelligence, neuroticism, anxiety and socio-economic status on the other.

The researcher conducted this study on 170 students (94 boys and 76 girls) studying in two medical colleges of Ahmadabad city. The students varied from different social background, different economic strata and also from different castes and religions. The tools that were used to collect the required data were J.A. Taylor’s Manifest Anxiety scales, Eysenck’s Neuroticism inventory, Advanced progressive Matrices-sets I and II by J.C. Raven, a socio-economic status scale, study habit inventory by C.J. Wrenn and the investigator developed a Questionnaire on study habit by himself.

Chi square test was used to analyze the data collected the researcher found that (1) No-relationship was found between anxiety and achievement.(2) There was no relationship between neuroticism and high achievement.(3) The results of the entire sample showed that higher the socio-economic status, the higher was the academic achievement. 4) The better and greater the number of good study habits, the higher was the academic achievement. (5) The Advanced Progressive Matrices score of the total sample showed that the mean IQ of the sample was above 120. (6) No relationship was found between the percentage of marks at SSC examination and passing or repetition of a semester for the entire sample. (7) More time being allotted to a difficult subject did influence the passing or failing of the students in the subjects. (8) A separate room for studies influenced the passing or failing of students in examination. (9) Concentrated study as well as the study of the whole course did influence the passing or failing of the total sample of medical students.

Singh, B. (1986) conducted a Ph.D. level study in Education entitled, “A study of some possible contributing factors to high and low
Achievement in Mathematics of the High school students of Orissa” at Sambalpur University. This research study was conducted on 370 students studying in XI class. The researcher used Cattell’s Culture Fair Intelligence Test scale 3 (Form A to Form B), Samals’ vocational interest inventory (VII), Minnesota counselling inventory (MCI), survey of study habits and attitudes (SSHA) form H and an achievement test in Mathematics developed by the researcher were used to collect the required data. Correlation and multiple regression analysis were used as the statistical techniques to analyze the data collected.

The researcher found that (1) Achievement in Mathematics was positively significant and related with intelligence, SES, and study attitudes. (2) Achievement in Mathematics was not related with scientific interest, mechanical interest, interest in agriculture, interest in business, interest in social service, interest in art, interest in office activities, interest in administrative activities, family relations, social relationship, emotional stability, conformity, adjustment, mood, leadership and study habits. (3) Regression analysis showed that study habits and interest in agriculture were significantly correlated with achievement in Mathematics. (4) High achievers scored high in the study attitude survey. While low achievers scored low, high achievers were more intelligent than the low achievers and high achievers in general were of higher SES than low achievers.

Darchingpui (1989) at the Ph.D. level research on ‘A study of science achievement, science attitude and problem solving ability among secondary school students in Aizawal’ found: (1) The study indicated significant relationships between scores on scientific attitude and achievement in science. (2) Significant sex difference in achievement in science and problem solving ability existed. (3) High socio-economic
status, family facility and type of school attended favoured achievement in sciences, scientific attitudes and problem solving ability.

**Dhar, Dubey R. N. (1989)** for his Ph.D. studied the ‘Effect of school environment and approval motive on memory and achievement’ found:

1. The means of arts students in academic achievement and in Hindi were found to be below 50% of the aggregate marks.
2. The mean performance of science students in academic achievement as well as in Hindi were found to be satisfactory. The majority of science students secured 50% of the aggregate marks.
3. The mean performance of arts students on recall tests of memory was The mean performance of arts students on recall tests of memory was above 50% of the aggregate marks.
4. The mean performance of science students on recall memory was above the average.
5. The distribution of scores of students in four selected variables. i.e. school environment approval motive academic achievement and memory scores on different recall tests were found to be approximately normally distributed.
6. The main effects of all the three treatments i.e. school location school environment and approval motive were found to be significant on academic achievements of arts students.
7. In the case of science students also the main effects of all the three variables were significant.

**Irudayaraj, M. (1989)** for his M.Phil. level research on ‘A study of creativity and scholastic achievement in science of standard X students in Devakottai District’ found: There was no significant relationship between science achievement and creativity of high school students.

**Begum, Khatija H. (1990)** studied the problems of teaching new science syllabus for standard VII in Andhra Pradesh and their impact on pupils achievement. Her study revealed that more than 60% of the
teachers found the content in the recent syllabus, new as well as overloaded. Dictation of notes by teachers was the dominant method of getting exercises done by the students. Lack of facilities for science teaching continued to bother teachers a lot. It was observed that achievement in science favoured significantly those students, whose teachers had attended an in-service education programme. It is proposed that school conditions need to be improved through, say supply of science kits and hand-books for teachers so that pupils may participate in the teaching-learning process by practicing processes of science such as classifying, inquiring and experimenting, etc.

**Joshi, Anuradha (1991)** has studied the influence of Treatment, personality and their interaction on achievement. The findings of this study were: (1) In the group activity the extraverts by their nature might have dominated and therefore, learnt more than their counter parts. (2) Extraverts are bold by nature so they took the advantage of all activities they were provided.

**Kumar, Uday Sam (1991)** conducted research on the teaching of general science and the development of scientific attitude in secondary school students in relation to achievement in general science. It was observed that there was a significant difference between the mean scores of boys in the average effective group in respect of perception of teaching of science. The urban and rural pupils of average group differed in respect of perception of teaching of science. There was no significant difference between the mean scores of scientific attitude of secondary school students of boys and girls in the high effective group in respect of perception of teaching science. There was no significant difference between the mean scores of perception of teaching of pupils of urban and rural areas in the high group.
Subramanyan and Ramadevi (1991) has studied some differential characteristics of high and low achievers in secondary schools. The findings of this study were; (1) The high achiever possesses higher level of mental ability and low achiever possesses low intelligence. (2) The scholastic attainment and creative talent are related to each other in a positive direction. (3) The high achievers possessed better reading skills compared to low achievers. (4) The high achievers motivated towards achievement. (5) School is the proper place to make use of intellectual ability to nurture the creative potential in pupils to improve reading skills, to inculcate good and healthy attitudes towards education and goals of life.

Vaidya, N (1991) had undertaken an independent research study entitled, “Developing Teaching-Learning Strategies for Enhancing Student Achievement in Science.” The findings of this study were; (1) It was possible to accelerate thought under certain conditions such as arranging thought provoking problems in their hierarchial order but abstract Piagetion schemes of thought were difficult to crack. (2) It was very much possible for children to help themselves in their day to day teaching-learning provided, the teacher did not insist on the right answer. The wrong answers, in fact revealed the evolving structures of their logical thought.

Nelliappan, N.O. (1992) investigated into the problem, “A Study of Scientific Attitude and Interests among Higher Secondary Biology students in Relation to their Learning Environment.” This research study was undertaken at Ph.D. level in Education. The findings of this study were; (1) There was a strong relationship between the high and low total learning environment of the higher secondary biology students and their scientific attitude and scientific interests. (2) The high and low total
learning environment groups of the higher secondary students significantly differed in their scientific attitude and scientific interest.

Chauhan, Poonam (1993) had undertaken a research study for Ph.D. Course in Education, entitled, “Relative Contribution of Some Socio-Cultural and Financial Variables to Over and Under Achievement in Science at Class VIII Level.” The findings of this study were; (1) The correlation between achievement in Science and general intelligence was found to lie between 0.29 to 0.60. (2) About one-third of the student population constitute over and underachievers. (3) The correlation coefficients between intelligence and most of the socio-cultural and familial variables were found to be statistically significant. (4) Family income, Parent education, family occupation and socio-cultural background had significant correlations with achievement in science. (5) In case of boys, over achievement was mainly determined by family income. (6) Underachievement in boys were mainly determined by family income and parent education. (7) In case of girls, overachievement in science was determined by socio-cultural background and family occupation. (8) Overachievement in Science for combined sample of boys and girls was determined by family occupation alone. (9) Underachievement in Science for combined sample of boys and girls was determined by family income and parental education.
II) REVIEW OF STUDIES CONDUCTED ON ACADEMIC ACHIEVEMENT IN INDIA

Singh, S. (1984) had undertaken a Ph.D. level study in Psychology entitled, “A Relationship of Home Environment, Need for Achievement and Achievement Motivation with Academic Achievement” at Magadh University. The main purpose of this study was to find out the relationship of home environment, need for achievement and academic motivation with academic achievement. This research study was conducted on 300 students (201 boys and 99 girls) studying in different classes. The students were selected from seven schools of Barh subdivision of Patna District. The researcher had used McClelland’s Thematic Apperception Test for need Achievement, Academic inventory, Ojhas parental Attitude scales and problems checklist as tools to collect the required data. Mean, standard deviation, inter correlation, analysis of variance etc were used as statistical techniques to analyze the data collected.

The researcher found that (1) Aggregate marks were significantly and positively related to average marks and self concept of academic ability. (2) Self-concept of academic ability was significantly and positively related to academic motivation. (3) Sex differences were statistically effective in all the four areas of home environment. Males had significantly higher mean score on school economic, recreation and home problems. There was a sex difference in respect of permissive, loving, protecting and rejecting behaviors of father, restrictive and rejecting behaviors of mother and academic motivation. Boys demonstrate the behavior as like their fathers and girls as like their mothers. (4) Sex differences were unrelated to self-concept of academic ability and need for achievement motivation. (5) School differences were
significant in the area of school economic and have problems of home environment and behavior patterns.

Dixit, Mithilesh Kumari (1985) had conducted a Ph.D. level study in Education, entitled, “A Comparative Study of Intelligence and Academic Achievement of Adolescent Boys and Girls studying in classes IX and XI.” This research study was designed as a comparative study of the academic achievement and intelligence of adolescent boys and girls studying in classes IX and XI. The sample for this research study consisted of 800 students studying in classes IX and XI. The researcher selected 400 boys and 400 girls. Jalotas’ group General Mental Ability Test was administered to the students to get an idea about their mental ability and marks obtained by them in the annual examination were taken as the criterion of academic achievement.

The major findings of this study included (1) Among class XI students there was no difference in the academic achievement of intellectually superior and intellectually very superior boys and girls. (2) At all other intellectual levels the academic achievement of the girls was superior to that of the boys. (3) Among class IX students there was no difference in the academic achievement of intellectually very superior and intellectually superior boys and girls. (4) At all other intellectual levels the academic achievement of the girls was superior to that of the boys. (5) In general the intelligence test scores of the boys were higher than those for the girls. (6) In case of the boys, there was very high correlation between intelligence test scores and academic achievement. (7) In case of girls, there was an average correlation between intelligence test scores and academic achievement.

Jagannadhan, K. (1985) conducted a Ph.D. level research study in Education, entitled, “The effects of certain socio-Psychological factors on
the Academic Achievement of children studying in classes V to VIII.”

The objectives of this study were; (1) To identity some of the personal and situational variables influencing academic achievement. (2) to identify some of the socio-Psychological variables affecting academic achievement. (3) to examine the difference in academic achievement among the sub-groups of the personal and situational variables. (4) to examine the differences in the academic achievement of the sub-groups of socio-Psychological variables. (5) to measure the magnitude of individual and cumulative relationship of these socio-Psychological variables in academic achievement, and (6) to formulate equations to predict academic achievement with the help of socio-Psychological variables under the study.

The researcher had developed Achievement Test in Telugu, Mathematics, General science and social studies as well as a Questionnaire for pupils and their teachers to measure ‘pupils’ role expectations. A questionnaire to measure pupils’ perception of school environment was also developed by the researcher.

The multi stage random sampling procedure was followed to select the sample. This study was conducted in 42 schools (12 primary 18 upper primary, 12 high school) from 3 districts of Andhra Pradesh. The sample comprised 1200 students selected randomly, representing the three classes, both sexes and also rural and urban areas.

The main findings of this study included; (1) the three levels of school environment, via, low perception, moderate perception and high perception indicated 43.74 percent, 47.72 percent and 51.66 percent of mean academic achievement respectively. The results of F-Test revealed that the mean differences were found significant at 0.01 level. However Krammers’ test showed that only high group differed significantly from
the middle and low groups. The zero order correlation between the pupils' perception of school environment and academic achievement yield a positive correlation 0.184 on the whole sample and 0.26 on the sub-sample and they were significant at 0.01 level. The relationship between the two variables for boys (0.154) and girls (0.232) separately also produced positive and significant correlation. The partial correlation between the two variables when the other independent factors were held constant were not significant on the whole sample and on the sub-sample. Inter-correlations among the independent factors indicated that school environment had a positive and significant relationship with socio-economic status, academic motivation, role expectations and home environment. However, all the correlations were low except with role expectations. School environment and intelligence were not found to have a significant relationship. (2) On the basis of the congruence between pupils and teachers expectations on the ‘ideal pupils role’, it was categorized in three levels incongruent, moderately congruent, and congruent. The mean academic achievements of the three groups were found to be 42.51, 46.23 and 55.6 respectively. The mean differences were found to be highly significant beyond 0.01 level. But the means between moderate and incongruent groups did not differ significantly. The simple correlation between the role expectations and academic achievement was found to be 0.309 for the boys and girls were 0.285 and 0.351 respectively. All the correlations were found significant beyond 0.01 level.

Jahan, Q (1985) had undertaken a Ph.D. level study in Education, entitled, “A Study of Profiles of Students of Science, Arts and Commerce at the Higher Secondary level of Education in Relation to Their Academic Achievement” at Aligarh Muslim University.
The major objective of this study was to compare the personality profiles of over and underachieving students studying in science, arts and commerce streams in Pre University classes. The sample comprised 758 male and female students. The tools used for collecting the necessary data were; (1) Cattell’s High school Personality Questionnaire (HSPQ) (2) Composite of marks obtained in different subjects of science, arts, and commerce streams served as measures of personality and academic achievement. (3) Thorndike’s method of identifying over-achievers and under-achievers on the basis of discrepancies between actual achievement and that predicted on the basis of intelligence was employed. The ‘t-test’ was applied as statistical technique to as certain the significance of difference the means of scores on the fourteen dimensions of HSPQ secured by the overachievers and under achievers.

The major findings of this study included (1) the over achievers of science were more reserved, intelligent, emotionally stable, excitable, obedient, sober, conscientious, shy, self-assured, controlled and relaxed as compared to the underachievers. (2) The over-achievers of arts faculty were more warm-hearted, intelligent, affected by feelings, undemonstrative, assertive, enthusiastic, conscientious, zestful, apprehensive and tense as compared to the underachievers. (3) The over achievers of commerce stream were more reserved, intelligent, affected by feelings, sober, conscientious and self-assured as compared underachievers.

Jena, Sumati (1985) for her M. Phil. Dissertation at DAVV, Indore on ‘A study of prediction of academic achievement with the help of aptitude and intelligence’ found: (1) Students were average and a little above in academic, aptitude and intelligence. (2) The relationship between intelligence and achievement was found satisfactory i.e. highly
significant at .01 level. The null hypothesis rejected. (3) Relationship of achievement with eight types of aptitudes (DATs) were all satisfactory. (4) Relationship of achievement with intelligence were of varying nature.

**Das, S. (1986)** had undertaken a research study for Ph.D. degree in Education at Maharaja Sayajirao University. The study entitled, “Peer Influence and Educational Aspiration of secondary school students, A study in relation to Their Academic Achievement.”

The major objectives of this study were; (1) to study the effects of area of institution, nature of institution and their interaction on peer influence of students, (2) to study the effects of intelligence and socio-economic status and their interaction on peer influence of the students, (3) to study the effects of area of institution, nature of institution and their interaction on educational aspirations of students, (4) to study the effects of intelligence, socio-economic status, and their inter-action on educational aspiration of students, (5) to establish the regression equation for the academic achievement in relation to intelligence, socio-economic status, peer influence and educational aspirations for different sample groups. The tools used to collect the required data were, Bora’s group verbal Examination of General intelligence Test, Narain Rao’s socio-economic rating scale, an Adapted version of Mathur’s Educational Aspiration scale; the investigator had prepared the peer influence scale and used in the study examination scores of the HSLC examination were recorded. This research study was conducted on 820 students of class X belonging to 20 schools in Assam state. The statistical techniques used to analyze the data collected included Analysis of variance and regress analysis.

The major findings of this study were; (1) Peer influence was stronger among the students of rural schools in comparison with those of
urban schools. (2) Peer influence was strongest among students of boys’ schools and least in the girls’ schools. (3) The educational aspiration of students belonging to urban schools was higher than that of students of rural schools. (4) The high intelligence group had higher educational aspiration than the students of low intelligence group. (5) Students of high socio-economic status group had higher educational aspiration than the students of low socio-economic status group. (6) Intelligence was the most powerful predictor of academic achievement, contributing 40.26 percent of total variance. (7) Educational aspiration was the second most powerful predictor bearing 8.58 percent of variance. (8) More predictability was observed in the rural group in comparison with urban group. (9) The highest predictability was observed in coeducational school group, which accounted as 67.22 percent of variance in comparison with the boys group (56.61 percent) and the girls school group (47.35 percent).

Mehna, V.H. (1986) at the Ph.D. level research on ‘An investigation into some factors affecting academic achievement in science of standard IX students of greater Bombay’ found that the pupils’ performance in science subjects can be improved: (1) Six variables viz. Verbal intelligence, motivation for learning general science, scientific knowledge and aptitude, numerical ability, liking for teachers of science and interest in medicine were significant predictors of achievement of class IX students in general science (R=0.5773). (2) If teachers succeed in generating a feeling of liking for them among pupils. (3) If teachers develop aptitude for science among children by providing scientific information and (4) If teachers can motivate children to learn science subjects. This needs adequate training for teachers in making science
teaching interesting and in training them in the techniques of arousing pupils motivation for learning science.

**Mehrotra, S. (1986)** for his Ph.D. on ‘A study of the relationship between intelligence, socio-economic status, anxiety, personality adjustment and academic achievement of high school students’ found: (1) Both for the boys and the girls there was an inverse relationship between level of anxiety and academic achievement. (2) Both for the boys and the girls there was a positive relationship between socio-economic status of the family of the students and academic achievement. (3) There was a positive relationship between intelligence and academic achievement. (4) There was a positive relationship between level of adjustment and academic achievement. (5) In general, the girls had a comparatively higher level of anxiety than the boys.

**Mohanty, R. (1986)** at the M. Phil. Level research at DAVV, Indore ‘A study of creativity in relation to intelligence, academic achievement and problem solving ability of students’ found: Students scores in all subject and total score (AA) were found reliable. Students were found comparatively high in Sanskrit and Hindi medium in science, social studies and low in Maths and English.

**Dalbekere, L. (1987)** at the M. Phil. Level research at DAVV, Indore on ‘A co-relational study of students intelligence, personality, problem solving ability, academic achievement and socio-economic status’ found: (1) The co-relation among those variables. (2) Intelligence, personality, problem solving ability and socio economic status was found contributing for academic achievement. (3) Intelligence, personality, SES and academic achievement were found contributing for problem solving ability.
Narang, R.H. (1987) at the Ph.D. level research on ‘A comparative study of the socio-economic and home factors affecting the academic achievement of boys and girls (10 and 11 years) in the Urban and Rural Areas’ found: (1) Socio-economic status did not affect academic performance in the city, town and village areas. (2) The number of siblings seemed to affect performance. Most high achievers had only one sibling. In the village areas most of the respondents among all categories of achievers had three siblings. (3) The exposure to mass media or the extent of exposure did not affect school achievement. (4) Regularity in doing homework helped achievement while copying it from others hindered performance. (5) The relationship with the principal did not affect academic achievement. (6) In the city area, the relationship with the teacher affected the achievement of Marathi medium girls. In the town area, achievement was affected by the ability of the respondent to go to the teacher with problems. (7) Where the non-academic programme of the school was concerned, participation in co-curricular activities was related to high achievement. However, the type of activities or hobbies pursued or the type of games played did not affect it. (8) The time spent on house work, the type of house, household chores performed, and the way free time was spent did, not affect achievement. However, the amount of free time affected the achievement of only girls. (9) The relationship with friends with special reference to the number of close friends, visits to friends, frequency of visiting them, leisure activities and friction with classmates did not affect achievement. (10) Low achievement was related to being frequently scolded by the parents.

Arora, Reeta (1988) for her Ph.D. on the ‘Role of parent-child relationship and teacher student relationship in the academic achievement of higher secondary school student of both sexes’ found: (1) No
significant relationship existed between educational achievement of students and parent child relationship. (2) Educational standard of students and teacher student relationship were found to be significantly related.

Manral, Bheema (1988) at her Ph.D. level research studied ‘The impact of emotional maturity and prolonged deprivation on indisciplined behaviour among university students in relation to their academic achievement’ found: (1) EM was related to 18. Out of five dimensions of EM, emotional unstability was related to behaviour in classroom, student union activities and behaviour in miscellaneous situations. Emotional regression was related to student union activities. Indisciplined behaviour was also related to PD. The emotional unstability was related to home environment, economic sufficiency, rearing experience, parental characteristics, interaction with parents, motivational experiences, emotional experiences and total score of PD. (2) All the dimensions of 18 were highly related to Ach. (3) EM and PD contributed towards IB when differentiated on the basis of Ach. (4) There was no significant difference between male and female students on EM, behaviour in classroom and library, behaviour related to sports and cultural activities and miscellaneous situations. But males and females differed on PD, Ach., behaviour in hostel, behaviour related to students' union activities and IB. (5) High maturity group differed significantly on PD, Ach., behaviour in hostel, behaviour related cultural activities and sports and IB when compared with low maturity group. (6) High deprived students differed from low deprived students on EM, behaviour in library, behaviour in examination and TB. (7) High achievers differed from low achievers on EM and all variables of IB. (8) High indisciplined students differed significantly on PD, EM and Ach., from low indisciplined students.
Sood, Ramana (1988) at the Ph.D. level research on ‘Cattell’s personality factors as predictors of academic achievement in some selected professional courses’ found: (1) Personality factors of shrewdness, social awareness (N) and high intelligence (B) contributed positively but group adherence (Q2), praxarnia practical (M) and conservatism of temperament (Q1) contributed negatively to academic achievement in the engineering course. (2) Personality factors of high ergic tension (Q4), stronger super-ego strength (Q4), radicalism (Q I), tender minded pretension (hard to fool) (L) and high intelligence (8) contributed positively but personality factors of untroubled adequacy (0), and artlessness (N) contribute negatively to academic achievement of medical students. (3) Personality factors of pretension (hard to fool) (L), radicalism, free thinking, liberal (Ql), high ergic tension (Q4), stronger super-ego strength (0), socially bold (Cl) and self-sufficiency (Q2) contributed positively but personality factors of alertness (N), tough minded (I), reserved (A), self-assured (0) and serious (F) contributed negatively to academic achievement of M8A students. (4) Personality factors of high intelligence (B), stronger super-ego strength (G), pretension (hard to fool) (L), higher ego strength, (C) and self-sufficiency (Q2) contributed positively but practical (M), serious (F), serene (0), submissive (E), and genuine but socially clumsy (N) contributed negatively to the academic achievement of law students.

Khan, Md. Ataur Rahman (1989) for his Ph.D. research on ‘Perceived justice and related factors affecting academic performance and satisfaction: A case study of Delhi University’ found: (1) The analysis demonstrated that boys and girls in both the subjects in the four zones of Delhi university were perhaps comparable in the extent of perceived justice in academic performance assessment
(2) The effects of sex and subject were however found to be insignificant for locus of control but zone (institution) dimension was found significant. (3) On academic performance, only the difference in the effect of subject was noted to be significant. (4) The other main and interaction effects were found to be most significant. (5) The perceived justice predicted academic performance significantly. (6) The subject was found to be a significant predictor of the academic performance and explained an additional four per cent of the variance. (7) The analysis revealed that the perceived justice was the best predictor of students satisfaction. (8) The overall results of regression analysis demonstrated that sex, subject, zone, perceived justice and locus of control together predicted academic performance and satisfaction better than each of these taken separately. The determinants of academic performance and satisfaction were multiple, interrelated and interactive.

**Khatri, P. K. (1989)** studied for his M. Phil. Level research at DAVV, Indore the ‘Prediction of academic achievement with the help of aptitudes, intelligence and achievement motivation’ found:

(1) Mean academic achievement score of girls was significantly higher than the boys. (2) It has been found that the co-efficient of correlation of academic achievement with verbal reasoning (7 DATs), IQ and AM was significant and positive. (3) It has been found that the variable of DAT, IQ and AM together has 76% contribution in predicting the AA of the IX class students.

**Academic Achievement is significantly related to all DATs.**

**Cherian, V.I. (1990)** tried to find out Relationship between punishment of pupils and their academic achievement. There was a
significant relationship between the frequency of punishment experienced by pupils and their academic achievement found in the study.

**Deb Madhu and Grewal, Hirdai Pal (1990)** in their research article on the ‘Relationship between study habits and academic achievement of undergraduate home science final year students’ and found: (1) Home environment of the students and planning of schedule was significantly related to their academic achievements. (2) Suggestions and comments were related to academic achievement. (3) The relationship between concentration for examination and academic achievement was significant. (4) Significant relationship between study habits and academic achievement was found. (5) Students' habits and interests also influenced their academic achievement. (6) College environment was related to study habits.

**Devi, Ujjwala A. (1990)** studied the ‘Pupils’ academic achievement in relationship to their intelligence, neuroticism and locus of control’ at the M.Phil.level and found: (1) Girls had a significantly higher academic achievement than boys. (2) There was no significant difference in the intelligence levels of boys and girls. (3) Boys showed a higher neurotic tendency than girls. (4) There was no difference between boys and girls in the locus of control. (5) Academic achievement showed a positive and significant correlation with intelligence. (6) Academic achievement was negatively correlated with neuroticism. (7) Intelligence showed a negative relationship with neuroticism and a positive relationship with locus of control.

**Shah, J. H. (1990)** in his research article on ‘A study of relationship among intelligence, self concept and academic achievement of pupils of standard X of semi urban and rural areas of Sihore Taluka’ found: (1) There was no sex difference in SC either in semi-urban or rural areas.
(2) There was no sex difference in DIQs (Deviation IQ) either in semi-urban and rural areas. (3) There was significant difference in AA, in favour of boys, in both semi urban and rural areas. (4) There were positive and linear correlation among SC, DIQs and AA in both types of areas. (5) Intelligence was more related to AA than SC.

**Thilagavathi, T. (1990)** in her research on ‘Academic achievement in relation to intelligence, creativity and anxiety at M.Phil. level found that (1) Teaching competencies of science teachers were related to the academic achievement of high school students. (2) Teacher personality was not related to student's academic achievement in science. (3) Both male and female science teachers were similar in their teaching competencies and personality, human relation and interpersonal skills.

**Wanjari, Shashi (1990)** for his Ph.D. on ‘A study of effects of serum uric acid and serum cholesterol on academic achievement of school going children’ found that in arts, science and commerce, the serum uric acid was significantly related with their academic achievements. Serum cholesterol showed a positive but not significant relationship with academic achievement in science faculty. In commerce rural male and urban male, the cholesterol was negatively and significantly related to achievement, while the relationship was highly positive and significant in urban female. In arts the relationship between serum cholesterol and academic achievement was positive and significant in urban boys.

**Deshpande, S. P. (1991)** for her M.Phil. Dissertation on ‘Relationship between scientific attitude and academic achievement of adolescents at different levels of intelligence – A Study’ found that the academic achievement of three groups is equal. There is no relation between academic achievement of adolescence and level of scientific
attitude. The academic achievement of boys is higher than the academic achievement of girls. There is no interaction effect between sex and scientific attitude on academic achievement of the adolescent. The academic achievement of adolescents with high IQ is higher than the academic achievement of adolescents with Low IQ. There is scientific attitude and intelligence.

**Padhi, J.S. (1991)** studied the effects of creativity and classroom environment on pupil academic self concept and academic achievement. The study revealed that the correlation between CE and AA was not significant, CR and AA was significant, ASC and AA in different school subjects was significant, CR and CE was non-significant, CE and CR with ASC were significant. The main effects of CR and CE and AA were significant. The main effects of CR and CE on ASC were significant. The interaction effects of CR x CE on AA was found to be non-significant. Family size had differential effects on AA, there were no differences in CE, CR. ASC and AA attributable to birth order. Fathers' occupation had influence on the ASC of their children. Educational qualification of the father had significant influences on the AA, ASC and CR of their children. The same result was also found with the mothers' education.

**Chhaganlal, Nandani Mansukhbhai (1992)** for her Ph.D. on ‘A study of the value, adjustment, attitude towards the teaching profession and academic achievement of teachers children as compared to non-teachers children found that non-teachers children were significantly better than teachers' children in social value, whereas teachers' children and non-teachers' children were found equal in power value, religious value, aesthetic value, theoretical value and economic value. Non-teachers' children were at a higher level ‘than teachers' children in academic achievement.
**Harikrishnan, M. (1992)** in his research on ‘A study of academic achievement of the students of the higher secondary stage in relation to achievement motivation and socio-economic status’ at M. Phil. level found that girls obtained a higher mean in achievement than boys. Socio-economic status was significantly related to academic achievement. Achievement was not related to achievement motivation.

**Kanakarajan, R. (1992)** studied the effect of non-directive teaching on some selected personality characteristics and academic achievement of lower secondary students found that the non-directive teaching technique significantly increased the following characteristics of personality: self-concept, autonomy, personal integration, creativity. Mean gain scores of students taught through non-directive teaching were significantly higher than those of students taught through directive teaching in the following characteristics: self-concept, autonomy, personal integration, and creativity. Under non-directive technique (1) girls achieved better than boys in self-concept. (2) boys achieved better than girls in autonomy. (3) no significant difference was seen between boys and girls in personal integration, and (4) boys achieved better than girls in creativity. Under non-directive teaching there was no interaction of levels of achievement and sex on gain scores for the following characteristics: self-concept, autonomy, personal integration, and creativity. The mean achievement score of students taught through non-directive teaching was higher than that of the students taught through directive teaching.

**Kaur, Parvinder (1992)** studied the relationship among creativity, intelligence and academic achievement in different subjects of X Graders. Her findings revealed that for males intelligence was positively correlated with fluency, flexibility, originality and composite creativity. (1) (a) For males fluency, flexibility, originality and composite creativity were
positively related with achievement in Punjabi, Hindi, English, mathematics and general science and originality and composite creativity were also related with achievement in social studies. (b) For females as well as the total sample, fluency, flexibility, originality, and composite creativity were positively and significantly related with achievement in each of the five subjects. (2) For males when intelligence was partialled out (a) fluency was positively related with achievement in Punjabi but negatively with social studies but not with the other subjects, (b) flexibility was not related with achievement in any of the six subjects. (c) originality was positively related with achievement in Punjabi, and mathematics. (d) composite creativity was related with achievement in Punjabi and mathematics but not with the other four subjects. (3) For females when intelligence was partialled out (a) fluency was positively related with achievement in all the subjects except general science. (b) flexibility was related with achievement in the three languages but not with the other three subjects, (c) originality as well as composite creativity were related with achievement in all the six subjects. (4) For the total sample when intelligence was partialled out fluency was related with achievement in Hindi, and English originality was related with achievement in the three languages and general science, composite creativity was related with achievement in all subjects (r from 0.11 to 0.16) except social studies. (5) For males as well as females intelligence was positively related with achievement in all the subjects; the same was true for the total sample. (6) For both males and females, when the effect of creativity or its dimensions was partially out all the inter- correlations between intelligence and achievement ranged from 0.16 to 0.61 and from 0.28 to 0.50 for the total sample. (7) Intelligence was found to be a better predictor than fluency, flexibility and originality of achievement in all subjects, Intelligence was also a better predictor of achievement in all
subjects than the total creativity except in the case of females where achievement in English and Hindi was slightly better predicted by composite creativity. (8) The prediction of achievement in school subjects when made on the basis of conjoint effect of creativity and intelligence was higher than if made on the basis of each variable separately.

**Verma, B.P. (1992)** in his research article on ‘Relationship between temperament and academic achievement’ found that the correlation’s between traits of 'sociability', 'ascendant', 'secretiveness', 'reflective', 'impulsivity', 'placid', 'accepting', 'vigorous', 'co-operative', 'persistence', 'warmth', 'aggressiveness', 'tolerance' and 'tough-minded', on the one hand, and academic achievement, on the other, were not found to be significant. Relationship of 'responsible' trait of temperament and academic achievement was positive and significant. High and low achieving groups did not show any significant difference in the mean scores of 'sociability', 'ascendant', 'secretiveness', 'reflectiveness', 'impulsivity', 'placid', 'accepting', 'vigorous', 'co-operative', 'persistence', 'warmth', 'aggressiveness', 'tolerance' and 'tough-minded' traits of temperament. High achieving groups of students had significantly higher value of mean scores of 'responsible' trait than low achieving group of students. Out of 15 traits of temperament only one trait, i.e. 'responsible' was found to be significantly related with academic achievement.

**Mane, D. H. (1999)** for his M.Phil. Dissertation on ‘The Effect of Teaching aptitude and graduate academic achievement on the theory performance of B. Ed. Students with science method – A study’ found that B.Ed. performance of students is independent of their teaching aptitude. B.Ed. performance of student is independent of their graduate academic achievement. Low, Average and High B.Ed. performance is Independent of the different levels of graduate academic achievement and
teaching aptitude. There is no sex difference among student teachers in their teaching aptitude. Teaching aptitude is independent of students' academic qualifications and the university from which they hail. B.Ed. students of all the 24 colleges have low teaching aptitude.

Sonawane, S. A. (2001) for his M.Phil. Dissertation on ‘Effect of educational interest and study habits on the academic achievement of urban XI standard students – A Study’ found that in the Excellent grade of study habit there are more number of Commerce faculty students than the Science and Arts faculty students. In the Good grade and Unsatisfactory grade of study habits there are more numbers of Science faculty students than the Arts and Commerce faculty students. In the Average grade and Very Unsatisfactory grade of study habits there are more number of Arts faculty students than the Science and Commerce faculty students. The total number of students of the Excellent and Good grade of study habits put together is more than the total number of students of Unsatisfactory and Very Unsatisfactory grade put together. However, the highest percentage of students are in the Average grade category of study habits. Hence, it can be concluded that the majority of the adolescents have Average grade study habits, though the study habits grade category differ faculty-wise. Arts faculty students are more interested in Agriculture, Fine Arts, Home Science and Humanities areas of educational interest than Science and Commerce faculty students. Science faculty students are more interested in Science and Technology areas of educational interest than the Arts and Commerce faculty students. Commerce faculty students are more interested in Commerce educational interest area than Science and Arts faculty students. For the Arts faculty students there exist a negative relationship between their educational interest areas of Science, Technology and Commerce with their academic achievement. For the
Science faculty students there exist a negative relationship between their educational interest areas of Fine Arts, Humanities and Commerce with their academic achievement. For the Commerce faculty students there exist a negative relationship between their educational interest areas of Agriculture and Technology with their academic achievement. There exists a significant relationship between study habits and academic achievement of the XI standard adolescents of all the three faculties. The study habits of the XI standard adolescents of the faculties of Arts, Science and Commerce do not differ. Where as the educational interest (Agriculture, Commerce, Fine Arts, Home Science, Humanities, Science and Technology) of the XI standard adolescents of the faculties of Arts, Science and Commerce differ.

Gurubasappa, H. D. (2005) this study examines the relationship between adjustment and mental ability as correlates of academic achievement of secondary school students of Tumkur district of Karanataka state. It was found that students with different levels of adjustment and mental abilities differed in academic achievement. Also it was found that there exists a significant positive high correlation between academic achievement and adjustment and mental ability.

III) REVIEW OF STUDIES CONDUCTED ON ROLE OF I.T. IN ENHANCING ACADEMIC ACHIEVEMENT - IN ABROAD

Henry (1986) investigated the effects of computer-assisted instruction, tutorial program on the academic performance and attitudes of college athletes. A pre-test, post-test experimental design was employed in this study. Forty athletes enrolled at a university located in
southwest Texas were divided into two groups, that is experimental group and control group. The experimental group was assigned a series of CAI tutorial lessons to be done in three months while the control group was tutored by traditional method during the same period of time. A modified version of an instrument developed by Brown was used to measure the attitude of college athletes, towards CAI. The main finding of this study is that the Computer Assisted Instruction had a significant effect on the academic performance (Achievement) of college athletes.

Johnson, Johnson and Stanne (1986) studied that the effects of computer assisted co-operative, competitive and individualistic instruction in terms of achievement, student interaction and attitudes. Seventy-four eighth-grade students were randomly assigned to conditions stratifying for sex and ability. A 3X2 ANOVA was used to analyze the differences between the conditions and between males and females. The results of the study indicated that when computer assisted co-operative, competitive and individualistic learning were compared, computer assisted co-operative learning promoted the ability to apply facts in test questions requiring higher level reasoning and problem solving and more success in complex problem solving tasks involving mapping and navigation.

Marie (1986) investigated how the students of elementary grades utilize computers and also explored the attitude of both male and female students and teachers towards the use of computers. Results showed that both teachers and students expressed positive attitude towards computers. The students were confident in their ability to use the computer.

James (1987) carried out a study to see the effect of computerized tutorial programme on high school juniors and seniors. It was found that, experimental group, scored higher than the control group. A significant
relation was found to exist between students background in Mathematics and their scores in Mathematics.

**Liabre (1987)** studied the effect of a computer administered test on anxiety and performance of students at college level. The results on test anxiety scale indicated significant differences in anxiety level. It was concluded that, the computer administered testing could potentially increase test anxiety and depress test performance of examinees who were relatively unfamiliar with computers.

**Niemice and Walberg (1987)** carried out critical examination of CAI and found that, (1) Learning through CAI is comparable to learning that, takes place through the live teacher’s teaching. (2) Learning through CAI is time saving. (3) Students responded favourably towards computer Aided Instruction. (4) Many students gained mastery status in a short period of time.

**Galinski (1988)** studied the relationship between the use of micro-computers and problem solving situations of Seventh and Eighth grade students of two private elementary schools. The results of this study showed that, the traditional maths instruction was not significantly better than the computer assisted maths instruction.

**Huge (1988)** carried out a study to examine the effects of computer-assisted instruction on the academic gains of students of sixth, seventh and eighth grades in the subject area of math’s reading in a selected school of the district. Findings showed that the students receiving direct CAI had significantly higher academic gains in both reading and math’s when compared with the students of control group who were taught without the benefits of computer. When considered in conjunction with grade level, ability level, sex ethnicity and socio-economic status all had a significant effect on the academic gains over students using CAI. Only
ability level, when considered in conjunction with grade level, had a positive effect on the academic gain.

**Neil, Straker (1988)** had undertaken an interactive learning project at school of Education, University of New Castle, U.K. The main purpose of this project was to test the interactive videodiscs in the mathematics classroom. Under this project Mathematical videodiscs were produced for use in schools in U.K. These discs were designed for students of average ability in the fourth and fifth years of secondary schools. These discs included work on basic arithmetic, statistics, graphs, modelling and optimisation. The learners were placed in situations where they had to make decisions on venue. It was found that, interactive videodiscs were helpful to improve the process of learning in Mathematics.

**Woodward (1988)** investigated the effectiveness of computer simulation in enhancing student learning in the Unit of Health. The results showed that the combination of structured teaching and computer simulation was effective in teaching not only factual level of knowledge, but higher cognitive skills, as well.

**Byrun and David (1989)** investigated the effects of CAI on one to one and small group learners in terms of post test scores. The results of this study indicated significant difference in learner’s post-test scores on the revised CAI products using the two methods of formative evaluation over the original versions. There was significant difference between post-test scores of the revised CAI products based on one-to-one or small group method of formative evaluation.

**Nicolas (1989)** investigated the influence of home computer ownership and have use on achievement in a school computer programming curriculum, ninety-six second graders and seventy-nine fifth graders were taught BASIC programming for three marking periods.
Pre-tests were given to both the computer-programming languages to access the students’ prior knowledge. Lessons were taught for approximately 20 minutes once in a week for 30 programming phase only. Post-tests were administered at the end of both the LOGO and BASIC lessons. Questionnaires were sent home with computer student to access the actual use of computers in homework completion. For analysis, the students were grouped by ability, sex and computer ownership. Post-tests scores for BASIC and LOGO and BASIC homework scores averages were analyzed using ANOVA. The overall hypothesis of no difference in achievement between owners and non-owners was not rejected. There was tendency for owners to out perform non-owners on both BASIC and LOGO post-test scores and programming homework score averages. The actual use of computers was not as important to achievement on homework scores as ownership, particularly at a fifth grade level. This study also suggested possible sex differences.

Ryser (1990) studied the effect of computer education on students’ achievement, attitudes and self-esteem. Investigator also established the relationship between success with computer instruction and personality characteristics, i.e. age and attitude towards school. The sample consisted of students from two elementary schools. One hundred and fourteen students participated in this study. One school was given the treatment of integrated computer instruction and the other school used traditional instruction without the benefits of the computers. The study revealed that there was no significant gains in Mathematics, language, arts and reading achievements, while there were interesting student gains in affective areas, such as attitudes and self-esteem. According to the results of the attitude measure, students in the school receiving computer instruction agreed more strongly with positive attitude statements than the students
of the school not receiving computer instruction. Results also indicate that there were no sex relation differences in achievement, attitude and personality characteristics.

Thombs (1990) investigated into the effect of computer symbolic modes on learning processes. The results of this study indicated that, computer symbolic structures can facilitate the learning process and it characterized an active learning environment.

Copolo (1992) conducted a study on the use of hand held and computer models as manipulatives to teach organic isomers in three dimensions. It was found that, the students in combination group of using both models, scored significantly higher on retention test of isomeric identification, compared to other group. This study demonstrated the effectiveness of using the computer models for instruction of organic molecules and isomers as computer provides a focussed and easily manipulated simulations.

Diana, Laurillard (1992) argues that computer based simulations can help the students to enhance their conceptual and intuitive understanding of theoretical concepts. Intuitive understanding of scientific concepts, goes beyond conceptual understanding, attaining a sense of familiarity with ideas that cannot be directly experienced requires opportunities for student direct activities and feedback on those activities in an environment that stimulates the theory concerned. The computer based simulations can offer these characteristics, but they still do not always achieve the intended enhancement in intuitive understanding.

Goforth, Dave (1992) investigated that visualization is a powerful tool in research; visual, dynamic and interactive representations help the learners using simulations and microworlds to gain qualitative
understanding of concepts. Recorded video can bring reality to computer assisted learning.

**Williamson (1992)** found the effect of computer animation, emphasizing the particulate nature of matter on the understandings and misconceptions of chemistry students at college levels. The study revealed that experimental group had a higher conceptual understanding score and fewer misconceptions than the Control Group. No difference was found with course achievement / attitude. The results of the study suggested that the treatment with animation may increase conceptual understanding by promoting the formation of dynamic mental models of phenomenon.

**Milheim, William D (1993)** found that, animation has been used in some form since the beginning of microcomputer based instruction, there has been only limited research concerning appropriate strategies for integrating this instructional option with a specific lesson. It is becoming increasingly easy to develop computer based training and multimedia materials that include a significant animation component. Many research studies support its use because the animation has capacity to motivate the students. Some guidelines should be followed while using animations. They use simple animations, focus on important objectives, allow speed variations in the presentation of the sequence, use animation with content which includes motion, trajectory or visualization, use interactive, dynamic graphics, avoid overuse of animation sequence that could lead to distraction of the learner.

**Perzylo, Leso (1993)** found that, multimedia represents a radical change in how information can be presented or communicated and how learners can access and retrieve information. Multimedia CD-ROM technology enables the learners to engage actively more of their senses in
the learning process as well as to develop their information searching skill and strategies. As a user-friendly means of acquiring information, multimedia CD-ROMs have exciting potential.

Waddick (1994) studied the use of computer learning environment as an alternative to traditional lecturing methods in chemistry. It was found that, the students could work at their own pace and constant feedback could be provided on progress. It helped in increasing the mastery especially in case of weaker students. It increased the attainment of students in experimental group in comparison with the students in control group.

Wilson (1995) conducted a study to examine the relationships among learning-style, attitude and outcomes of computer assisted instruction at university level. The findings of the study revealed that, the attitude of students towards CAI was positive and no significant relationship was found between attitude towards CAI and gained scores. These findings suggest that, significant learning occurs regardless of students attitude towards CAI. However, one does not find any significant impact the CAI makes on certain characteristics of learners such as their attitude, attendance, writing quality, type and frequency of revision used, logical reasoning, inductive / deductive reasoning, problem analysing skills etc.

Frear, Valerie and Hirschbuhl, John (1999) examined the effects of the interactive multimedia instruction upon the variables of achievement and problem solving skills on non-science majors in an Environment Science course at a mid-western University. The findings of this research study indicate that, the interactive multimedia had a significant effect on both of the variables i.e. variables of achievement and problem solving skills.
Wishart, Jocelyn and Blease, Derek (1999) found that, the installation of a computer network in a secondary school results in improved teaching and learning and increased enjoyment of learning in the school with both pupils and teachers viewing the use of IT in the form of computer as beneficial to learning where such positive effects of using computer are noted, they can be justified theoretically using behaviourist, cognitive and social constructivist theories of motivation and learning. The wide range of ways in which use of computer can be both extrinsically and instrinsically motivating explains the increased motivation observed in the pupils.

Peter, Brown (2001) conducted a research study to teach veterinary Pathology by using computer based tutorials. The results of this study showed that computer based learning is suitable for teaching veterinary pathology and the approach could be extended to teach pathology of other body systems such as respiratory, urinary and endocrine system.

Mary, Peat and Sue, Franklin (2002) conducted a research study pertaining to supportive student learning and the use of computer based formative assessment modules. They opine that, Universities today are in transition. Much of the change is driven by economic pressures and demands for the graduates who will be able to function in a knowledge based society. To cope with these pressures and demands, the majority of Universities are turning to the use of internet and intranets to deliver courses in distance modes as well as to enhance the quality of educational programmes on campus. With these programmes students are expecting and receiving fast and direct feedback (Ring 1993). As student numbers have increased, many Universities have introduced computer based assessment for summative purposes, as a mechanism for providing
immediate feedback to students and to reduce load on over stressed off. (Bull 1993, Lyell and McNamara, 2000).

**ROLE OF I.T. IN ENHANCING ACADEMIC ACHIEVEMENT- IN INDIA**

Anuradha, K., Bharathi, V. V. and Jayamma, B. (2006) attempted to study the television viewing behavior of adolescents and its impact on their academic achievement. The sample consisted of 48 adolescents in Tirupati town and their mothers. The results revealed that the mean TV viewing time for boys was 166.47 mts and the same for girls was 182-89 mts. However, adolescents did not differ significantly in their TV viewing behavior according to sex, grade and type of family. The percentage of marks was found to be more for adolescents with cable connection than without cable connection.

Baviskar, C.R.(2007) made the study for his Ph.D. work entitled “Development of Test-based computer multimedia software package for school students to enhance their academic achievement in science and Zoology in particular.- A Study had the following objectives (1) To develop multimedia software package for zoology components at the upper primary school level. (2) To test the effectiveness of the computer multimedia software. (3) To compare the effectiveness of the use of computer multimedia software package for teaching over the traditional method of teaching. The results were as follows (1) The computer multimedia software developed in this research was effective. (2) The multimedia software was found to be beneficial according to the students. (3) The use of developed computer multimedia software will contribute to the enhancement of the children’s performance in the science.
Bhapkar, D.S. (2008) made the study for his Ph.D. work entitled ‘Development of text-based computer multimedia software package for school students to enhance their academic achievement in science and Botany in Particular – A Study. Had the following objectives (1) To analyze the general science text book of VI, VII and VIII standard. (2) To develop text-based computer multimedia software package for the lessons related to Botany aspects in the General science text book of VI, VII and VIII standard (3) To test the effectiveness of text-based computer multimedia software package developed for this study.(4) To enhance the academic achievement of school students in Science and Botany in particular by using the text-based computer multimedia software package. The conclusions of the study were (1) Though ‘science’ is now treated and taught as ‘Integrated whole’ the ‘General Science’ text books of upper primary school students have lessons dealing with the sub branch of science i.e. Botany, which were identified after analyzing the text books of concerned standards. (2) The text based computer multimedia packages developed on the identified lessons were found to be effective (3) 3. Text based computer multimedia software packages can effectively used for the enhancement of academic achievement of upper primary school students in General Science.

IV) REVIEW OF STUDIES CONDUCTED ON INFORMATION TECHNOLOGY- IN ABROAD

Mackenzie, Norman, Jones, Hywel C and Payne, Trevor (1970) had conducted a survey about the audio-visual aids purchased and the practical difficulties encountered in using it in Sussex schools. It was
found that 98 schools in Sussex saw considerable scope for the development of audio-visual aids in their schools, whereas 43 schools reported no scope for the development and greater use of audio visual resources. The heads of the schools were trying to overcome the limitations imposed by the shortage of facilities, equipments, trained staff, materials and money.

Carpenter, C.R. (1971) conducted research on instructional films and suggested that film research may very well begin with learning theories and principles of learning i.e. the instructional films should motivate learners, the learner must respond to the film and the student must get reinforcement.

Webster, B.R. and Cox, S.M. (1974) conducted a research study on ‘The Value of colour in Educational Television’. The results of this study suggest that when the student’s attention is directed towards the colours used on captions to denote the most important information than their recall of that information is significantly better than either that of subjects whose attention was not so directed or that of subjects who saw the captions with no colour change.

Mckenzie, John (1977) investigated, “Computers in the Teaching of Undergraduate Science.” The results of the study revealed that, (1) The method of developing CAL Packages adopted by the project CUSC begins at the subjects subcommittees where teachers from different institutions meet and consider those topics from their subject which are agreed to be suitable for the technique often because they have proved difficult to teach by traditional method. The main development is done by just one teacher probably with the help of a full-time programmer. (2) The computer simulations can be used successfully in teaching of Biology. For Example - Experiments like indicator Dilution Method for
measuring cardiac output as well as experiments in genetics for example experiments on drosophila for studying mutations. (3) While teaching Chemistry, the topics like electrons surround an-atom, distribution of electrons in different orbits can be simulated with the help of computer. (4) In Physics, the experiments like Rutherford scattering can be simulated successfully with computer.

Reid, N et al. (1978) investigated into the problem, “Computer Managed Chemistry Teaching for Secondary and Tertiary Students”. The findings of this study were; (1) The computer directs the sequence of the work and removes the burden of the heaviest calculation leaving students free to make the decisions by normal group discussions. (2) There should be no more than four participants per group. (3) The computerized version offers hints and encourages messages.

Brown Stephen, Nathenson, Mike and Kirkup, Gill (1982) conducted a study about helping students to learn from audio-visual media. The findings of this study suggest that, the students can be helped to learn more effectively from audio-visual media, providing a carefully structured approach to the gradual development of learning skills and the various media are well integrated with each other.

Copeland, Peter (1983) found that the mix of colour moving pictures audio, text and questions provides a learning experience quite different from other teaching procedures. The analysis of this experience should provide valuable insights into how the arrangement of information and presentation attributes used can affect and relate to learning performance and patterns of study.

Barker, Philip (1985) has studied the role of Information Technology in Education and Training. It was found that, there is an
urgent need to achieve the successful utilization of information technology within education and training. Human-machine interaction, artificial intelligence and computer networks are likely to have a significant impact upon the quality of instruction.

Hodgson, B.K. and Murphy, P.H. (1985) investigated into “Computer Assisted Learning, Project Work and the Aims of Scientific Education.” The main findings of this study were; (1) Most teachers agreed that one of the aims of scientific education at any level should be the inculcation of scientific methods at least as much scientific facts. This can be probably achieved only by students immersing themselves in investigations in which responsibility for decisions about what to do next and how are primarily left with them. Project work often provides such opportunities but it can be very expensive. (2) Simulation, CAL can be another means for providing opportunities to the students to take decisions and it is increasingly been used as a relatively inexpensive alternative to conventional laboratory work. (3) Computer simulations are used to complement laboratory work in Science teaching. There is every chance that their use will enhance the quality of scientific education and improve scientific literacy.

Bajracharya, R. K. (1986) Studied the science education in the secondary schools of Nepal with a view to evolving a functional model for improving the science education. He found that (1). The objectives were not achieved as there was no practical work in the curriculum for the pupils. (2). The existing curricular content of grades IX and X was theory-oriented and far from the pupils' daily lives. Some topics in the content were below and some were above the grade level. (3). The techniques of teaching science which were practiced in most of the schools were traditional. The only teaching aid used in the classroom was
the blackboard and chalk. (4). Some methods such as discovery and free choice activity were not known to many teachers. (5). Most of the secondary schools (except residential schools) did not have a science room or laboratory, adequate materials and science teachers. Some schools had certain materials most of which were irrelevant to the course content. Aids such as aquarium, microscopes, films, slides, tapes, etc. were absent. (6). In most of the schools there was no provision for replacement of expendable materials in science. (7). Teachers' guides and manuals were not available in most of the schools. (8). The prescribed textbook contained inappropriate topics and diagrams. It reflected only reading skill and did not provide for practical skill and concept development. (9). Teaching time per day for one class was 40-45 minutes. All science teachers mad expressed that this was not enough for demonstration and other activities in the class. There was a need for more time per day. (10). Most of the science teachers felt that they were overloaded with teaching and the classes were crowded, so they did not get time to prepare the lessons properly. (11). The school supervisors were not efficient. Science teachers did not get professional help from them. (12). Science teachers felt the need for in-service training in construction of apparatus from local materials, techniques of teaching, curriculum development and test construction. (13). From the class teaching it was seen that teaching in most of the schools was very dry. There was no interaction between students and teachers which could help pupils to develop their interest in and attitude towards science learning.

The study had its implications for educational planners and administrators that proper study materials and appropriate facilities should be provided to the science teacher’s science educators and students.
Atkins, Madeline and Blissett, Gill (1989) had undertaken an exploratory study on “Learning activities and Interactive Video discs” and found that the designers of videodiscs and supporting software need to take into account the dynamics of group processes if their discs are to be used by small groups of pupils on a virtually stand alone basis.

Sharhan, Jamal Al (1994) investigated into the use of audio-visual aids in intermediate stage for girls in Riyadh, Saudi Arabia. The results of this study revealed that very little real progress has been made in enabling the teachers to optimise the teaching learning climate by being able to make use freely of audio-visual aids. The author made some suggestions to improve current practices as (1) Increase the number of audio-visual training courses available for intermediate school teachers. (2) Make more audio-visual equipment and materials available to all schools. (3) Schools should organize workshops for the repair and maintenance of audio visual equipment and materials. (4) There should be increased budgets made available to schools for the acquisition, maintenance and repair of audio-vidual equipments and materials. (5) Classroom facilities should be improved to include adequate power points, screens and blackouts. (6) Better audio-visual support facilities should be provided in every school. These should be able to provide support and advice as well as coordinate the distribution and production of audio-visual support materials in all subject areas.

Lewis, Roger (1999) investigated into the role of technology in learning and managing to achieve a vision. It was suggested that (1) Develop technology to support active learning. (2) Ensured assessment, encourages active learning and curricula are not overloaded with information. (3) Ensure vulnerable groups are supported in using
Selwyn, Neil and Bullon Kate (2000) investigated into primary school children’s use of I.C.T. It was found that (1) Children’s use of ICT in primary school is an important foundation, the government’s vision of establishing an information society. (2) The vast majority of primary pupils are positively oriented towards the ICT. (3) The children point towards the organizational and management features of the classroom as perpetuating their low levels of use.

Almeida, Leandro et al (2002) investigated into the problem, “Science Learning in Virtual Environments: A Descriptive Study.” The results of this study showed that, (1) The view of 3D computer animations implies an increased conceptual understanding of some contents by students with high spatial abilities. (2) The responses after observing the topic ‘Virtual Water’ were more accurate, more complete and showed better conceptual understanding that the previous responses given by the same students. (3) Interactivity, navigation and 3D perception were the more influential visualization parameters for understanding the concepts. (4) A photo or movie may show students the internal geometry of ice, but only virtual reality allows them to enter inside and observe it from any viewpoint. (5) An animation could illustrate the mechanism of solid-liquid phase transition, but virtual reality provides the students with a much stronger sense of “being there”. (6) Students reported an increased motivation for the formalism behind the molecular dynamics after having explored the 3-D motion and its relations to the physical properties. (7) Stereoscopic visualization does not seem to contribute much to conceptual understanding in spite of some sense of immersion provided by the stereoscopic view, results for screen
and stereoscopic glasses were almost identical. The single stereoscopic feature which most students seemed to really appreciate was the 3-D structure of ice. The students reported that this gave them a more tangible grasp of solid state structure.

**Goodison, Terry (2002)** investigated into ICT and attainment at primary level. It was found that many schools have successfully implemented ICT across the curriculum over a considerable period of time and thereby achieving the results identified by British Educational communications and Technology Agency.

**Synnove Kekkonen, Moneta and Giovanni B Moneta (2002)** investigated the effectiveness of web-based, highly interactive and multimedia rich e-learning materials by comparing students learning outcomes in the lecture and on line versions of an interactive computing course. The course versions differed only in that, face to face lectures were replaced with e-learning modules in the on line course; the other course elements for example laboratory sessions, use of computer mediated communications, examination were the same. The researcher conducted e-learning trial at the Hong Kong University of Science and Technology. A batch of 105 students were taught through lecture and the batch of 809 students were taught through on-line. The lecture and on line students achieved comparable factual learning outcomes and the on-line students out performed the lecture students in applied conceptual learning.

**Trindade, George et al (2002)** found that, students learn more effectively if the method of instruction matches their learning style. Since Physics and Chemistry deals with three dimensional objects, the ability to visualize and mentally manipulate shapes is very helpful in their learning. Much of what Physics and Chemistry students know, takes the form of
images. Computers are being increasingly used as teaching tools in Physics and Chemistry education. The new approaches include computer simulations, multimedia presentations and virtual environments. Computer based worlds are useful to visualize physical and chemical processes allowing for better conceptual understanding. Three dimensional virtual environments are being developed for studying phases of matter, phase transitions, atomic orbitals etc. The researcher found that, three dimensional virtual environments may help the students with high spatial aptitude to acquire better conceptual understandings.

Goldenberg, L. and et. al. (2004) in their research report on what middle grade students say about learning science with multimedia reported that The JASON Multimedia Science Curriculum (JMSC) was developed in 1989 by the JASON Foundation for Education (www.jason.org), and is a multimedia, interdisciplinary, inquiry-based science curriculum that responds to the dual demands of teachers having to teach state standards while engaging students in scientific inquiry. The JMSC encourages interaction between students and real life science and scientists while teaching scientific content and concepts by selecting a unique research expedition site and topics each year, upon which a print curriculum, video, live satellite broadcasts, and a variety of online activities that include digital labs and electronic journals are based. In 2002, approximately 25,000 teachers and one million students, grades four through nine, utilized the "JASON XIV: From Shore to Sea" curriculum to explore the features of California's Channel Islands and study the Chumash people who once lived there. In this curriculum students use computers to do online simulations known as digital labs, Internet research, and presentations. Through the curriculum, students are exposed to how scientific technologies (e.g., remote-operated vehicles,
thermal imaging equipment, and satellite pictures) contribute to helping scientists answer research questions. They are also encouraged to understand the limits of any one technology and that multiple technologies might be needed to acquire more detailed information.

Cabrero, F.J. et al (2005) conducted a research study on the problem, entitled, “Teaching of the Physical and Technical bases of Imaging Diagnosis using a Multimedia Application (Macromedia Director) : The opinion of students.” This was a inter-disciplinary research study. The aim of this study was to design, apply and assess an electronic book as supportive material for learning of part of the subject “Medical Physics” which was imparted for the first year of the degree course. The specific aim of this research study was to provide a basic insight into the physical and technical bases of radiological imaging and to expand the students capacities and attitudes towards the study of this material.

While designing of the multimedia application, a great care was taken in certain aspects such as, dividing the contents into parts that would be significant to the users or navigation through the screens so that it would not be necessary to hit more than three buttons in order to reach any given contact. The CD entitled, “Fundamentos fisicos y tecnico del diagnostico la imagin” (Physical and technical bases of imaging diagnosis) was developed as interactive media material which allowed students to explore the contents at their will. The information which was often hidden must be found by interacting the mouse with the content shown on the screen at each moment.

A questionnaire concerning student satisfaction with the new multimedia material was introduced. The results of this study revealed that, the positive perception of the students regarding the use of
multimedia material. In this case, the students accorded technical aspects of the Multimedia material as well as image quality. It has been shown that a multimedia resource designed with simple language and complemented with abundant images offer a practical view to apply the knowledge and it also helps to achieve efficient learning practices in the field of medicine (Allan and Zylinski 1988).

Lawless, K. and et. al. (2005) conducted a pilot study on multimedia education for underserved populations: Diabetes and your eyes. Their study revealed that there is little data available regarding the use by underserved populations, particularly urban African-Americans and Latinos. The purpose of this pilot study was to create a multimedia lesson providing instruction on preventive care (i.e. dilated eye examinations) and investigate its ability and interest among specific targeted outpatients. A touch screen 'kiosk' was incorporated into a clinical waiting room specifically for patient education. Results demonstrated ability and interest in computer use for patient education regardless of educational background or computer experience. Patient attitudes collected regarding diabetic eye disease and eye exams will assist in further development of the tool. Future implementation of similar educational interventions may likely require addressing the same barriers related to difference in culture, educational background, literacy level, language, and computer expertise.

Sanghoon Park and Jung Lim (2005) The purpose of this paper was to investigate the effects of different types of visual illustrations on learner’s learning interest, motivation and achievement, especially in multimedia learning. The participants were drawn from two classes of an “Introduction to Educational Technology” course and randomly assigned to one of the three treatments: one with cognitive interest illustrations
which were designed to signal the structure of the explanation and another with emotional interest illustrations which are interesting but irrelevant illustration to understand the structure of text. The last one only contained text information. Result revealed that the post interest was different between learners in cognitive interest illustration group and text only group, and also different between learners in emotional interest illustration group and text-only group. However, the types of illustration didn’t have an effect on learner’s achievement in terms of information recall and achievement test. There were also no significant differences between learner’s motivations among three illustration groups.

Schnotz, W. and Rasch, T. (2005) this study found that new technologies allow the display of text, static visuals, and animations. Although animations are inherently attractive, they are not always beneficial for learning. Problems may arise especially when animations modify the learner's cognitive load in an unintended way. In two learning experiments with 40 and 26 university students, the effects of animated pictures on knowledge acquisition were investigated. Some pictures displayed visual simulations of changes over time, whereas other pictures could be manipulated by learners to represent different states in time. Results showed that manipulation pictures had an enabling function for individuals with high learning prerequisites, whereas simulation pictures had a facilitating function for individuals with low learning prerequisites. However, the facilitating function was not beneficial for learning, because learners were prevented from performing relevant cognitive processes on their own. A careful analysis of the interrelation between different kinds of cognitive load and the process of learning is therefore required.

Slykhuis, David A. and et. al. (2005) Eye-tracking technology allows for the determination of the exact location of the point of gaze of a
subject's eye. This study sought to take advantage of this ability to determine how students attend to science related photographs. Pre-service science teachers were shown a PowerPoint™ Presentation with embedded photographs. The photographs were classified according to the Pozzer and Roth (2003) classification scheme. Special focus was given to the photographs classified as complimentary, most highly integrated with the text, and decorative, the least integrated with the text. A second variable, accompanying audio narration, was integrated into the study design. Analysis indicated complimentary photographs received significantly more attention from the subjects. The effect of audio narration was to blur this distinction as students spent a greater amount of time on the given slides. Using eye-tracking technology, this study was able to confirm that students' devote more attention to highly relevant photographs.

Steelman, J. D. (2005) in her research article on multimedia makes its mark described that the high quality multimedia products make use of technology to further the understanding of a topic in ways that traditional media cannot accomplish. This article describes the use of multimedia in collaborative student projects dealing with an area of study in the standard curriculum for their state or country. Based on the comments by teachers, ITFs, and students, it is evident that the incorporation of multimedia projects developed by students has many more benefits than barriers and when these barriers are acknowledged, they are much easier to overcome. We can learn from other teachers’ and students’ experiences by allowing enough time for the projects, maintaining flexibility, and developing organizational tools to scaffold tools to scaffold students when they gather data and materials. Janet Barnstable, 2003 middle grades winner from Percy Julian Middle School in Oak Park, Illinois,
states, “It was a great experience. They had fun while creating an educational project. They learned a lot about their community’s environmental concerns and were able to help their school create a recycling program.” Barnstable continues, “I’ll never teach again without being a facilitator of a project-based class in which students collaborate and communicate with others to produce [high]-quality, multimedia-rich work!” Royals said, “Students become the teachers” when they prepare such products. Royals encourages other teachers to use the projects in their teaching; sometimes, the creators present them to their fellow students. I found it particularly interesting that students believed that working on a sustained large-scale multimedia project to analyze and synthesize information on a self-selected topic within the curriculum provided an in-depth understanding as opposed to “easy memorization.” An inquiry based approach leading to a product emphasizing analysis and synthesis of information should be our highest educational goal. With this methodology we are teaching students to be creative, productive citizens in a democratic society. It seems that wrapping this methodology around a multimedia project can be an effective means for promoting the type of learning we strive for in students. This can be fun and exciting not only for students but also for teachers and administrators observing education at its best.

**Deimann, M. and Keller, J. M. (2006)** in their research article on volitational aspects of multimedia learning revealed that research on multimedia learning has produced a vast body of findings which, however, are not yet being integrated into a comprehensive framework of reference. For a considerable time, cognitive centered approaches have dominated the literature. Although motivational variables are now being taken into account, there is still a large gap in regard to an adequate
representation of motivation in multimedia learning. This is an important concern given the various challenges and obstacles, such as navigational problems, distractions, and cognitive overload, that learners have to face due to the very nature of hypermedia. A promising area of theory that can help concerning this matter is represented by volition, an old concept in the study of human motivation and action (James, 1902), which has been reestablished within recent developments in psychology, such as the "theory of action control" (Kuhl, 1984). In this article, a volitional framework to supplement the mostly cognitively-based research on multimedia learning is introduced to serve as a basis for critically reviewing and reinterpreting current research findings. In particular, the volitional framework is applied to common phenomena in multimedia such as "lost in hypspace," "cognitive overload," and "seductive details" together with other obstacles to persistence and learning. In addition, several future directions in research on both theory and practical strategies based on the application of volitional strategies in multimedia learning are provided.

Hennessy, Sara and et. al. (2007) studied pedagogical approach technology-integrated science teaching through two separate projects described have examined how teachers exploit computer-based technologies in supporting learning of science at secondary level. This paper examines how pedagogical approaches associated with these technological tools are adapted to both the cognitive and structuring resources available in the classroom setting. Four teachers participated in the first study, undertaken as part of the InterActive Education project in Bristol; all of them used multimedia simulations in their lessons. The second study presented was part of the wider SET-IT project in Cambridge; 11 teachers in eight schools were observed using multimedia
simulations, data logging tools and interactive whiteboards. Teachers were interviewed in all cases to elicit their pedagogical thinking about their classroom use of ICT. The findings suggest that teachers are moving away from only using "real" experiments in their practice. They are exploring the use of technologies to encourage students to engage in "What If" explorations where the outcomes of "virtual" experiments can be immediately accessed, for example through using a simulation. However, this type of activity can serve just as a mechanism for revealing--and indeed reinforcing--students' informal conceptions if cognitive conflict is not generated or remains unresolved. The teachers in our studies used simulations, data logging, projected animations and other dynamic digital resources as tools to encourage and support prediction and to demonstrate scientific concepts and physical processes--thereby "bridging the gap" between scientific and informal knowledge. They also integrated technology carefully with other practical activities so as to support stepwise knowledge building, consolidation and application. Research of this kind has design implications for both curriculum-related activities and emerging computer-based learning technologies, in terms of helping us to understand how teachers capitalize upon the technology available in supporting students to construct links between scientific theory and empirical evidence.

REVIEW OF STUDIES CONDUCTED ON INFORMATION TECHNOLOGY- IN INDIA

Sonar, M. S. (1975) of Shivaji University worked on an analytical study of the use of the filmstrips in teaching science in upper primary
grades. The findings were: (1) The filmstrip is one of the most efficient and economic teaching aid. (2) Using filmstrips in teaching of science can increase the achievement of students to a greater extent. (3) Filmstrips with Marathi or in regional languages will be more popular in the near future.

Shitole, C.B. (1976) had undertaken a Ph.D. level study in Education, entitled, “To Develop Programmed Learning Material for Agricultural Subjects in Marathi Medium Schools and To Study its Utility for Different Categories of Students”. The main findings of the study are - (1) Programmed Learning Material was superior over traditional method irrespective of the category and sex of the student. (2) The study also showed that Programmed Learning Method require less time than the traditional one.

Patel, A.D. (1977) carried out a Ph.D. level study in Education, entitled, “Development and Try out of Auto-Instructional Programmes in Some Units of Geometry for Class VIII and To study its Effectiveness in the Context of Different Variables”. The important findings of this study are - (1) The Programmed Learning Material was found to be effective for the pupils irrespective of their study habits. (2) Learning through Programmed Learning Material was superior in case of students who had good reading ability. (3) The more anxious students could learn better through PLM than their counterparts.

Muddu, V. M. (1978) of Osmania University studied the effectiveness of the use of motivation pictures as aids in the teaching of biological sciences as compared to the usual methods. The findings were: (1). There was a significant improvement in the post-test performance of students in both the groups over the pre test. (2). There was significant improvement in post-test performance over pretest performance in higher
ranges of scores particularly in the case of the experimental group. (3). There was a definite improvement in the pass percentage in case of the experimental group. (4). The sound pictures helped to a great extent the above average students to comprehend the subject matter in biology. (5). The use of films in teaching of biological sciences helped in more learning in lesser time and better retention of what was learnt. (6). Instructional films stimulated the scientific interest of the students. Instructional films had immense potentialities in teaching and provided the elements for vicarious visual experiences which in turn made the lessons more vital and further made the language used in lessons more meaningful.

Golani, T. P. (1982) studied the use of audio visual aids in the secondary schools of district Thane for his Ph.D. level research. The major findings were: (1). Schools that were situated in urban areas and the ones which were conducted by rich societies possessed audio-visual aids. (2). Only a few teachers used audio-visual aids in teaching. (3). Teachers who were trained in the use of audio-visual aids were inadequate in number. (4). At many places the audio-visual aids were in a broken-down condition and awaited repairs. (5). At many places the hardware was purchased. However, it was not used as proper software was not available. (6). Audio-visual aids were useful in teaching. (7). Audio-visual aids were not used due to lack of properly trained personnel and lack of accommodation in the schools. (8). There were no incentives to teachers who used audio-visual aids. (9). The state institute for audio-visual education could not provide training to personnel and could not supply proper learning materials.

Vardhini, V. P. (1982) for her Ph.D. research developed a multimedia instructional strategy for teaching science (Physics and
Chemistry) at secondary level. The findings were: (1). Almost all the units indicated average/high level of performance on the total test. (2). The strategy was found valid against the criterion of scientific attitude in that significantly higher performance was noted for the group in the post-test over the pretest. (3). Validity of the strategy was established from reactions expressed by students for its continuance and also their improvement in science achievement. (4). Intelligence and achievement using the strategy presented a significant relationship. (5). A significant relationship was found between scientific attitude and achievement for the experimental group and control group. (6). Visual projections with teacher explanation and those with taped commentary were equally effective in terms of achievement. (7). Programmed material and discussion sequence were equally effective, on the total test. 8. The strategy was found feasible when seen in terms of its reproducibility and the cost management by individual schools.

Krishnan, S.S. (1983) had undertaken a Ph.D. level research study in Education, on the problem, entitled, “Development of Multimedia Package for Teaching a course on Audio-Visual Education.” The objectives of this study were; (1) To develop a multimedia package to teach a course on Audio-Visual Education for the instructor training in the Central Training Institute for Instructors Madras. (2) to study the effectiveness of the multimedia package in terms of achievement of instructor trainees, (3) to study the effectiveness of the multimedia package in terms of attitude of the instructor trainees towards the multimedia package, (4) to study the relationship between the instructor trainee’s achievement and his English language ability through which, the course was administered, (5) to study the feasibility of the multimedia
package in terms of (a) cost and (b) time for the instructor training programme.

The major findings of this study were - (1) Ninety-eight percent of the trainees obtained more than 80 percent of the marks on the final post-test. (2) The mean percentage of the post-test scores varied from 81.41 to 90.46 (3) The mean gain in the total scores for all the modules was found to be significant at 0.01 level. (4) The mean gain scores of knowledge, comprehension and higher mental abilities were found to be significant at 0.01 level. (5) The mean attitude change was found to be significant at 0.01 level. (6) The achievement of trainees and their language ability were found to be positively related at 0.01 level of significance. (7) 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.

Vardhini, V.P. (1983) had undertaken a Ph.D. level study in Education, entitled, “Development of a Multimedia Instructional Strategy for Teaching Science (Physics and Chemistry) at Secondary Level.” at CASE - The MSU, Baroda. The major objectives of this study were; (1) To develop a duly validated multimedia instructional strategy for teaching science (Physics and Chemistry) in Standard VIII. (2) to study the relationship between achievement through strategy and (i) Intelligence, (ii) Scientific attitude. (3) to study the relative effectiveness of alternative inputs for a few units of the course. (4) to study the feasibility of the strategy in terms of time and cost. This study was conducted on a sample of 45 students studying in Standard VIII of an English Medium School in Baroda city, ‘The Shreyas Vidyalaya Baroda’. The statistical techniques like Mean, S.D., t-test were used to analyse the data collected. The data
was collected by using Achievement tests (pre-test and post-test), scientific attitude test, Madhukar Patel’s Intelligence Test. The main findings of this study were; (1) With the exception of one unit, all others have indicated average or a high level of performance on the total test. (2) The strategy was found valid against the criterion of scientific attitude in that significantly higher performance was noted for the group on post test over pre-test. (3) The post test performance of the experimental group was found to be significantly higher than the control group. (4) Validity of the strategy was inferred from reactions expressed by students for its continuance and also their improvement in science achievement. (5) Intelligence and achievement on the strategy present a significant relationship particular for comprehension and skill objectives. High, average and low intelligence categories of students of the group exposed to the strategy register significantly higher performance than the corresponding categories of control groups. In the experimental group, however, high intelligence category registered a significantly higher performance than average and low intelligence, (6) A significant relationship was found between scientific attitude and achievement for experimental group and control group. (7) Visual projections with teacher’s explanations and visual projections with taped commentary were equally effective in terms of achievement on the total test and on each objective. However, the former was preferred as expressed by students in their reactions. (8) Programmed learning and discussion sequence were equally effective on the total test, on comprehension and skill objectives. For knowledge objective, the former indicates a significantly higher level of performance. Discussion as an instructional input results in significant gains for both inputs. (9) The strategy is found to be feasible when seen in terms of its reproducibility and the cost management by individual schools.
Menon, M. B., (1984) tried to evolve a multimedia approach to teaching at post graduate level for his Ph.D. research. The findings were: (1). 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. (2). In the subsequent year around 90 per cent students scored 75 per cent and more marks. (3). An improvement trend was witnessed with regard to discussion sessions. (4). At different stages of implementation of the strategy, the students' attitude towards the multimedia approach went on increasing in a favorable direction. (5). 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. The unit cost varied from Rs. 471 to Rs. 321 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.

Rabindra, Das B. (1984) undertook a Ph.D. level study in Education, entitled, “The Development and Try out of Self Instructional Materials on Health Education for High School Students with Special Reference to Communicable Diseases.” The main findings of this study are - (1) The self Instructional Materials succeeded in enhancing the learning capacities (gain in knowledge) of the students when self-administered by the student as well as administered under the supervision
of the teacher. (2) The self-Learning techniques were found superior to the other modes of learning. (3) Self Instructional Material administered under the supervision of teacher was found to be effective. (4) A very high proportion of students showed a favourable attitude towards the prepared self-instructional materials.

**Desai, K. V. (1985)** investigated the efficiency of different instructional media in the teaching of science to the pupils of class VIII in relation to certain variables. The findings were: (1) The programmed learning approach was more effective that the traditional way of teaching science. (2) The slide with discussion approach was more effective than the traditional way of teaching science. (3) The experimental approach was more effective than the traditional way of teaching science. (4) In the teaching of science, the experimental approach was the most effective of all approaches. (5) The programmed learning approach and slides with discussion approach were equally effective. (6) 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.

**Dighal, K.C. (1985)** developed improved method of teaching biological sciences in schools of Tripura and West Bengal. The findings were as follows: (1) There was a significant difference in the effectiveness of ‘self activity method’, ‘life science club method’, and ‘audio-visual method. (2) Two or three methods when combined, formed
an improved one on the basis of their similar nature. Combination of methods could be made according the needs of a teacher. (3). Preparation of charts and models, collection of specimens through local excursions, organization of science exhibition by the students, arrangement of film shows by the school, and orientation programmes for life science teachers brought better results.

Goel, D.R. (1985) had undertaken an UGC financed research project entitled, “Educational Television in India : Organization and Utilization” at CASE, MSU Baroda. The main objective of this investigation was to study the organization and utilization of Educational Television (ETV) programmes. The major findings of this research project were; (1) In 1983-84 Doordarshan Kendra, Delhi telecasted 16 programmes per week (13 for secondary students + 2 for elementary pupils + 1 for teachers). (2) In Delhi, T.V. Handbooks were distributed to all T.V. viewing schools. But in other states, the T.V. Handbooks were not circulated to the schools within stipulated time. (3) In Delhi and Maharashtra the script writers and teachers were oriented. (4) In Delhi and Maharashtra, the teachers were oriented for utilizing the E TV Programmes in classroom. Such orientation was not provided to the teachers in other states. (5) Systematic attempts to study the audience profile and needs of users were made only in Maharashtra and Delhi. (6) Most of the programmes were urban oriented which created problems in rural areas. (7) The programmes in Marathi in Maharashtra created problems to the multilingual students population of Maharashtra.

Mehta, J.M. (1985) carried out a study for Ph.D. Course in Education, entitled, “Construction of Different Types of Programmes on the Unit of ‘Interest’ in Mathematics of Standard IX and Study of Relative Efficiency of These.” The major findings of this study are - (1)
The different types of learning programmes on ‘Interest’ were equally efficient as compared to the ordinary method. (2) The linear Programme on, ‘SIMPLE INTEREST’ was found efficient. (3) The effect of learning through different programmes upon high achievers and low achievers was equal.

**Barve, M.V. (1986)** had undertaken a Doctoral Study in Education, on the Problem, entitled, “Preparation and Testing of Filmstrips for Teaching of Science - A Course in Standard IX and a Study of Their Comparative Effectiveness in Teaching - Learning Process as compared to the Traditional Practices.” The major findings of this study are - (1) Filmstrip was more effective than the traditional method for teaching the facts, Principles and concepts in Science. (2) Filmstrip was an effective aid for all levels of learner’s i.e. low, medium and high achievers. (3) Filmstrip was more effective for the learners between 13 and 16 years of age. (4) Filmstrip was more effective method of teaching Science for both the sexes i.e. males and females.

**Joshi, Anuradha (1986)** tried to evolved an instructional strategy for teaching elements of science to class IX students of M. P. State. The developed instructional strategy was found to be effective, significantly superior to traditional method in terms of development of higher mental ability. The intelligence significantly effected academic achievement of students, high as well as low intelligent. Students could be benefited equally through the developed instructional strategy. Extroverts were found to be benefited significantly more through developed instructional strategy as compared to introvert. Highly adjusted students were found to be benefited significantly more through developed instructional strategy as compared to low adjusted students. Majority of students belonging to different level of intelligence, personality and total adjustment expressed
their favorable reactions towards majority of the components of instructional strategy and instructional strategy as a whole.

**Lambhate, M. V. (1986)** Developed instructional materials for teachers teaching science to class VI in rural areas of M. P. His findings were (1). The main conclusion of the study is that the use of experimental instructional material by the teachers of experimental group has contributed towards the improvement of their performance. (2). The teachers of experimental group had performed better than the control group on i) Selection of organization of context ii) Use of proper scientific terminology and teaching aids and experimentation. iii) Maintaining the classroom discipline by sustaining the attention of students with the help of instructional material. (3). The experimental instructional material could not equip teachers to enable their pupils to think critically. Promotion of critical thinking in students is an important dimension of science teaching. Hence suitable is to be made in the instructional material to take care of this dimension.

**Rajoriya, Renuka (1986)** compared the advanced organizer model with traditional method for teaching science to class VIII students with different residential background.

Her findings were: (1). Advanced organizer model was found to be effective and suitable for teaching science to class VII students belonging to rural as well as urban area. (2). The attitude towards science was found to influence significantly and positively to students achievement in science.

**Kalacherry, K.A. (1987)** carried out a study for Ph.D. Course in Education, entitled, “Preparation and Experimental Try out of Programmed Instructional Materials in the Syllabus of Chemistry
prescribed for Class VIII in Maharashtra State.” The main findings of this study are - (1) About 83 percent learners were able to respond correctly to 83 percent of the frames. (2) It was found that a few students who scored usually below 50 percent in the traditional system, scored above 85 percent through the use of programmed materials.

Kanade, H. M., (1987) revealed the trends in CIET’s educational television programmes over a four year period, 1982-86 through CIET Project, NCERT. The findings were: (1). In all, 321 programmes with an overall duration of 100 hours were produced in the CIET during the four-year span. Out of these, 132 programmes were for the 5-8 year age groups, 140 for the 9-11 year age groups, and the rest for teachers. (2). These programmes were prepared in different phases spreading over 5 years' time. (3). The ET cell had produced adequate length of material for transmission. As far as the children's programmes were concerned, no program was to be repeated at least within the same year. (4). Some of the listed programmes had become technically unusable or content-wise outdated. (5). Three important series, viz. story time series, Bal Jagat and our Body and Health were dominant ones among the 5-8 year age group programmes. (6). Three important series, viz. Air, Story of Man, and Delhi:-Our Capital, ran for a considerable period of time for the 9-11 age group children. (7). The programmes classified under different categories were: knowledge (73.5 percent), Attitude (25.4 percent) and the rest under skill. In most cases stories were integrated with biographies to strengthen the moral base. (8). Among the teachers programmes the major thrust had been on low cost teaching aids and experimentation, population education and on programmes dealing with concepts of science and mathematics.
Prabhakar, Shivaji (1988) for his M.Ed. Dissertation, developed the software for computer aided instruction and its comparison with traditional method for teaching semiconductors at plus II level. He found that: (1). The CAI material was found to be effective in terms of achievement of students belonging to classes XI and XII. (2). The CAI material was found to be effective in terms of reaction of students belonging to classes reacted favorably to the various aspects of the package. (3). The CAI material was found to teach semiconductor topic equally well is both classes XI and XII students when pre test was considered as covariate. The same results were obtained when intelligence was considered as covariate. (4). The CAI material was found to be significantly superior to the traditional method but no significant difference was observed when the groups were matched with respect to intelligence. (5). The sex did not influence the achievement of students. (6). There was no significant effect of interaction between treatment and sex on achievement of students. (7). Both classes XI and XII students were found to have equally favourable reaction towards CAI material when the groups were matched with respect to post test.

Mitra, J. (1989) had undertaken an independent study entitled, “Experimental Project to Develop Need-based and Community-oriented Self-Learning Instructional Materials in Biology for the Elementary Level Rural Pupils of the Formal System and Drop out Children at this Stage.” The results of this study revealed that, (1) Various areas of community problems and needs which had a direct or indirect relevance to biology education. (2) On the basis of identification of areas of community problems nine self learning modules were developed. They included how could you make the best use of your food, eye care and eye diseases, hygiene of water mosquito and malaria, worms that are our enemies,
Pests—enemies of our crops, plants and soil, plants could cure you and nature as your physician.

**Bhardwaj, Himani (1989)** for her M.Ed. Dissertation, developed the computer aided instructional material on microbes for class VIII. She found that: 1. The null hypothesis cannot be sustained. 2. From reaction scale it is evident that a. This method of instruction is more helpful and interesting than other methods normally used. b. The subject matter in the software is arranged in proper sequence. c. Capital letters used in the headings highlight the point covered. d. Graphics used in the package are adequately balance and integrated well with the subject matter. e. The language used in the module is simple to understand and f. Ample interaction between students and computer is provided. g. By this mode one can read at one’s own pace. h. The subject matter and the explanations given were appropriate. i. Students would like to read other topics also through the use of computers.

**Bhattacharya, Madhumita (1989)** worked on the problem, entitled, “A Critical Review of Work Done on the Use of Computer as an Instructional Tool for Teaching Chemistry.” This study was conducted at M.Phil. level of University of Delhi. The major findings of this study were; (1) The available softwares in Chemistry were of good quality. However, background knowledge was inferred in most of the Chemistry software. (2) It was not always possible to maintain the sequence of content, especially in games. (3) Most of the available softwares adopted lecture cum demonstration, method in a class of 20-40 minutes. (4) Most of the software contained knowledge and discovery I levels of teaching but they lacked in reflective I level. (5) Computer-assisted instruction could be applied most effectively to an individual or to small groups. (6) The majority of the softwares could be used for concept development. (7)
The softwares that have been selected for classroom teaching mainly provided simulation of a real situation thereby assisting students in long-term retention. Most of these softwares were in the tutorial mode. (8) The students got proper feedback. (9) Technical quality of the majority of softwares were satisfactory. The majority of the softwares can be used for concept development.

**Mishra, Renu (1989)** in her M.Ed. Dissertation tried to develop the computer based evaluation software on educational technology for M.Ed. Her findings were: (1). The computer based evaluation (CBE) is objective, accurate, valid, reliable and comprehensive. (2). CBE is effective and well organized. (3). A computerized test can be used again and again. (4). The non English medium students face difficulties while responding in English medium through computers. (5). A limited numbers of computers may be an impending factor in testing a large number of students. (6). All students may not trained in handing the computers for evaluation through computers. (7). The scoring on the items and evaluation data processing is done very fast. (8). CBE facilitates the instructional process to a large extent.

**Pravakar, S. (1989)** conducted a research study at M.Ed. level on the problem, entitled, “Effectiveness of Computer Aided Instruction at High School Level.” The investigator developed a computer software on the lesson ‘semiconductor’ to teach the students of IX standard. The results of this study showed that, (1) The CAI was found to be effective in terms of achievement of students, (2) The CAI material was found to be effective in terms of reactions of students, (3) The CAI was found to be effective to teach the topic ‘semiconductor’ to the targetted students. (4) The CAI material was found to be significantly superior to the traditional method but no significant difference was observed when two groups were
matched with respect to intelligence. (5) The treatment, sex and their interaction did not influence the achievement.

**Bhardwaj, H (1990)** had undertaken a research study at M.Ed. level on the problem, entitled, “Development of Computer Aided Instructional Material on ‘Microbes’ for Class VIII”. The main objective of this study was to study the reactions of students towards computer aided instructional material. From the study it was found that, Computer Aided Instruction was more helpful and interesting than other methods normally used. The student’s reactions were in favor of developed CAI.

**Miss Sarva Mangala M. Dhotarad S. (1990)** conducted her M.Ed. Research on 6 students of VIII standard of an English Medium School of Kolhapur city. The statement of the problem was - “The use of computer in Teaching and Learning Chemistry - A Study.” The topic solvent solute and solution was selected from the VIII standard text book. A lesson was prepared by the investigator for the Unit to be learnt by the student themselves. The test was divided into two parts which were paper pencil test and computer test. Paper pencil test was given to the students. From the study, it was found that students have scored better in the computer test than the paper pencil test indicating that computer can be used more successfully to teach Chemistry than the regular method of presentation and testing for paper.

**Aparadh, Salma (1990-91)** to study the problem, 6 students of the English Medium School of VIII standard were selected. The topic, “The Allotrophs of Carbon” was selected from the VIII Standard text book. A lesson was prepared by the investigator.

The test was divided into two parts which were paper-pencil test and computer test. Paper pencil test was given to the students. She found that the marks obtained by all the students have shown an increasing trend in
the case of computer aided instruction and testing than paper pencil presentation and testing. The teacher in computer aided information becomes more a facilitator than a traditional teacher and provided for individualised self learning.

**Doijad, Umesh Mahadeo (1990-91)** conducted his M.Ed. research on students of VIII Class of an English Medium School in Kolhapur City. The statement of the problem was - “Teaching of VIII Grade Chemistry Through the Medium of Computer - A Study.” The topic selected was - “Mixture and compound”.

A lesson was prepared by the investigator for the unit to be learnt by the students themselves. The test was divided into paper pencil test and computer test. After both the tests the students were interviewed by asking same questions. After analysing the data it was found that, the time taken for the students to read, comprehend and answer the questions is less in case of Computer Aided Instructions and testing than Paper pencil presentation of testing. The marks obtained by the students show an increasing trend in case of computer. It indicates that computer can be used more successfully to teach Chemistry than the regular method of presentation and testing of the papers.

**Kalimuthu, T. (1991)** had undertaken research study at M.Phil. level, entitled, “Developing a Video Programme on Environmental Pollution in Biology for Higher Secondary Students.” The major findings of this study were; (1) 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. (2) The higher secondary students improved their achievement on environmental pollution after viewing the video programme.
Mahajan, S. (1991) had developed the computer software for automation of the Diploma course in Computer Education for Ph.D. level research. Researcher had found that: (1). Science group scored significantly higher than art group in CET when pre B.Ed. entrance test was considered as covet. (2). Males and females did not differ significantly on achievement in computer based entrance test when pre B. Ed. Entrance test was considered as covariate. (3). Maths and non-Maths groups did not differ significantly on achievement in computer education when pre B. Ed. Entrance test was considered as co-variate.

Mahapatra, B. C. (1991) for M.Ed. Dissertation developed and tested the effectiveness of computer aided instruction in terms of achievement and abstract reasoning of class IX students and researcher had found that: (1). CAI was found to be effective in terms of achievement of students (2). The developed CAI was found to be significantly superior to traditional method when the students mean achievement score were adjusted with respect to intelligence. (3). The CAI is not superior to traditional method when mean adjusted reasoning score were adjusted with respect to intelligence. (4). There was no significant difference in respect to the extrovert and introvert students towards CAI except on four aspects of CAI namely. (5). The subject matter of atom and chemical bonding was at a suitable level. a. There is enough interaction between students and computer. b. The method is used for learning than teaching. c. The figures are well integrated with the subject matter.

Pillai, G. S., Dhanasekaran, S. (1991) in their study on the ‘Relevance of the course on audio-visual education in the B.Ed. programme to the present day educational technology requirements’ found: (1). Under the different optional and elective subjects of the B.Ed.
the objectives of introducing the elements of audio-visual education were not totally achieved. These were achieved only among 32% of subjects. (2) All the universities in Tamilnadu did not give equal emphasis to audio-visual education in the B.Ed. programme. (3) Out of 52 audio-visual aids identified, the preparation and use of 'Improved Aids' has been recommended in all the universities and in one autonomous college of education. (4) The students did not receive sufficient practice in the preparation, production, operation, and use of educational technology hardware and software. (5) The practical training given to the student-teachers, in general, was not up to the level required under the B.Ed. programme. (6) Though sufficient hardware and software were available in the colleges of education, they were not utilised properly to the optimum level. (7) Though teachers, teacher-educators, and heads of schools differed in their assessment of educational technology requirements, they invariably expected higher educational technology requirements. (8) While students, teachers and teacher-educators opted for a higher level of knowledge and comprehension, the heads of schools opted for the component 'skills' under educational technology requirements. (9) There were gaps found in the audio-visual education of the B.Ed. programme mainly (a) in achieving the objectives of audio-visual education, (b) in giving practical training to the student-teachers in audio-visual education and (c) in achieving modern educational technology requirements.

Sinnathambi, V. (1991) at the M.Phil. level research on ‘Developing a video programme on energetic in higher secondary students’ found: (1). The students who were taught by the video method learned more concepts on ‘energetics’ than those who were taught by the
lecture method. (2). The students improved their achievement on ‘energetics’ after viewing the video programme.

**Wagh, S. K. (1991)** for his Ph.D. on ‘Development of a multimedia instructional system for remedial measures in fractional system’ found: (1). In fractional numbers and their operations, students were found to commit common errors in the basic process cross multiplication, the terms used and in mixed operations in addition, subtraction, multiplication and division. (2). The facilities resources and raw materials for the instructional material were available but not used in schools. (3). A Multi-media Instructional System (MIS) was designed and constructed. (4). The Traditional Instructional System (TIS) and the MIS remedial approaches both helped students in improving their performance on all the six computational skills in fractional numbers. (5). The skill wise and overall differences between the means of gains of boys and girls from the control group and the experimental group were found to be non-significant. (6). The six skills were found to be differ from each other in their difficulty level. The ascending order of skills from easy to difficult was experienced by both the groups. (7). The effect of systems on the performance of the students in fractional numbers was not dependent on (a) the sexes, (b) levels of skills when sex levels were averaged. (c) levels of skills when system levels were averaged. 8. systems and sexes jointly did not affect the performance of the students in fractional numbers at different levels of skills, when systems and sex averaged over the levels of skills.

**Kapadia, A.M. (1992)** conducted a research study for Ph.D. Course. The statement of the problem was, “The Impact of Television on Students Learning : An Exploration”. The major findings of this study were : (1) Significant improvement had been achieved after the treatment
with the telefilm. (2) The telefilm was found to be more effective. (3) It was found that television had an impact which affected the study habits. It was also found that television was not considered as an obstacle in the study. (4) Seventy-five percent of the students opined that television motivated self learning. (5) Television had no adverse impact on the attendance of the students in the school. (6) The social relations of majority of the students had been disturbed by television. (7) Majority of the students felt that their interest was satisfied by television. (8) Students suggested an increase in educational and agricultural programmes in Hindi or Gujarathi.

Khot, P. J. (1992) for his M.Phil. Dissertation used computer to teach educational psychology for B.Ed. students – A study’ found that the ‘t’ test of learning-time revealed that experimental group students who got experiences through the computer learn faster than the controlled group students who got experiences through the regular method in the class-room. In the other words the students of experimental group learn faster than the students of the controlled group. The ‘t’ test between scores of experimental group and controlled group revealed that the experimental group students scored more than the students of controlled group. The ‘t’ test between the time taken for answering the tests of experimental group and controlled group revealed that, the experimental group students take less time for answering the tests than the time taken for answering the test of controlled group students, hence computer method of testing is time saving.

Gupta (1993) developed a software package to measure the social sensitivity of student teachers. The sample of the study consisted of 76 student teachers from different classes of Institute of Education, DAVV Indore. The major findings of this study were as follows : (1) There was
significant difference in the mean score of students of Science group and arts groups. (2) There was no significant difference in the mean score of students grouped on the basis of family income. (3) There was no significant difference in the mean score of students of male and female groups. (4) Residence did not create any significant difference in the mean score of students. (5) There was significant difference in the mean score of students, grouped on the basis of language. (6) The software was found to be reliable, as the test-re test reliable coefficient was found to be 0.62.

Joshi, Anuradha (1993) for her Ph.D. work on ‘Developing of software package for teaching chemistry to class IX students of M. P. State’ found: (1). The developed package was found to be effective in terms of achievement than traditional method. (2). The developed package was found to be effective in terms of student’s reactions. (3). The adjusted mean reasoning ability in science score of the students studying through developed software package was significantly higher than the students studying through traditional method, when intelligence was taken as covariate. (4). The adjusted higher mental ability in science score of the students studying through developed software package was significantly higher than the students studying through traditional method, when intelligence was taken as covariate. (5). The mean scientific attitude scores of the students taught through developed software package was higher than those studying through the traditional method, but the t-value was not significant. (6). Overall student reaction was favorable towards the package but when time passed they become used to for the treatment and the percentage of favorable reactions decreased.
S. Rajeshwari (1993) of Madras University has developed the simulation program to understand the basic principles or concepts, the underlying theory and education of end points of precipitation titration by potentiometric methods, enumerated with the escalation of prices of chemicals. There is a growing need for simulation of experiments on computer with the advent of inexpensive microcomputer system. It is possible for all the educational institutes with a modest budget to introduce a digital computer into schools, graduate, post-graduate chemistry labs.

Singh and Gupta, M. (1993) developed, “Computer Assisted Instruction in Chemistry”. The design of the study was pre-test, post-test experimental design. 60 students of Class VIII were used as sample. The major findings of this study were; (1) Students of strategy I (CAI + teacher assistance) scored significantly higher than the students of strategy II (only CAI). (2) The girls of both the strategies scored significantly higher than the boys of both the strategies in terms of their mean gain scores and mean retention scores on criterian test. (3) The girls of strategy I (CAI + teacher assistance) scored significantly higher than the girls of strategy II in terms of their mean gain scores and mean retention scores on the criteria on test. (4) The boys of strategy I scored significantly higher than those of strategy II in terms of their mean gain scores and mean retention scores on the criterion tests. (5) Students of both the strategies revealed highly favourable opinion towards CAI in terms of percentage of favourable responses. (6) Girls of both the strategies revealed more favourable opinion towards CAI than the boys in terms of percentage of favourable responses.

Kadam, U.R. (1996) had undertaken a research study for his M.Ed. dissertation, on the problem, entitled, “Use of Computer to Teach
Subtraction of Two Matrices for Twelfth Standard Student - A Study”. The major findings of this study were; (1) The ‘t’ test of the experimental group and controlled group scores revealed that there is significant difference of scores both the CAI method and traditional method. (2) From the means of both the groups it is observed that, CAI method is more effective than traditional method. (3) There is no significant difference regarding the effectiveness of CAI method between boys and girls of experimental group. (4) There is no significant difference regarding the effectiveness of traditional method between boys and girls of controlled group. (5) A computer programme can be prepared on texts of mathematics. (6) Computer can be used as a tool of teaching and learning of mathematics.

Karandikar, C.M. (1996) had undertaken a Ph.D. level study in Education, entitled, “Evolving a Video-Instructional Package to Teach Balanced Diet to the Students of Std. VIII and Studying its Effectiveness in terms of the Students Achievement” at CASE - The MS Univ., Baroda. Some of the major findings of this study were; (1) There was significant difference between mean achievement of high SES and low SES group of students studied through video instructional package in urban area on immediate retention test. (2) There was significant difference between mean achievement of high SES and low SES group of students studied through video instruction package in rural area on immediate retention test scores. (3) There was significant difference between mean achievement of high anxiety and low anxiety group of students studied through video instructional package in urban area on immediate retention test. (4) There was significant difference between mean achievement of high anxiety groups of students studied through video instructional package in rural area on immediate retention scores. (5) There was
significant difference between mean achievement of male and female students studied through video instructional package in urban area on immediate retention test. (6) There was significant difference between mean achievement of male and female students studied through video instructional package in rural areas on immediate retention test scores.

**Kumbhar, J.S. (1996)** had undertaken a research study at M.Ed. level on the problem, entitled, “Effective use of Computer to teach Addition of two Matrices for Twelfth Standard - A Study”. The major findings of the study were; (1) The ‘t’ test of experimental group and controlled group scores revealed that there is significant difference of scores between the CAI method and traditional method. (2) From the mean of both the groups it is observed that, CAI method is more effective than traditional method. (3) There is no significant difference regarding the effectiveness of CAI method between boys and girls of experimental group. (4) There is no significant difference regarding the effectiveness of traditional method between boys and girls of controlled group. (5) Computer is used as a tool of teaching and learning mathematics.

**Khriwadkar, Anjali (1998)** had undertaken a Ph.D. level study in Education, entitled, “Development of Computer Software for Learning Chemistry at Standard XI” at CASE - The MS University, Baroda. The objectives of this study were; (1) To develop CAI package in subject of chemistry for Standard XI science students, studying GSTB syllabus, (2) to study the effectiveness of the software package in terms of instructional time and achievement of students. (3) to study the effect of software package on students achievement in relation to students, (a) intelligence level, (b) motivation level, and (c) attitude towards the package, (4) to study the attitude of the students and teacher regarding the effectiveness of the CAI package with regard to aspects of the software
such as the content of the software, presentation of the software, examples and illustrations, graphs and figures, evaluation items, utility of the software and instructions given in the instructional manual that are provided with the software. The main findings of this study are; (1) It was found that, the experimental group achieved significantly higher than the control group. (2) It was found that the mean instruction time taken by the students of experimental group was less than the mean instructional time taken by control group students to learn three chapters of Std. XI Chemistry text book. As far as achievement of students on achievement tests was concerned, it was found that the achievement of the experimental group students was significantly higher than the control group students. (3) It was found that variables like IQ, motivation and Attitude affect the academic achievement of student. The three variables together showed an interaction effect on Academic Achievement of students. (4) With regard to the students attitude it was found that the students liked learning through the software package. This software package helped them to learn quicker as well as to score better an achievement test. They expressed that learning through computer software was more interesting because they could learn on their own.

Sharma, Aabha (1998) for her M.Ed. Dissertation at DAVV, Indore on ‘Computerization among video based instructional strategies for teaching science at class IX level in terms achievement and reaction’ found: (1). It is found that video followed by lecture instructional strategy was significantly superior to only video as well as video followed by discussion instructional strategies. (2). There was no significant influence of sex on achievement in science. (3). The attitude towards science was found to influence significantly the achievement in science. (4). Achievement in science was found to be independent of the interaction
between treatment and attitude towards science. (5). The above average students were found to achieve more in science from those of the below average. (6). The achievement in science was found to be independent of interaction between treatment and intelligence. (7). The achievement in science was found to be independent of interaction between treatment and sex.

**Zyoud, Munther Mohammad (1999)** had undertaken a Ph.D. level study in Education, entitled, “Development of Computer-Assisted English Language Teaching for VII Std. Students.” CASE - The MS University, Baroda. The objectives of this study were; (1) To develop Computer Assisted English Language Teaching Programme for Std. VIII Gujarathi medium students, (2) to study the effectiveness of the Computer Assisted English Language Teaching Programme on Students Achievement in terms of (a) Vocabulary, (b) Grammar, (c) Comprehension, by taking pretest and IQ as covariate, (3) to study the effectiveness of Computer Assisted English Language Teaching Programme on the experimental group, Student’s Achievement in Vocabulary, Grammar and Comprehension with respect to their intelligence motivation and attitude, (4) to study the attitude of the students towards usefulness of the Computer Assisted English Teaching Programme.

The major findings of this study are; (1) Computer is used to its full potentials, it can create an atmosphere where the students can learn and interact with the computer without being afraid of the teacher’s presence. The students can learn at their own pace and interact with the computer privately without being afraid of committing any mistakes. (2) The computer can support countless types of exercises to drill and test Vocabulary and Grammar. (3) Computerized exercises can help the
students to become familiar with significant amounts of vocabulary. (4) Computer Assisted Instruction is important in teaching vocabulary Grammar and Comprehension because it provides effective individualized instruction. (5) The computer can control, deliver, evaluate and inform the students of their achievement.

**Dalwadi, Nitin (2001)** had undertaken a research study at M.Ed. level, entitled, “Development of Computer Assisted Instruction in Science for the Students of Standard IX” at CASE - The MS University of Baroda. The objectives of the study were; (1) To develop CAI in Science for Standard IX. (2) to study the effectiveness of the CAI in terms of achievement of students. (3) to study the opinion of the science teachers and students regarding the effectiveness of the CAI developed CAI material with the help of windows based foxpro-2.6. The topic on ‘Light’ was selected for preparation of CAI package. This experiment was conducted on 30 students of Tejas Vidyalaya, Ellora Park, Vadodara. The data was collected through pre test, post test and opinionnaire constructed by the investigator. Mean, Standard deviation and ‘t’ test were used to analyze the data collected.

The major findings of this study were; (1) CAI was found to be effective individualized instructional technique for teaching Science to Std. IX student. (2) CAI helped the students to learn the topic of ‘light’ and clarified the concepts. (3) Students were found to have a positive opinion towards the developed CAI. (4) The Science teacher was found to have a positive opinion towards the CAI developed by the investigator.

**Patel, Rupesh (2001)** had undertaken a research study at M.Ed. level entitled, “A Study of Learning through CALM in relation to Selected Production Variables and Contiguity” at CASE - The MS University, Baroda. The objectives of this study were; (1) To analyze
CALM in relation to the production variables and contiguity. (2) To study the effectiveness of CALM in terms of mean achievement of students. (3) To study the learning through various message items in relation to production variables and contiguity.

Thirty students of Std. VIII (2000-2001) of Shreyas Vidyalaya, Manjalpur, Baroda were selected purposively for the present study. The CALM developed by B.C.Ed. students of DAU was used to study its effectiveness. To study the effectiveness of the CALM developed by B.Sc.Ed. students, single group pretest post test design was used. For objective No. 1 qualitative data was collected and for objective No.2, the scores on pre test and post test were collected. The CALM was on two topics (a) Solar system, (b) Magnet.

The major findings of this study were; (1) The correlated ‘t’ value on CALM on solar system and magnet have been found significant at 0.01 level. So there has been significant gain through interaction with the CALM. (2) Largely the status of CALM has been found significantly higher on production variables and contiguity vis-a-vis achievement. (3) Some of the teaching points on CALM solar system and magnet have been found wanting in terms of mode of representation, spatial contiguity and temporal contiguity. (4) Achievement has been found relatively higher when technical message items were supported with animation on the same frame. (5) Text mode was found to be dominating in both the CALM, which is against the characteristics of computer.

Anuradha, K. and Bharathi, V. V. (2002) conducted study on effect of TV viewing on elementary school children’s academic achievement. The results of this study showed that certain TV viewing behaviour like viewing only selective programme, viewing TV programme with parents and interaction of father or mother while
watching TV improved children’s academic achievement. Parents education programme in this aspect may be very helpful.

**Gaikwad, Vaishali P. (2002)** conducted her M.Ed. research on 40 students of ‘Irwin Christian High School, Kolhapur’, of IX Class. The statement of the problem was “The Use of the Text based Software to Teach a Topic in Science for Ninth Standard - A Study”. The topic selected was Life Process II (Asexual Reproduction in plants by Artificial vegetative propagation). Pre-test was conducted and based on the marks obtained in Pre-test, 40 students were divided into experimental and control group. The control group was taught by the regular teacher whereas the experimental group was taught by the researcher through the computer. Then common post test was conducted. The data was analysed with respect to Mean, standard deviation and ‘t’ test. The software was prepared through Windows 97 containing 12 slides. The major findings of the study were that the overall performance of the experimental group was better than the control group. For experimental group, it’s a new learning experience, computer assisted instruction method is better as compared to the traditional method based on the findings of this study.

**Kadhiravan, S. and Suresh, V. (2002)** studied the effects of Computer-assisted Instruction on Self-regulated Learning. In their study, lecture method was used in instructing the control group while CAI as Individualized Instruction Strategy (CAI) and CAI with Peer Interaction (CAIPI) strategies were used in the case of experimental group under Quasi experimental design. Sample size include 3 groups of 35 students. The results of this study revealed that the instructional strategies enhance the students use of SRL strategies. CAIPI strategy is the most effective one in enhancing the students’ use of SRL strategies whereas CAI strategy is more effective when compared to the lecture method. In the
lecture method the teaching strategy was arranged as to suit the needs of the average learner and there is no provision for immediate feedback. In addition to that there is a provision for shared understanding in CAIPI. Hence, it is concluded from the study that CAIPI and CAI strategies are more effective in enhancing the students’ use of higher order learning strategies than the lecture method.

**Patil, Priyaz Murtuj (2002)** has conducted her M.Ed. research on 50 students of XI standard of ‘Purohit Junior College, Sangli’. The statement of the problem was, “Teaching of Cathode Rays for XI Standard by using Computer Software - A Study”. She has used experimental method. Firstly, all the 50 students were given a pre test. Based on the score of pre test, 50 students were divided into experimental and control group. The investigator prepared a software on the chapter of cathode rays. The control group was taught by the regular teacher and experimental group was taught by the investigator through the computer. After teaching, a common Post Test was given. The marks obtained in pre test and post test were statistically analysed and compared with respect to the Mean, S.D. and ‘t’ values.

After the study it was found that, the mean of the experimental group was higher than that of mean of the controlled group. It was also found that, S.D. of experimental group was less than that of controlled group. From the research it was found that, computer assisted learning is more useful than the traditional method. Due to the software, the students learn at their own pace and time. CAI worked effectively and created interest among the students about teaching and learning through this method.

**Shirgave, K.S. (2002)** had undertaken a research study at M.Ed. level on the problem, entitled, “Teaching of Dispersion in a set of Data
for IX Standard Through Computer - A Study”. The major findings of this study were; (1) The ‘t’ test of the experimental group and control group scores, revealed that, there is significant difference of scores both the CAI method and traditional method. (2) From the means of both the groups, it is observed that CAI method is more effective than traditional method. (3) A computer programme can be prepared on texts of Mathematics. (4) Computer can be used as a tool of teaching and learning of Mathematics.

Admuthe, R. S. (2003) for her M.Phil. Dissertation on ‘Development of computer based software for teaching and learning a topic in Educational psychology at the B. Ed. Level – A study’ found that the performance in the post test, given by experimental group was better than control group. The better performance could be because of better understanding of topic educational psychology learnt by using computer assisted instruction (CAI) method as compared to traditional method. As the computer assisted instruction (CAI) method is found to be more effective method than traditional method for the topic ‘Personality and Adjustment’ of subject educational psychology in the B.Ed. syllabus. So, CAI method may be used for teaching all topics of educational psychology at B. Ed. Level. If computer software packages, floppies and CD’s are available in the B.Ed. colleges, the students can learn the subjects at their own pace and time. Teachers should be trained to use as well as prepare computer software for their own subjects, so that they can compliment their teaching. If good computer softwares are provided to all students, slow learners, fast learners and average learners can study the topics of their own speed. If good software’s are provided the students and teachers will be motivated to use them and enrich their knowledge on the topics.
Bhapkar, D.S. (2003) had undertaken a research study at M.Ed. level on the problem, entitled, “The Use of Text-Based Software to Teach a Topic in Science to the IX Standard Students - A Study”. The major findings of this study were: After the post-test, the analysis of the collected data was carried out. Mean, standard Deviation of Pre-test and Post-test were calculated. Also ‘t’ test was applied so that the null hypothesis would be accepted or rejected. (1) From the research it was found that, the mean score of the experimental group was higher than that of the mean score of control group. (2) It was also found that, the standard deviation of experimental group was lesser than that of the control group. (3) After application of ‘t test it was found that, the null hypothesis which was formulated was rejected. It is because the calculated ‘t’ value was greater than that of standard ‘t’ value. (4) From the result it was found that, teaching through the user friendly computer software was more useful than the traditional method. (5) There was significant difference in the performance of both the groups. (6) From the results it can be said that, the computer software to teach the topic ‘Increase in Food Yield’ is more useful than the traditional method.

Koroghlanian, C. and Klein, J. D. (2004) studied the effects of audio and animation in multimedia instruction. This study investigated the effects of audio, animation, and spatial ability in a multimedia computer program for high school biology. Participants completed a multimedia program that presented content by way of text or audio with lean text. In addition, several instructional sequences were presented either with static illustrations or animations. The study examined the effects of instructional mode (text vs. audio), illustration mode (static illustration vs. animation), and spatial ability (low vs. high) on practice and posttest achievement, attitude and time. Results indicated that spatial
ability was significantly related to practice achievement and attitude. Participants with high spatial ability performed better on the practice items than those with low spatial ability. Participants with low spatial ability responded more positively than those with high spatial ability to attitude items concerning concentration, interest, and amount of invested mental effort. Findings also revealed that participants who received animation spent significantly more time on the program than those who received static illustrations.

Macwana, Snehal (2004) had undertaken a research study at M.Ed. level entitled, “A Study of Development and Effectiveness of Computer Assisted Learning Material for Class IX Students” at CASE - The MS University, Baroda. The objectives of this study were; (1) To develop CALM on light for Std. IX Gujrathi medium students. (2) to study the effectiveness of CALM on light for Std. IX students. (3) to study the reactions of Std. IX Gujrathi medium students on CALM developed on light. (4) to study the reactions of science teachers on CALM developed on light. This experimental study was conducted on 81 students (40 experimental group + 41 control group) of Std. IX in ‘Kalarav High School, Halol’. The data was collected with the help of an achievement test. The statistical techniques like mean, S.D. correlation and ‘t’ test were used to analyze the data collected. The major findings of this study were - (1) CALM was found to be effective for teaching science at Std. IX. It helped the students to learn the topic of ‘light’ and clarified the concepts. (2) Students were found to have a positive reaction towards the developed CALM. (3) Science teachers were found to have a positive reaction towards the developed CALM.

Uma, S. (2004) in this study, investigator made an attempt to understand the role of computers and technology in classroom teaching
and learning science and maths. Thus four lessons in science and maths were selected. Each lesson was to be taught and evaluated using different methodologies. The sample of the study was twelve students who passed V class and entering VI class. The outcome of the study was revising through computers has increased their performance. The best scores are when computers are not used.

**Garad, V. N. (2005)** for his M. Ed. Dissertation on ‘Development of text-based computer software to teach a topic in science for IX standard students – A study’ found the 't' test of the experimental group and control group scores revealed that there is significant difference of scores both the CAI method and traditional method. From the means of both the groups it is observed that CAI method is more effective than traditional method. Computer software can be prepared on texts of science. Computer can be used as a tool of teaching and learning of science.

**Mane, J. V. (2005)** for her M. Ed. Dissertation on ‘The use of Text-Based software to teach science for VIII standard student – A study’. When performance of two groups were experimental and control considered General Science topic 'Light' for the VIII standard. The performance of the experimental group for questions on topic 'light' was better than control group may be because of better representation of the subject through computer software as compared to the traditional classroom method and or may be because of learner get experience according to their own speed. The over all performance of the experimental group and control group was also analyzed by 't' test and it revealed that the experimental group performed better than the controlled group which is also seen in question wise analysis. The reason may be that computer students are more cautious while learning the lesson through the computer. The feedback revealed that CAI develops
confidence within that group. Hence we can conclude that CAI is more beneficial than regular classroom instruction.

**Patel, Jayesh (2005)** had undertaken a research study for partial fulfilment of M.Ed. degree, entitled, “A Study of an ICT Awareness, Use and Need of the Teachers of Maharaja Sayajirao University of Baroda, Vadodara”. The objectives of this study were; (1) To study the ICT awareness of the teachers of The MS University, Baroda, Vadodara. (2) to study the ICT use of the teachers of the MS University of Baroda, Vadodara. (3) to study the ICT need of the teachers of the MS University of Baroda. (4) to study the variables like gender, marital status, teaching experience, age etc. related with the ICT awareness of the teachers of the MS University, Baroda. (5) to study the variables like gender, marital status, teaching experience, age etc. related with the ICT use of the teachers of the MS University, Baroda. (6) to study the variables like gender, marital status teaching experience, age etc. related with the ICT needs of the teachers of the MS University, Baroda. This was a survey type of study. The present study was conducted on forty teachers of different departments of the MS University, Baroda. The investigator prepared a scale for data collection. The statistical techniques like percentage, mean S.D. t-test and ANOVA were used for analysing the data collected.

The major findings of this study were - (1) The ICT awareness of the teachers of the MS University, Baroda was found to be very low. (2) The use of ICT like computer, internet and other components by the teachers of MS University for classroom, teaching professional development and personal development is nearly equal and it was not found great. (3) From the analyzed data, it was found that, the teachers do not feel the great need of ICT. (4) The study shows that, the variables like age, gender,
qualification, designation, marital status, category, teaching experience, salary of months, level at which the teacher teaches, teaching subjects, medium of instruction, computer training and availability of PC etc. do not have significant relationship with their ICT awareness. (5) The study shows that above mentioned variables do not have significant effect on their ICT use. (6) The study further shows that the above mentioned variables do not have significant effect on their ICT need.

Pati, S. P. and Acharya, S. (2005) studied the impact of visuals on the achievement of rural pupils. In this study, the investigators conclude that extensive use of visual aids has a positive impact on the academic achievement of the rural pupils and suggest that teachers should massively use visual aids while teaching in the class for qualitative improvement in education in general and achievement in particular.

Srinivasan, S. and Crooks, S. (2005) in their research article presents a review of the literature on multimedia learning in science. It is no small matter that teachers value using technology, more specifically multimedia, in teaching. But this interest falls far short when it comes to application. Why is it so? This article tries to find the reasons behind this dichotomy. Then, research from science related areas that addresses important issues relevant to multimedia design in conjunction with Mayer's theories is presented. Finally, examples of research involving effective science learning experiences for students with multimedia is presented, and directions for future research are shown. The purpose of this article is to encourage research in order to expand the use of multimedia in the sciences by overcoming the weaknesses that exist at present.
Waghmare, V. H. (2005) for his M. Ed. Dissertation on ‘Preparation of computer software to teach English grammar for VIII standard students – A Study’. The pre-test was administered for both the groups and it was found that the performance of both the groups were same. The t-test analysis supports this statement. The post-test scores on 'Pronoun' of both the groups when compared, it was found that Experimental Group students scored more than that of Controlled Group. The t-test analysis for the same reveals that Experimental Group has performed better than the Controlled Group for the questions on 'Pronoun'. A computer program can be prepared on tests of English. Computer can be used as a tool of teaching and learning of English.

CAI is found to be better than the traditional classroom method.

Conclusion

After the review of related literature and research in this area is done it is found that most of the researches are dealing with instructional material. Some are about computer multimedia. Among them very few
are development of Computer Multimedia Software Package related to Science subject. There is not a single study which is related to development of Computer Multimedia Software based on Chemistry components.

Though these researches are indirectly related to this study the research design, methodology is found to be useful. The sample shows wide variation and hence definite conclusions cannot be drawn. However these studies have enabled this research to plan this study properly.

As already mentioned there was not a single study related to Chemistry components; the research problem can be said as an original and as pointed out in the first chapter in the significance of the study there is definite need of conducting research work on the topic selected for this study.