CHAPTER- III

REVIEW OF RELATED LITERATURE

“If we could first know where we are and whether we are tending, we could better judge what to do and how to do”

-Abraham Lincoln
CHAPTER III
RELATED LITERATURE

“Practically all human knowledge can be found in books and libraries. Unlike other animals that must start a new with each generation. Man builds upon accumulated and recorded knowledge of the past.” Best (1983) a review of related literature is an important pre-requisite to actual planning and the execution of any research work. We should not neglect a particular thing because it is of the past and should not except a new one because of the newness. Infact, there is nothing new accept in the content of old. It is only with reference to old that a new thing is learnt.

An analytical review of research is evidence related to the problem has been presented in this chapter with a view to seek some guidelines from the previous research which could be helpful in formulating the present investigation of hypothesizes and get insight into variables.

3.1 INTRODUCTION

Review of related literature is an essential aspect of research project. It implies a survey of accumulated and recorded knowledge of the past and drawing maximum benefits from previous investigations and findings, taking hints from the designs and procedures of previous researches, matching the conclusions drawn earlier and hence increasing the existing store knowledge.

Good, Bear and Scats (1935) have analyzed the purpose of survey of related literature as:-

- To show whether evidence already available solves the problem adequately without further investigations and thus to avoid the risk of duplication.
- To provide ideas, theories, explanations or hypothesis available are formulating the problem.
- To suggest method of research appropriate for the problem.
- To locate data useful in the interpretation of results.
- To contribute to the general scholarship of the investigator.

Keeping in view this requirement, in this chapter an effort has been made to present studies which throw light on what has been done by previous investigator. So experimenter tried to review the related literature as under:-
3.2 STUDIES RELATED TO ACHIEVEMENT IN SCIENCE, SCIENTIFIC ATTITUDE, CREATIVITY AND SEX DIFFERENCES

Rambo (1964) in his *comparative study of academic achievement of highly creative and low creative students of VIII, IX and X class*, found that highly creative students similar to the low creative students in their grade points. Study conducted on a sample of 500 students showed that with academic achievement test it is found that students of class VIII, IX and X that are highly creative, scored significantly higher in achievement than low creative students.

Nuttall (1970) applied the Minnesota tests of creative thinking (MTCT) and Stewart Teacher Rating of creativity (STRC) for measuring creative abilities on a sample of 189 boys of 6th grade. The results showed that Teacher Rated Creativity (STRC) was positively related to achievement grade of 6th grade students.

Khire (1971) reported in his study the *relationship of academic performance with creativity*, on a sample of 1054 boys of grade VII and XI. It was found in his study that academic performance was related positively and significantly to creativity.

Chatterjee (1972) examined *relationship between biographical factor, achievement in science and aptitude* on a sample of 200 pupils found that there was high degree of correlation between biographical factor, achievement in science and aptitude for technical stream.

Sandifer (1973) investigated *the nature of relationship between creativity and different areas of academic achievement at the 9th grade level* found that creativity produced statistical significant increase in the achievement variables that were language, science and arithmetic.

Mishra (1977) identified a decrease in performance (23.38 per cent of his sample) of educationally backward students in science and mathematics and diagnosed inferior intellectual potential is the cause of their backwardness.

Jhag (1979) studied the personality correlates of creative children on a sample of 700 students of Bhopal Division and found that scientific creativity was normally distributed and urban students were better in it. Creative children were found to be better in abstract thinking, emotional stability, independence, self-sufficiency, self-concept and intelligence, and were more venturesome relaxed, controlled and doubting.
Asha (1980) explored the relationship between creativity and achievement on a sample of 800 students of 10th class revealed that there is positive and significant relationship between creativity and achievement.

Shinde (1982) conducted study on a sample of 180 students to found scientific attitude of secondary school students and investigate that students with high academic achievement had high scientific attitude and the students with average academic achievement had average scientific attitude.

Austin (1983) studied the effectiveness of computer assisted instruction over concept attainment model in teaching geometry. A sample of 320 students were taken and found that the computer assisted instruction lesson was effective for teaching geometry than concept attainment exercise.

Bradley (1983) studied the effectiveness of computer assisted instruction in teaching math’s, science and S.S.T in relation to achievement. A sample of 250 students were taken and found that the computer-assisted instruction has been effective in teaching Math’s. Science than S.S.T. This showed improvement in achievement for boys and girls, using CAI to study.

Krishnan (1983) developed a multimedia package for teaching a course of audio-visual education for the instructor training programme and studied the effectiveness of multimedia package in achievement of audio-visual education of trainees and found the change in attitude of the instructor trainees toward the multi-media package. The instructional strategies were prepared in modular form on a sample of 340 students and it was found that the mean gain in the total scores of knowledge comprehension and higher mental abilities for all the modules were found significant at 0.01 level.

Ansari (1984) worked on construction and standardization of achievement tests in general science for standards, V, VI and VII for children studying through Hindi as the medium of instruction in Greater Bombay. Investigator compared the achievement in science of boys and girls studying in municipal and non-municipal schools in the city. The sample was of 1200 students. The major findings were the performance of boys was better than that of girls. The students of non-municipal schools had a better performance in general science than those of municipal school.

Slavin (1984) studied the effectiveness of team-assisted individualization on the science achievement. Sample consisted of 1371 students in third, fourth and fifth grade classroom in a sub-urban school. Out of these, 113 students (8.2%) received special education
services for two hours per day. The results indicated statistically significant treatment
effect favoring team-assisted individualization for science achievement.
Mehna (1986) investigated some factors affecting academic achievement in science of IX
standard students. The sample comprised 308 girls and 376 boys of class IX of English
medium schools of Greater Bombay selected through the cluster sampling method. The
research findings imply that the pupils’ performance in science subjects can be improved,
(1) if teachers succeed in generating a feeling of liking for them among pupils, (2) if
teachers develop aptitude for science among children by providing scientific information,
and (3) 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.
Cherian (1990) conducted a study on family size and academic achievement of children.
The sample consisted of 369 boys and 652 girls in the age range of 13 to 17 years who
represented total 7th standard population. The marks obtained by the pupils at the 7th
standard external examination conducted by the Department of Education of the
Government of Transkei were used to know their academic performance. The results
showed a negative relationship between family size and their academic achievement.
Hence, from the above studies it can be concluded that there is negative relationship
between family size and academic achievement of children.
Gangopadhyay (1991) did research work on an experimental survey of *effectiveness of
classroom teaching techniques in relation to student’s achievement*. The sample consists
of 100 students of class IX divided into four groups. He found that lecturing technique and
explanation with demonstration showed more effectiveness than only Lecturing and
explanation.
Mevarech and Bracha (1992) investigated *the effect of different cooperative environments
on creativity and interpersonal relationships among students*. They found that students in
cooperative environment scored higher on several aspects of creativity. Figurative
originality, verbal flexibility and verbal originality increased than did the students in
control group.
Morrell (1992) studied *the effect of computer assisted instruction (CAI) on student’s
achievement in high school Biology*. No significant difference was found between the
achievement levels of the CAI groups and Control groups during the photosynthesis unit.
Attitude was found to be positive during the photosynthesis unit of botany. But during
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Genetics units, attitude was negative. This could be because the material in the Genetics unit was more complicated and CAI classes had very little teacher’s assistance.

Kaur and Gill (1993) carried out a study to examine the sex differences in academic achievement in different subjects of rural and urban children. The sample consisted of 160 from 9th grade students. The results revealed that, boys scored higher than girls in science achievement and highest marks were obtained by students of urban boys followed by urban girls, rural boys and girls.

Verma (1993) conducted a study to find out the influence of gender on academic courses. The sample consisted of 120 students of both gender belonging to science course. The students were randomly selected from two institutions located in Sangaria and Mandi of Haryana. The results revealed that, male science students had higher mean scores on comprehension learning and use of evidence than art students. Female science students did not show any marked differences in their study approaches related to science learning.

Chowdhary and Ghosh (1996) The study entitled relationship between the achievement in science and creativity. The sample comprised of 160-students of class 9th (85 boys and 75 girls) studying in the English medium schools under CBSE. Achievement test in science and Wallach Kagan test of creativity were used to assess the factors of the learners. It was found that, there were significant relationship among the achievement in science and scores in creativity.

Jovanovic (1998) in his study to examine the boys and girls in the performance based science classroom. The sample comprised of 165 students studying in grades 4th, 5th and 6th standard. Performance based science classroom, where teachers are associated with these classroom were identified not only as hands on science instructions but also instructors sensitive to increasing girls participation in science. Results indicated that boys and girls did not participate equally in performance based science classroom. Moreover, it was found that there was a decrease in science ability perception of girls not boys over the school years, whereas boys and girls experienced these classrooms differently.

Tessler (1995) stated emphatically that computer assisted instruction is an effective method for teaching visually oriented subjects such as Ultrasonography.

Gregoire, Heidmann (1996) focused on technology and student’s motivation to learn the subjects. Study was done on a sample of 350 students of IX class. Student’s attitude toward computers was found positive. In general, the most students considered computer activities to be highly motivating, interesting and helpful in achievement than conventional learning.
Anandan (1998) in his study on **effectiveness of CAI in economics** showed that CAI had produced **significant positive effect on the achievement in Indian economics** when compared with traditional method. Significantly favorable achievement was noticed in component of knowledge and comprehension but not in application. There was significant difference favoring CAI, even after allowing for the difference in intelligence and socio-economic status of the students.

Ghetiya (2000) conducted a study on **effectiveness of sex and method of teaching on academic achievement for science teaching**. The sample consisted of 88 boys and 113 girls of 8th standard drawn from Rajkot based Gujarati medium schools. Teaching methods namely programme learning and demonstration method considered as dependent variables and two levels of sex (boys and girls) as independent variables. Two-group test was applied for the analysis of data. The results revealed that there was no effect of sex on academic achievement, where as the methods of teaching had effect on academic achievement. Hence, from the above studies it can be concluded that boys scored better than the girls in achievement of science.

Mohapatre and Mishra (2000) examined the **effect of gender on science achievement with a special reference to primary and secondary school years**. The sample consisted of 185 students of both boys and girls from D. M School Bhubaneshwar. A questionnaire was prepared that included simple concepts of science books of 5th, 7th and 9th standard. The results depicted that, the boys had steady achievement in science, whereas little effort in lower class towards the girls made them equalize with the boys in science achievement.

Ahmad and Hasan (2003) studied the **attitude of secondary school students toward science in relation to sex, socio-economic status and intelligence**. The study was based on a sample of 286 secondary school students of Aligarh district. It was found that the students from high socio-economic status show better positive attitude toward science than middle and lower. The students with high intelligence show positive attitude toward science than middle and low.

Nabi (2003) studied on a sample of 286 secondary school students of district Aligarh. Stratified random sampling procedure was used to select schools. It was found that main effects of SES (socio-economic status) and intelligence was found significant whereas the main effect of sex as well as interaction was non-significant. Students having high SES show gender positive attitude toward science in comparison to middle as well as low SES. Students having high intelligence level enjoy positive attitude toward science as compared to middle and low level of intelligence.
James and Marice (2004) studied *the achievement in science in relation to scientific aptitude and scientific attitude*. To investigate this sample of 470 students of standard 11th who opted for science group drawn from 10th class school of Tamil Naidu. Marks secured by students in science in Board exams of Tamil Naidu were taken. Results indicate that there is a positive relationship between achievement in science and science attitude. There is a significant gender difference in science achievement favoring girls. Students from different types of schools (gender wise) differ in their achievement in science favoring girl’s school.

Rezwana Shamayel (2007) studied *the impact of teaching strategies in English in developing creativity among IX standard students of Bangalore city with special reference to sex, intelligence and socio-economic status*. A sample of 78 students of IX standard in Bangalore city was taken. Dependent variable was: creativity. It was found that there is significant difference in the effect of creativity and teaching strategies on the students of controlled and experimental group. There is no significant difference in the effect of creativity scores on the students of different intelligence levels. There is no significant difference in the effect of creativity scores on the students of different socio-economic status. There is significant difference in the effect of creativity scores on the students of different creative potential levels.

Mehra and Thakur (2008) studied on a sample of 112 students of class VII of two Government schools of Chandigarh. Instructional treatment at two levels were applied:- experimental group T1 followed by cooperative learning and control group T2 taught by conventional method. It was found that field-independent and field-dependent students retained comparably at knowledge levels of objective (t= 1.96). Field-independent students retained better than field-dependent at comprehension level of objective (t= 3.13) through cooperative learning and conventional learning.

Mahmood Alam (2009) found *the extent of relationship between creativity and achievement motivation of the students and academic achievement*. A representative sample of 450 students studying in class X was drawn using survey method. The findings revealed that there was significant positive relationship between creativity, academic achievement, achievement motivation and academic achievement.

Mary and Sahaya (2009) conducted *a study on scientific attitude of upper primary students towards science learning*. The sample consisted of 237 students in Pondicherry. The result showed that the factors like being a domicile, gender, locality of school, medium of
Related Literature

instruction and size of the family do not influence their scientific attitude and achievement in science.

Ganihar and Wajiha (2009) investigated factors affecting academic achievement in mathematics on a sample of 800 IX class students of secondary schools. The result revealed that many factors like mathematical creativity, attitude toward mathematics, achievement motivation and low level of anxiety influence the academic achievement in mathematics at secondary stage.

Narayan and Anjuli (2010) studied on a sample of 52,075 students studying in IX and X classes of secondary schools of Bhopal district. It was found that there was significant influence of scientific attitude on environmental practices of students. Values of means of environmental practices are in a descending trend from very high to very low categories of scientific attitude. The environmental practices of students with higher levels of scientific attitude were more environmental friendly compared to students with lower levels. Components of scientific attitude were significantly influencing environmental practices of secondary school students.

Kamini and Rekha (2010) studied on a sample of 200 students of 9th class of Government schools in which 100 were boys and 100 were girls. The results derived indicated that there was significant difference in academic anxiety as well as academic achievement of boys and girls and negative correlation between academic anxiety and academic achievement.

3.3 STUDIES RELATED TO INSTRUCTIONAL STRATEGIES, ACHIEVEMENT IN SCIENCE AND SCIENTIFIC ATTITUDE

Enstwistle and Enstwistle (1970) carried out a study on the relationship between personality, study method and academic performance. He found correlation analysis of these scores in relation to academic performance at the end of first year, which showed the superiority of the introvert students with good study methods and academic performance.

Sahajahan (1980) performed an experimental study of teaching science in standard VI and VII through modules and found that the modular way of learning was more effective than the conventional method. Majority of students possessed a favorable attitude toward modular instruction. The reaction of teachers to modular approach of instruction was also favorable. The achievement of students through instructional modules has a positive correlation with their scientific attitude toward modular way of learning. However, no significant difference was found between the achievement of extremely high and extremely low achievers and between boys and girls while learning through modules. The

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attitudes of students toward instructional modules academic motivation of students and their reading comprehension were not related to one another.

Sharma (1982) compared the effectiveness of three modules for civics teaching with traditional teaching method in terms of achievement of students – teachers on criterion test. It was found that the mean achievement scores of the experimental groups of students-teachers were significantly higher than that of control group.

Prabhune (1984) studied the effects of using self-learning and discussion method of instruction and objective assessment tools measuring higher level of intellectual skills abilities and scientific attitude. A sample of 250 students were taken and found that self-instructional teaching device was significantly effective in developing learner’s scientific attitude and problem solving skills.

Kishore (1986) conducted study on a sample of 250 students. It was concluded that mastery learning strategy produces negative cognitive and affective change among students. Thus mastery learning strategy can work as a viable alternative to the lecture method of instruction.

Collard & Lolyd (1987) carried out an effectiveness of the personalized system of instruction to the traditional lecture-discussion method in relation to student’s achievement, attention and attitudes. He found that (i) there was no significant main effect and interaction effect in achievement between the control and experimental group, (ii) there was no significant difference in attitudes or attendance (drop outs) rates between two groups.

Dutt (1987) studied the effect of Bruner’s strategy of problem solving ability of high school students. It was observed on the sample of 450 students that the Bruner’s strategy was superior to scanning strategy of problem solving.

Joshi (1987) studied an instructional strategy for teaching elements of science to class IX students of M.P. state. The sample for the field study comprised 109 students studying in class IX. Findings were the developed instructional strategy (IS) was found to be effective in terms of achievement of students on criterion tests and reactions of students towards different components of the IS and the IS as a whole. The developed IS was found to be significantly superior to the traditional method when the students' mean achievement scores were taken and were not adjusted with respect to intelligence.

Malhare (1988) compared the study of relative effectiveness of teaching methods based on the motivations due to competition and motivation due to initiative, spirit, interest and tendency to cooperate independent study. For this a sample of three divisions of standard
VIII named Group I, Group II, Group III were selected for experiment from N.W. Girls school. Group I which was selected for cooperation oriented teaching had 72 girls. Group II, which was selected for competition oriented teaching, has 66 girls. Group III has 58 girls was controlled. It was found that (1) the achievements of group I were better than the achievement of group II implying that the cooperative teaching method were more effective than the method of competitive teaching and (2) Group III controlled teaching was not better than competitive method.

Goel and Agbebi (1990) made a comparison of the relative effectiveness of individualized method and lecture-demonstration method on acquisition of psychomotor skills and related cognitive skills among female pupils. The study on a sample of 450 students revealed that a significant difference was observed between groups which followed the individual laboratory method and lecture-demonstration method. The group of students following the individual laboratory method achieved significantly better on psychomotor skills than did the lecture demonstration. Students who followed the lecture-demonstration method achieved at a higher level related cognitive skills than did the group of students followed the individualized laboratory method.

Chen (1994) studied on sample of 420 students on CAI (Computer assisted instructions) and it was concluded that CAI showed significant difference on achievement in mathematics between the students who use computer as compared to the students who were taught through conventional methods. The students who used the computer scored significantly higher on the post test than those who did not use the computer.

Chopra (1994) studied on the Concept Attainment Model and Conventional model on a sample of 300 of X class students. It was found concept attainment good in learning English Language than conventional model.

Reddy, and Ramar (1995) investigated that the effectiveness of multimedia modular approach in teaching mathematics to 250 low achievers of VIII standard and compared with traditional lecture method. They found that the experimental group performed significantly better than the control group on the post test. That indicates the superiority of multimedia modular approach over traditional lecture method.

Gokhale (1996) studied the effectiveness of concept simulation for enhancing higher order thinking and concluded that the students who used the computer simulation software in lecture – laboratory activities performed better on problems than students who were taught traditional lecture laboratory instruction. These findings lead the researchers to believe...
that problem oriented simulations help to develop higher order thinking strategies and students cognitive abilities.

Bhattacharya (1997) found that there was a significant relationship between each of the three domains (cognitive, affective and psychomotor), scientific attitude and academic achievement. All the three domains of the variables and scientific attitude contribute 67.50% of variance toward academic achievement, which may be considered as a high contribution.

Batchelder (1997) conducted a study on the **efficacy of using computer assisted instruction with male member participating in the prison education programme at the South Mississippi Correctional Institution (SMCI)** through an experimental study and reported that there was no statistically significant difference in the scores of male members in the experimental and control group.

Sandholtz (1997) found technology to have an enduring and positive impact on student’s engagement particularly when technology integrated into other aspects of the student’s education experience.

Cheema (1998) in her study on the **effectiveness of computer assisted instruction as related to intelligence, learning style and attitude towards science subjects**, on a sample of 200 students of XI class observed that computer assisted instruction was found to be more effective as compared to lecture method strategy in terms of achievement in biology. It was also concluded that highly intelligent students achieved more marks in both strategies.

Sharma (1998) studied the **effectiveness of mastery learning strategy in comparison to conventional strategy in respect to performance**. Relative effectiveness of mastery learning in relation to stress level of students and three learning types: concept learning, rule learning and problem solving was studied. It employed two 3x3x3 factorial design. One for achievement scores and other for retention scores. The research was carried out on students of class IX of age range 13-15 years. The final sample comprised of 277 students. Findings were: - three stress level groups showed comparable achievement gain scores, no interaction was found between treatment and stress level for the achievement gain scores. Blooms mastery learning strategy yielded higher achievement gain scores than conventional method and Keller's personalized system of instruction.

Narain (1998) studied the **effect of large group of lecture-demonstration and small group of laboratory methods in teaching of chemistry at secondary level**. The sample consisted of 79 girls and 91 boys who were randomly assigned to the two teaching methods. It was found that some learning found to be better through demonstration and some through
practical work. Neither of the methods was so superior to the other in teaching in all aspects of science as to force us to use it to the exclusion of the other (1) in lesson connected with analytical chemistry had been an increase in knowledge through the lecture-demonstration method while there was increase in understanding and laboratory skills through small group laboratory method.

Carter (1999) in his study showed that computer assisted instruction is an effective tool for instruction in vocational education. A sample taken was of 250 students. The results suggested that CAI training programme in vocational education was superior to the traditional programme.

Shah and Aggarwal (1999) studied the impact of intelligence on the effectiveness of programmed instruction (PI) and computer assisted instruction (CAI) method in terms of achievement on a sample of 340 students. It was concluded that for less intelligent students PI method was more beneficial, whereas for average and above average students achieved higher when they were taught through the CAI method.

Braathen (2000) studied on the sample of 450 students. It was observed that no significant difference was found between groups having constructivist and behaviorist methods of instruction on post test scores when controlled pretest scores were taken as a covariate.

Makanong (2000) developed constructivist teaching based model on a framework of constructivist theory and used in teaching of algebra to 164 students. It was found that quantitative data indicated no significant difference of mathematics problem solving processes. The quantitative data indicated that constructivist teaching was a promising approach capable of getting students more involved in learning mathematics.

Gulati (2001) in his experimental study on a sample of 60 students found significant difference in the pre-test, post-test and mean achievement scores. Group of students taught by mastery learning strategy scored higher on post-test as compared to pre-test. It was revealed that there is significant difference in the gain mean achievement scores of two groups of students taught by mastery learning model and conventional method of teaching. Gain mean achievement scores of group taught by mastery learning strategy was higher as compared to group of students taught by conventional instruction.

Singh (2001) studied the comparison of CAI and Total Television teaching on achievement in mathematics. Sample of 300 students of IX class was taken. It was revealed that CAI (computer assisted instruction) proved significantly better over Total Television teaching and traditional teaching on achievement in mathematics.
Natesan (2001) found the effectiveness of teaching concepts in mathematics through video cassette. Experimental method was adopted. Achievement test was used as a tool for the study. Sample of 30 students were taught through video cassette as an experimental group and 30 students were taught through traditional method. It was found that the increased level of academic achievement of experimental group was due to the teaching of mathematical concept through video cassette.

Kaur (2002) studied relationship between intelligence and scientific attitude on achievement in science, on a sample of 240 students of IXth class selected from eight districts of Punjab State. It was revealed that variables of intelligence and scientific attitude were positive and significantly related with each other at 0.01 level of significant. Thus study clearly depicted that intellectual ability and scientific attitude of the students go together in same direction. It was concluded that science achievement and scientific attitude were independent of each other.

Kumar (2002) studied the effectiveness of modular curriculum in subject of science in relation to style of learning and thinking. A sample of 300 students was taken randomly from the population of class IX students of Government model senior secondary school of Chandigarh. The group was exposed to modular curriculum was found to achieve learning and thinking significantly higher than those exposed to traditional curriculum.

Mehra and Mondal (2002) reported the effect of peer tutoring on learning outcomes of high school science students. This experimental study determined the differences between learning outcomes of Assamese high school science students who were exposed to peer-tutoring or traditional instruction. A sample of 240 students were taken and divided into two groups in different schools. Results indicated better learning outcomes in terms of achievement in science with peer-tutoring.

Geeta Rani (2003) concluded that three strategies (reception strategy, selection strategy and traditional strategy) used for acquisition of science concept in relation to Intelligence, Cognitive style and Gender differences on the sample of 240 students in which the reception strategy was found to be superior than selection strategy and traditional strategy at both the development stages.

Soni (2003) studied the effectiveness of auto-telic learning on students of fourth and fifth grades both boys and girls and compared their success with traditional methods of teaching. The sample of the study (N=74) was selected using purposive sampling procedures. Three instruments were used: achievement test, the observation schedule and
the attitude scale. Investigator reported that there is a significant effect on the learning of students through auto-telic approach.

Pabla and Tejvir (2006) studied that on the sample of 250 students and found that students taught through computer assisted instruction (CAI) and Video assisted instruction (VAI) gained more scores in mathematics than taught through Self learning (SLM) teaching, thus CAI and VAI proved to be superior teaching strategies over SLM.

Thangarajathi (2007) studied that cooperative learning method is effective than that of conventional method in learning mathematics at high school level. The random sampling technique was used for this study. A sample of 200 students was taken. The conventional method can make improvement in the achievement among pupils to a certain extent, but when compared with the cooperative learning method the conventional method was not as much effective as cooperative.

Agboola and Oja (2007) studied the effect of project, inquiry and lecture-demonstration teaching methods on sen. sec students achievements in separation of mixtures a practical test, compared relative effectiveness of three methods conducting experiment using pre-test and post-test experimental design with control group. A sample of 233 students of sen. sec schools was selected from four local govt. areas of slum state Nigeria. Treatment using inquiry or lecture method was applied on three experimental groups while students in control group were taught using traditional method. It was found that students taught with project method perform better in chemistry achievement test than lecture-demonstration while students taught through lecture-demonstration perform better than those taught through inquiry method.

Nivavathi Gananadevan (2007) in his study came to the conclusion that the multimedia programme prepared by the researcher was more effective for the achievement in science of 9th standard students. A sample of 30 students for each test was selected. The students learning through multimedia programme were found to be better than the students learning through the conventional method of teaching.

Gaonkar and Patil (2007) studied out in Dharwad city on a sample of 96 respondents (11 were treated as control group and other 5 groups of 17 students each were treated as experimental group) to teach science subject using 5 different strategies (1- Models, 2- picture book, 3- video instruction, 4-peer tutoring and 5 individualized instructions). The result revealed significant difference between pre-test and post-test scores. Performance of students taught through video instruction was highest followed by picture book, models, individualized instruction, peer tutoring and least score was obtained by the control group.
taught using normal teaching and video instructions were significantly effective in improving ability of learning science among slow learner.

Bains and Batani Devi (2010) conducted study on 30 Dyslexic children with the age range of 7 to 10 years with reading difficulties. Pre-test, Post-test experimental and control groups design was used. Six children were randomly assigned to four experimental and one control groups. Multistructured method and linguistic method, behavior modification method, alphabetic-phonics method and eclectic method were used to reduce the reading difficulties and comprehension of dyslexic children. Mean differentials were worked out to see the effectiveness of these methods. It was found that all four intervention strategy were effective in reducing the reading difficulties and reading comprehension of dyslexic children than control group.

3.4 STUDIES RELATED TO COMPUTER ASSISTED INSTRUCTION (CAI) AND CONVENTIONAL INSTRUCTION

Goodman (1964) in his study based on the comparison of the performance of a group of airline agents instructed in their jobs by computer assisted instruction (CAI), to a group taught through conventional method found that CAI group did 5% better on criterion measures and needed only half the training time.

Nanavati (1981) developed a multimedia package on population education on a sample of 400 students and found that learning package was more effective than the traditional method in teaching the pupils of IX standard.

Hooda and Jerial (1983) carried out a study aimed at finding out the effects of mastery learning strategy on different dimensions of verbal and non-verbal creativity on a sample of 300 children of VI standard. The study revealed that students in the experimental group scored significantly higher than those in control group on all dimensions of verbal and non-verbal creativity. This shows that backing through mastery learning helps in improving the different dimensions of creativity.

Hooda (1983) found that pupils taught through mastery learning strategy gave significantly higher outcomes than pupils through conventional teaching. Sample of 200 students of class VII were taken but reported that it showed no significant impact on self-concept and attitude of students toward mathematics.

Pamela (1983) in her study on computer assisted instruction (CAI) for remedial teaching in mathematics at secondary level on 250 sample found that CAI produced a significantly higher achievement as compared to conventional classroom instruction.
Stefen (1985) studied the effectiveness of computer assisted instruction and traditional instruction, on sample of 350 students and found that the computer assisted instruction is more effective over traditional instruction in improving skills at college level.

Koul (1986) investigated the effect of teaching strategy on student's achievement motivation in science. Sample of 450 students taught through mastery learning strategy scored significantly higher than that of group taught through conventional method.

Behal (1992) studied the effect of concept attainment model and computer assisted model on acquisition of concept in mathematics, on a sample of 450 students. It was found that computer assisted model of teaching was superior to concept attainment model.

Mahajan (1996) conducted his research on 150 students and studied with the objectives to compare the mean achievement of students taught through computer assisted linear programming with the mean achievement of students taught through traditional method. It was found that computer assisted linear programming on geometry was effective in terms of achievement of students belonging to experimental group than that of control group taught by traditional method.

Rajan (1996) conducted a study to investigate the effect of three modes of analogy presentation- individualized instruction, pictorial and computer stimulation in chemistry. Sample consisted of 308 students from 9th grade classes, taught by three chemistry teachers in three high schools in Kerala. The results revealed that, the computer stimulation group scored greater than the pictorial and individualized instruction group.

From the above studies it is indicated that individualized instruction in schools is considered necessary for meaningful learning in helping the slow learners.

Chadwick (1997) studied meta analysis with (CAI) computer assisted instruction and conventional instruction on a sample of 300 students. It was found that CAI is more effective than conventional instruction for secondary mathematics.

Chibbaro (1997) found no significant difference between the two strategies (Computer assisted instruction and Traditional classroom instruction) of instruction at cognitive level on a sample of 200 students.

Aggarwal and Mohanty, Manisha (1998) conducted study on the effectiveness of multimedia programmed learning and traditional method of teaching. A sample of 300 students were taken and found that the students performance taught by multimedia and programmed learning method were significantly higher than those taught by traditional method. Further it was found that programmed learning and multimedia were more effective for secondary level than primary level to teach science.
Jothikani and Thiagarajan (2004) studied the effectiveness of computer assisted instruction (CAI) in mathematics among B.Sc. degree students. Pupils of 250 samples of all three years were divided into two equivalent groups. It is found that mean scores are significantly higher in experimental group for all six units with reference to objectives and their level of achievement than conventional method.

Liao, Cliff (2007) performed a meta analysis to synthesize existing research comparing the effect of computer assisted instruction versus traditional instruction on students achievement in Taiwan. 52 students were located from four sources. Results suggest that CAI is more effective than traditional method.

Jyothi (2007) studied the impact of computer based learning on students of chemistry of 9th class. The present research was experimental and had seen the effectiveness of self-instructional module with conventional teaching method. The study revealed that the self-instructional module prepared by a teacher through a simple power- point presentation could show immense impact on learning of chemistry. Students were better motivated through computer-based learning.

Villaisamy (2007) investigated the effectiveness of multimedia on the achievement of sample of 520 pupils in science at 8th standard. The control group was taught through conventional method of teaching. It was found that there is a significant moderate positive relationship between learning achievement and scientific attitude of the students. This is due to the favorable impact of multimedia approach in the learning of the 8th standard pupils.

Nivavathi Gananadevan (2008) study on students of 250 sample and found that multimedia programme prepared by the researcher was more effective for the achievement in science of 9th class. Students learning through multimedia programme were found to be better than students through traditional method of teaching.

Ponraj and Sivakumar (2009) found the effectiveness of computer-assisted instruction in teaching Zoology in relation to learner’s personality. The sample consisted of 40 students in control group and 40 students in experimental group. It was found that achievement scores of experimental group were higher than control group.

Padmavathy (2011) studied the effectiveness of use of computer in teaching mathematics at high school level. Finding of the study showed that use of multimedia learning package in mathematics is helpful in improving the achievement of the students. The sample consisted of equal number of 40 students in control and experimental groups. The results revealed that there is no influence on the gender, locality of the school, computer
knowledge of the pupil and education qualification of the parents on the achievement of the students through multimedia learning package.

3.5 STUDIES RELATED TO ACTIVITY ORIENTED AND COMPUTER ASSISTED INSTRUCTION

Randolph (1984) investigated the relationship among cognitive style, achievement in science, selected personality variables and the gender of students on a sample of 300 students and found significant correlations among cognitive style and science achievement.

Dighal (1985) studied on improved method of teaching biological sciences in schools of Tripura and West Bengal. The sample consisted of 500 students of class IX from five schools, four in Tripura and one in West Bengal. The major findings of the study were that there was a significant difference in the effectiveness of ‘self activity method’, ‘life science, club method’, and ‘audio-visual method’. Preparation of charts and models, collection of specimens through local excursions, organization of science exhibitions by the students, arrangement of film shown by the school, and orientation programmes for life science teachers brought better results.

Gangoli and Gurumurthy (1985) studied on the comparative study of the effectiveness of open-ended approach of doing physics experiments versus traditional approach at higher secondary stage. The sample of the study consisted of 92 students (46 in each group) consisting of 66 boys and 26 girls selected from two colleges of Mysore city. It was concluded that the guided open-ended approach was superior to the traditional laboratory approach in developing the content matter and practical skills in physics. Though in general the development of creative abilities was shown to be independent of the approach, the development of the fluency aspect of creativity seemed to be enhanced by doing experiments in the open-ended way. It could also be concluded that the two approaches were not affected by the intelligence, SES, creativity level, and sex of the students.

Fritz (1985) reported that neither locus of control nor field-independence / dependence was related to academic achievement in sample of 200 gifted students.

Yore (1986) investigated the effect of lesson structure and cognitive style on science achievement of elementary school children with a sample of 150 students. His findings stated that high structured lesson resulted in higher achievement than low structured and field independent students achieved significantly higher science scores than field – independent students.
Agnihotri (1987) studied influence of some of the methods of teaching physics on the achievement in physics of class X students in Delhi. Two units of physics were taught according to the design by the investigator, the traditional method and lecture-demonstration method, programmed instruction and assignment-cum-discussion methods. A sample of 520 students of X grade was selected. The result revealed that the traditional method and the lecture-cum-demonstration method followed by the verification type of laboratory work was more effective than the assignment-cum-discussion method but this method was less effective than the programmed instruction method for the teaching of physics.

Lambhate (1987) studied development of instructional material for teachers teaching science to class VI in rural areas of M.P. A random sample of 12 middle schools was selected out of all the middle schools of Depalpur Tehsil. The findings of the study were the use of instructional material by the teachers of the experimental group contributed towards the improvement of the performance. Experimental group performed better on selection and organization of contents, use of proper scientific terminology, teaching aids and experimentation, and maintaining the classroom discipline by sustaining the attention with the help of instructional material.

Sushma (1987) compared three methods of teaching on attitude with a sample of 200 students and found that biological inquiry model was more effective than conventional teaching and concept attainment model was more effective than biological inquiry model. There no significant difference was found between the gain scores of attitude with biological science inquiry model based teaching and conventional teaching.

Chin, and Suen (1995) examined the outcomes of multiple choice tests and performance based assessments for field – independent and field – dependent students. Subjects were 102 undergraduates who completed home- assignments and tests of first year class students and found substantial interaction between cognitive style and assessment approach. Results suggest that performance –based assessment tended to favour field-independent.

Sherman (1999) studied on constructivist approach and traditional method and found that there was significant difference between the two groups of students on a sample of 500 students of 9th class. Constructivist approach was better with respect to traditional approach in their achievement of multiplication understanding and skills.

Deopuia (2000) a comparative study of teaching science through environmental and traditional approach in schools of Madhya Pradesh. A sample of, 50 schools having 500
students and 100 teachers were included at the primary level. At the middle level, the experimental group consisted of ten schools, 250 students and 40 teachers were taken. At the higher secondary level, 125 students and ten teachers from one school were taken. Finding of study were the students of primary schools of the experimental group showed considerable improvement towards environmental awareness. There was no significant difference between male and female teachers' attitudes towards the environmental approach and also toward the attitudes of teachers.

Muddu (2002) studied on the effectiveness of the use of motion pictures as aids in the teaching of biological sciences as compared to the usual methods. The sample of the study consisted of 60 students of class VIII of the age group 12-14 years. It was found that there was significant improvement in post- test performance over pretest performance in higher ranges of scores particularly in the case of the experimental group. The sound pictures helped to a great extent the above average students to comprehend the subject matter in biology.

Basantia and Panda (2010) examined the effect of multi-dimensional activity-based integrated approach (MAI) over traditional method of teaching (TMT) in developing creative abilities among elementary school children through subject. A sample of 52 students from class VI of multipurpose school and 60 students from class VI of Kendriya Vidyalaya, of Bhubaneswar city were taken. The results indicated that multi-dimensional activity-based integrated approach is a suitable approach for developing fluency and for flexibility ability but not for originality ability. The content area wise analysis of data indicated that multi-dimensional activity – based integrated approach was suitable for developing creative abilities in all content areas of history, geography and civics in social studies.

Pati and Behera (2011) studied the effect of activity-based learning approach on developing competency of reading comprehension in English. A sample of 30 students of class V was taken. It was found that pair work stimulated the learners to actively involve in the program and it helped to achieve the competencies and suitable selection of the text and its presentation in an activity-based learning approach; song, drama and role-play facilitated easy grasp of the contents.

Manoj and Devanathan (2011) studied the effectiveness of problem-based learning strategies on process skills in biology science in relation with scientific attitude. Problem-based learning is a student-centered instructional strategy in which students collaboratively solve problems and reflect on their experiences. A sample of 140 students...
was taken. Analysis of data showed that problem-based learning group students attained significantly higher scores than conventional group students for process skills. Process skills in biological science and scientific attitude were positively correlated and problem-based learning strategy has significant bearing on enhancing scientific attitude.

3.6 CONCLUSION
On the basis of the studies presented in this chapter it may be said that the conventional method of teaching different subjects at various levels was found to be less effective than various innovative teaching patterns like computer-assisted instructional strategy and activity-oriented instructional strategy of teaching in terms of achievements of students. Thorough review of the reported studies of related literature showed that though very serious work has been done in instructional strategies, leading to strategies of teaching, empirical studies with special reference to specific subjects but variables like academic achievement, scientific attitude and creativity taken with these strategies along areas are not seen. Even among them, one relating to science teaching is found to be none. Hence these surveys show the relevance of the research work taken by the investigator. The review of related studies throw light on the nature on work done in this area and help the investigator in designing the study, in formulating the objectives, selecting methods, tools and techniques of the present study.