CHAPTER II
CHAPTER - II

REVIEW OF RELATED LITERATURE

INTRODUCTION

Review of related literature helps the investigator at a large level to proceed in his study. The survey of related literature shows whether the evidence already available solves the problem adequately without further investigation and thus avoids the risks of duplication. It provides ideas, theories, explanations or hypotheses valuable in formulating the problem. It suggests methods of research appropriate to the problem, and located comparative data useful in the interpretation of results.

The literature pertaining to the study on "EFFECTIVENESS OF THE COMPUTER ASSISTED INSTRUCTION AND COOPERATIVE LEARNING IN BIOLOGY FOR STANDARD XI STUDENTS" is reviewed in this chapter under the following headings:

A. Recent Developments in Educational Technology
B. Studies on Self-Instructional Material
C. Studies Conducted in Video Programming
D. Studies Conducted in Biology through Modules
E. Studies Conducted in Computer Assisted Instruction
F. Studies on Co-Operative Learning
G. Studies on Computer Assisted Instruction and Co-operative Learning
H. Conventional Teaching
A. RECENT DEVELOPMENTS IN EDUCATIONAL TECHNOLOGY

Education has been undergoing a creative revolution and the teaching methods have moved from a predominantly teacher oriented and teacher controlled approach to teacher pupil interactive system. Such a system requires a number of changes in the instructional procedure and the material used for effective teaching and learning process. One should give importance to media of communication and recognise audio visual and demonstration materials as necessary to impart scientific knowledge to students.

Educational technology as an instrument can be used for both development in a narrow sense and for reconstruction in holistic sense. It is the designer of the system of educational technology which has to formulate the goals very specifically and then build the strategy to achieve those goals (Kulkarni, 1988).

Educational technology is also a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives, and employing a combination of human and technical resources to bring about more effective instruction. It is an area of study and practice concerned with all aspects of organisation of educational systems, subsystems and procedures whereby resources are allotted to achieve specified outcomes (Prakash and Gandhi, 1995).

B. STUDIES ON SELF-INSTRUCTIONAL MATERIAL

Mahalakshmi (1991) conducted a study on development and validation of self instructional module in polynomial for IX standard students. According to her, there was no significant difference between boys
and girls of IX standard in the achievement through self instructional module. There was significant difference between urban and rural area children as far as achievement were concerned.

Thaker (1994) in his study, effectiveness of linear and branching programmes taught Economics to class XI students and found that linear programme was more effective than the branching one, but branching programme was more effective for textbook materials.

Jayanthi Devi (1998) studied the development of self-instructional material in Biological Science for standard XI. She found that control group students and experimental group students differed significantly in their achievement scores of X standard general science. Significant difference was found in the scores of pretest between control and experimental group students. Control group students differed significantly with experimental group students in their post test scores. Control group and experimental group students of the above Q3 level did not differ significantly in the post test. Control group and experimental group did not differ significantly in their gain scores. Significant difference was found in the attainment of objectives, knowledge and application between control group and experimental group. Control group students and experimental group students did not differ in their attainment of understanding objective.

Maheswari (2002) conducted a study on “Teaching environmental issues to IX standard students through self-instructional module”. The findings indicated that control group and experimental group students differed significantly in their gain scores of quarterly exam. Control group and experimental group students differed significantly in their scores of pretest. Control group and experimental group students differed significantly
in their scores of post test. Significant difference was found in the score of control group students in the pretest and post test. Significant difference was found in the performance of the experimental group students in their post test than their pretest. No significant difference was found in the gain scores of the control and experimental group. Experimental group students had higher knowledge, understanding and application in the unit 'Chemicals and Environment'.

Kumar (2004) studied the effectiveness of self learning module in Mathematics in relation to class room environment. The findings indicated that there was significant difference in the mean achievement of group exposed to self learning material and group taught through traditional method of teaching. Class room environment affected significantly the mean achievement of the students. There was no significant interaction between the mode of teaching and the class room environment.

Sundarraj and Francisca (2005) made a study on effectiveness of self learning material for the teaching of the basic concepts of Accountancy. The objective of this study was to construct self learning material for teaching basic concepts of the subject Accountancy and to study the self learning method in comparison to traditional method of teaching of basic concepts of subject Accountancy in standard XI. The findings were that self learning material was more effective than lecture method in teaching of basic concepts of the subject Accountancy.

Dash (2005) conducted a study on gain in learning from face-to-face workshop over self-instructional material. The findings were that self learning materials (printed form) continued to be the mastery of any kind of distance learning programmes.
Kundaliya (2006) studied ‘the effectiveness of self learning material for the teaching of basic concepts of accountancy’. Objectives of the study were to construct the self learning material for the teaching of the basic concepts in the subject Accountancy for standard XI and to study the self learning method in comparison of traditional method for the teaching of the basic concepts in Accountancy for standard XI. The findings were that the self learning material was more effective than lecture method in teaching of basic concepts of the subject Accountancy in standard. – XI.

Nirmala (2006) studied ‘The Preparation of self-instructional material on environmental chemistry for standard XI students’. Her finding was that the self instructional material provided an enriched learning than the traditional method of teaching.

C. STUDIES CONDUCTED IN VIDEO PROGRAMMING

Basker (1990) studied the effectiveness of teaching social concepts to the working children through video method. The main findings of the study were teaching a social concept to the working children through video was more effective than teaching by traditional method. The male children learned more social concepts than the female children when they were taught by video method. There was no difference between male and female children in learning the social concepts when they were taught by traditional method.

Shah and Mandal (1993) made a study on effectiveness of three instructional strategies for higher education. Lecture cum live demonstration, video film and booklet were the strategies followed. They found that video film was the best strategy followed by lecture cum
demonstration and booklet methods. They suggested that video technology should be made more available to the educational instructions.

Rao and Rajaguru (1995) studied the effectiveness of video assisted instruction on the achievement of slow learners. They found that the slow learners of control and experimental groups were alike in immediate retention. But female slow learners of video assisted instruction group performed better in immediate retention than conventional learning group.

**D. STUDIES CONDUCTED IN BIOLOGY THROUGH MODULES**

Chelladurai (1994) conducted an experimental study on the impact of modular approach in developing environmental awareness among primary school students. He stated that there was significant difference between the pre-test and post-test scores of experimental group students. There was significant difference between the post-test scores of experimental group and control group. In environmental science impact could be achieved after modular experimentation to a considerable extent.

Reddy and Ramar (1995) undertook a study to assess the effectiveness of Computer Assisted Instruction in teaching science to slow learners. They stated that, the slow learners in the experimental group evidenced better mean gain than the control group slow learners. Also, they could narrow down the gap between the two groups of students. The narrowed down gap between both the groups may be ascribed to the effectiveness of Computer Assisted Instruction.

Thalamalai (1996) studied the effectiveness of multimedia based modular approach in teaching botany at higher secondary level. The study concluded that this multimedia based modular approach was more effective
than traditional lecture method in teaching botany to plus one students. This multimedia modular treatment was more effective to below average students, moderately effective to average students and not as significantly effective to above average students as it was to the students of the other two groups. The study also pointed out that concrete presentation of subject content, direct experience and learner’s involvement could be ensured in this approach.

Balasubramanian and Meera (2002) conducted a study on relative effectiveness of different modes of computer-based instruction in teaching biology. They found that Computer Assisted Instruction in drill and practice were more effective than the tutorial and simulation modes in teaching Biology at standard XI. More software packages can be developed for the whole syllabus which will help the students to learn at their own pace. The Computer Assisted Instruction package in Biology should be planned, developed evaluated and implemented with the help of a team of experts constituting curriculum planners, educational technologists, computer experts and Biology teachers. It will be helpful in the development of quality packages in the teaching and learning of Biology.

Hasenekoglu (2004) made a study to collect and evaluate opinions of Computer Assisted Instruction experts and biology teachers about a high school level Computer Assisted Biology Instructional Material presenting computer-made modeling and simulations. It was a case study with a material covering “Nucleic Acids and Protein Synthesis”. This topic was developed as the “case”. Having decided the material, expert opinions were sought for technical and teacher educational assessment. Research data were collected via: An Assessment Scale for Experts, An Assessment Scale for
Teachers and A Teacher Interview. Data on Assessment Scales were evaluated by determining percentage-frequencies and material proved adequate both in educational and structural point of view. Both qualifying and quantifying Teacher and Expert assessments about the software on “Nucleic Acids and Protein Synthesis” were positive.

Arora and Singh (2005) conducted a study on development and evaluation of self learning modules to enhance the traditional physiology class at CMC Ludhiana. The result indicated that self learning modules are an effective method of studying and reinforcing learning.

Nirmavathi and Gnanadevan (2008) conducted a study on effectiveness of multimedia programme in science. They found that there was no significant difference between the experimental group and control group in the achievement of science at pre test level. There was a significant difference between the experimental group and control group in the achievement of science at post test level. The students learning with the help of multimedia program fared better in science than the students learning through the conventional method. There was a significant difference between the Mean achievement test scores of the pre test and post test for the experimental group. This shows that the multimedia program has helped the students to score more marks in the post test.

E. STUDIES CONDUCTED IN COMPUTER ASSISTED INSTRUCTION

Nishino and Koki (1994) undertook an exploratory investigation to determine the effects of a multimedia computer-based science learning environment and gender differences, on achievement and attitudes and interests of students in an eighth-grade science classroom. The students in
the experimental classroom had a significantly higher post-test mean score in 'self concept' than the students in the traditional science classroom.

Reddy and Ramar (1994) studied the effectiveness of multimedia based modules in teaching social science to low achievers. The study concluded that the multimedia based modules enabled the experimental group low achievers to show a significantly higher performance in the post-test. While the rate of progress shown by the control group was 14.9 percent, the rate of progress experimental group low achievers was 70.3 percent. Though there existed a gulf of difference between the experimental group and the normal group in the pre-test, the gap was narrowed down to a very great extent by the experimental group low achievers in the post-test. It signifies that the multimedia based modular approach enabled the experimental group low achievers to cope with normal students to a considerable extent.

Michael (1994) made a comparison in the effectiveness of the delivery of an Interactive Computer-Assisted Instruction module to a traditional lecture/lab delivered module. This study examined the use of computer based multimedia interactive learning system to determine if the learning of a conceptual predictive technological concept was more effective with Interactive Computer Assisted Instruction (ICAI) or with Traditional Instruction (TI). Learners in the experimental group (ICAI) that scored or 37.3 per cent (19/51) on the pre-test had a significantly higher adjusted mean post-test score than learners in the control group.

Margaret and Robert (1995) studied Monitoring Computer-Based Collaborative Problem Solving. Their findings were that undergraduate students used an intelligent collaborative learning system with the Jigsaw
method of cooperative learning, and were monitored by the group leader as they developed algorithmic projects. Students thought that the system, although slow, was easy to use and useful for collaborative work.

Reddy and Ramar (1995) assessed the effectiveness of multimedia based modular approach in teaching of Maths to low achievers. Though the control group and experimental group low achievers were alike in the pre-test, the experimental group low achievers could surge far ahead of control group low achievers in the post-test. While the control group low achievers could not narrow down the gap that existed between them and the normal group students, the experimental group low achievers could narrow down the gap to a considerable extent due to multimedia modular treatment. This substantiates the advantage of multimedia based modular approach over traditional lecture method. In terms of progress and rate of progress, it is the experimental group low achievers who excelled the other two groups. It testifies to the effectiveness of multimedia based modules in teaching Maths to low achievers.

Rangaraj (1995) studied the effectiveness of Computer Assisted Instruction in teaching Physics at higher secondary level. He revealed that Computer Assisted Instruction as a support system was more effective than the conventional lecture method.

Nancy (1995) conducted a study on using Computer Assisted Instruction to teach Grammar through magazine writing to students in grades two and three. This study investigated whether using whole language, cooperative learning, Computer Assisted Instruction, or creating a magazine would help second and third grade students to learn punctuation skills. Results of the practicum indicated that integrating computers into classroom
magazine writing provided the correct environment for learning punctuation skills.

Araselvi (1996) conducted an experimental study to measure the effectiveness of educational audio and video cassettes in teaching mathematics. She found that both the strategies i.e., audio instruction and video instruction were more effective than the traditional lecture method. The video instruction was more effective than audio instruction in teaching mathematics to the students of class VIII.

Natarajan (1996) made a study on effectiveness of modular approach in learning English by the plus two higher secondary students. He stated that modular approach significantly improved the achievement of students after modular treatment. Sex has not influenced the performance of the boys and girls taught through modular approach. The boys and girls taught through modular approach showed better performance than the boys and girls taught through traditional lecture method.

Janakavalli (1996) in her study on the impact of multi-media approach in teaching environmental education at the secondary level concluded that the new concerns for the individual learner and the new ways of presenting information, using the appropriate media, especially multi-media would certainly help the teachers to create a conducive class room situation and an effective design for instruction.

Rajaguru (1999) reported that the multi-media instruction facilitated the learning disabled children to learn science concepts better than their counter parts in the conventional teaching group.
Vasanthamani (1996) studied the effectiveness of multi-media approach in teaching physics at the secondary level. The pre test achievement score was not significant between the pupils of urban and rural locality but there was significant difference at 0.01 levels between girls and boys.

Reddy and Ramar (1997) assessed the effectiveness of multimedia based modular approach in teaching English to slow learners. The study found this strategy to be effective in teaching English to the slow learners. This approach had a positive impact on the retention of slow learners. They also suggested how this strategy could be boosting up the achievement of slow learners so as to diminish wastage and stagnation in our schools. Further, they have described how this approach can be used so as to reach out to all the students.

Ramesh (1998) studied the individualized instruction as an alternative strategy in development of cognitive skills in atomic physics among the students of X. The results showed that programmed instruction and Computer Assisted Instruction groups gained more in cognitive skills than conventional teaching group.

Rani (1998) developed computer aided module for problem solving in algebra for XI Standard students. The study revealed that there was a significant difference in achievement of the students between the pre-test and post-test. There was significant difference among the low achievers in following the computer instructions. There was no difference between the high and low achievers in following the computer aided instructions. There was significant difference between the problem solving ability of boys and girls.
Kadhiravan (2000) studied the effectiveness of computer assisted instruction in relation to student’s use of self-regulated learning strategies. Among the different instructional strategies viz., lecture method, Computer Assisted Instruction and Computer Assisted Instruction with Peer Interaction, it was found that Computer Assisted Instruction with Peer Interaction is the most effective strategy and the lecture method is the least effective one in realizing the instructional objectives in physics and influencing the student’s use of self regulated learning strategies. Computer Assisted Instruction stands between the other two strategies in these respects.

Meera (2000) studied the relative effectiveness among different modes of computer assisted instruction in relation to students’ personality traits in realizing the instructional objectives in teaching biology at higher secondary stage. The study revealed that Computer Assisted Instruction was found to be more effective than traditional lecture method. She concluded that Computer Assisted instruction in drill and practice mode was more effective when compared to that of tutorial and simulation modes.

According to Varghese, (2001) Computer Assisted Teaching was found to be significantly useful in teaching as well as learning English grammar.

Amsaveni and Gopalakrishnan (2001) undertook a study on preparation of instructional module for environmental education at primary level. The study was carried out in three stages. The first stage was the pre test, and the second stage was the experimental stage and the third stage was the post test stage. There was a significant difference at all levels of achievement of pupils due to the change in the methodology of teaching.
This was due to the effectiveness of teaching through instructional module. The study concluded that multimedia is more effective than the conventional method.

According to Helen Joy (2001) for effective History teaching, various diagrams, simulation, map drawing and graphical representation are needed in the classroom and these can be effectively taught using the computer. Advanced technology like computers and internet are being used at various levels to improve learning because of its inherent capabilities.

Rangarajan and Ilangovan (2001) found the effectiveness of Computer Assisted Teaching in teaching social sciences at the primary level. Comparing lecture method and computer assisted teaching; they found the computer assisted teaching to be more effective in teaching lunar and solar eclipse.

Balasubramanian and Rangaraj (2002) conducted a study on development and validation of syllabus oriented, computer-based instructional package in teaching physics. It was found that more than 90 percent of the features as identified and stated in the proforma were reported to be ‘good’ by most of the evaluators. Less than 10 percent of the features alone were reported to be ‘adaptable’. It is hard to see that none of the features was reported to be ‘No’. Hence, it is evident that the software packages developed for the study are quite good.

Annakodi (2002) proved that multi-media, programmed learning and cooperative learning could be used as effective strategies for teaching nutrition and health. It is concluded that for individual learning, new ways of presenting information using appropriate media, would certainly help the
teachers create a conducive classroom situation and an effective design for instruction leading to effective learning.

Vasanthi and Hema (2003) strongly advocated the need to develop a number of learning modules on various subjects for the technological training students and to give special training to teachers for developing computer assisted teaching modules.

According to Helen Joy and Manickam (2002), many teachers were of the opinion that computer assisted teaching is meant for teaching of science and does not have a significant role in teaching subjects in humanities.

Vaishnav (2005) studied on the effectiveness of Computer Assisted Instruction for teaching biology. The objectives were to develop Computer Assisted Instruction in biology on topic “Food, Nutrition and Health” and study its effectiveness in terms of achievements of students and to compare the achievement mean scores of students studying through Computer Assisted Instruction and traditional method by considering intelligence as covariate. He found that the Computer Aided Instructional material was found to be effective in terms of the Achievement of students. The Computer Aided Instructional material was found to be superior to the traditional method when intelligence was taken as covariate.

Dange and Wahab (2006) studied the effectiveness of Computer Assisted Instruction on the academic achievement of IX standard students in Physical science. Their findings showed that there was no significant difference between mean gains scores of experimental and control group of pre test. There was no significant difference between mean gain scores of pre test and post test of control group and experimental group. There was no
significant difference between mean gain scores of post test of control and experimental groups.

Manivannan (2006) studied the Attitude of Teachers and Disabled Graduates towards the computer application in teaching learning process. He indicated that there was no significant difference between the attitude of teachers and disabled graduates towards the application of computers in teaching and learning process. There was no significant difference between the male and female teachers with regard to the computer application for the learning of disabled persons. There was no significant difference between the rural and urban teachers with regard to the computer application for the learning of disabled persons. There was significant difference between the attitude of visually impaired graduates and locomotor disabled graduates regarding computer application.

Vinod Kumar (2006) observed the relative effectiveness of Power Point Assisted Instruction and the traditional method of teaching with reference to the topic ‘National Income’ in the syllabus prescribed for the higher secondary level in TamilNadu. The author details how the Power Point slides were prepared. The pre test and post test equivalent group experimental design was adopted. It was found that the Power Point Assisted Instruction makes for higher scores compared to the traditional method. There is no gender difference in learning through the Power Point Assisted Method or the traditional method.

Nirmavathi and Gnanadevan (2007) studied the impact of multimedia for the development of a favorable attitude towards science. Their findings indicated that there was no significant difference between the experimental group and control group in their attitude towards science at the pre test.
There was a significant difference between the experimental group and control group in their attitude towards science at the post test. The students learning with the help of multimedia programmes will increase the favorable attitude towards science than the students learning through the conventional method. There was a significant difference between the mean attitude towards science scores of the pre test and post test for the experimental group. The higher mean value in the post test shows that the attitude of students towards science is more favourable in the post test than in the pre test. It further shows that the multimedia programme has helped the students to develop a positive attitude towards science. There is no significant difference between the mean attitude towards science scores of the pre test and post test for the control group.

Parasakthi (2007) studied the Preparation and Validation of a Learning Module on Cancer Biology Unit in XI Standard Syllabus and proved that learning module can be developed on Cancer Biology Unit with high effectiveness for XI Standard Students. She found that Learning Modules are effective supplementary aids to students learning.

Annakodi (2008) found that teaching through instructional package was almost equally effective in all the schools irrespective of school types. There was no significant difference between the achievement of boys and girls. The recommendations are that the teachers are to be encouraged to make use of innovative techniques in teaching, facilities such as tape recorder, radio and multi package are to be provided to the teachers in rural areas, pupils are to be encouraged to listen to the radio and television programmes related to environment and involved in quiz programme and in-service programmes are to be arranged for intensive training of the teachers in environmental education.
Babu and Vimala (2008) examined the impact of multimedia method in accountancy learning at higher secondary level. Their findings revealed that there was no significant difference between the pre test and post test errors of experimental group of aided school students with respect to the remediation in multimedia. It was also found that remedial programme have decreased the error level in post test when compared to pre test. The effect of remediation through multimedia method played a positive role in minimizing the errors in Accountancy Learning at higher secondary level.

Kannan and Husain (2008) conducted a study on effectiveness of the use of computer technology in teaching the concepts of physics at senior secondary level. From the analysis of data they found that the computer assisted teaching is the best method to teach the concepts of physics at senior secondary level. There is no much profitable learning by the students of physics without the aid of the teacher or by the traditional method of teaching physics.

Benjamin and Sivakumar (2008) studied interactive multimedia CD based learning in physics. Their findings were that the interactive multimedia CD based learning is found to be effective. The performance of the learners in the experimental group in the post test is better than that of pre-test performance. The mean scores of the post tests of the experimental group are higher than that of the control group, indicating significant difference at 0.05 level. The supremacy of the interactive multimedia CD based learning courseware was established over the conventional method of instruction.

Ponraj and Nellaiyapen (2008) conducted a study on CAI in Teaching zoology and found that experimental method of teaching is more effective
than the traditional method of teaching the topics Nucleus in zoology. In other words teaching the topic Nucleus in zoology by using CAI is more effective. There is no significant difference between the control group and experimental group in the pre-test. But in the post-test the experimental group performed better than the control group. From the findings it is clear that there is significant difference between the variables such as boys and girls, rural and urban area students. There is no significant difference between the achievement scores of hostel and day scholar students with regard to CAI in teaching the topic Nucleus in zoology.

Sujatha and Gowri (2008) observed the effectiveness of modular packages in teaching biology. They found that the learning module on genetics had produced significant higher mean achievement in IX standard students. So, it shows the effectiveness of modular package in learning genetics.

**F. STUDIES ON COOPERATIVE LEARNING**

The cooperative learning advocated by the NCERT (1993) takes into account all the vital points in the teaching-learning situation. In order to study the efficacy of cooperative learning, action research projects were assigned to institutions dealing with general education as well as special education. The institutions selected for this purpose varied from special schools to colleges of education and universities involved in teacher preparation programmes. In some cases cooperative learning was introduced as a teaching approach, whereas, some colleges of education introduced this approach as a training technique.

Cooperative learning is one of the recent innovations in education which can be applied in teacher education too, and could work well in
teaching at all stages of learning and it can be used as a training technique as well as a teaching technique (Mani and Muthaiah, 1993).

Thirunavukarsu (1996) studied the effectiveness of co-operative learning strategy in enhancing achievement of VIII standard students in social science. He indicated that the performance of control group in post test was better than the pre test. It was revealed from the comparison of the general performance of the control group and experimental group in the post tests that there was significant difference in their mean difference. There was no difference between the pre-test and post-test means of the control group. In both tests the performance of female was better than the performance of male students. In the pre-test the performance of female was better than the male. In the post test mean difference between male and female was negligible.

Sasidharan and Hameed (1997) found in their study, when small cooperative groups are formed and utilized for learning, it can be found that almost all the students take part in the activity for achieving the common goal.

Johnson and Smith (1998) say that co-operative learning is an instructional paradigm in which students work on structural tasks in face to face interaction, inter dependence individual accountability and appropriate use of collaborative skills.

Johnson and Johnson (1999) experimented with “Learning Together” They have found that it is a pure cooperative learning method. Members of groups work together towards certain shared learning goals. They help each other and become familiar with the topic and issues introduced by the teacher. Cooperative interaction is found to be present to a great extent.
Johnson (2000) found that all eight cooperative learning methods had a significant positive impact on student achievement. When the impact of cooperative learning was compared with competitive learning, Learning Together promoted the greatest effect, followed by Academic Controversy, Student-Team-Achievement-Divisions, Teams-Games-Tournaments, Group Investigation, Jigsaw, Teams-Assisted-Individualization, and finally Cooperative Integrated Reading and Composition. When the impact of cooperative lessons was compared with individualistic learning, Learning Together promotes the greatest effect than the other methods. The consistency of the results and the diversity of the cooperative learning methods provide strong validation for its effectiveness.

Veenman et al., (2000) examined teachers' use and evaluation of cooperative learning along with pupils' reactions to cooperative grouping and the quality of the group cooperation in a sample of Dutch Primary School Teachers who implemented cooperative learning methods. Observations showed the time-on-task levels of the pupils working in groups to be high, but effective learning and cooperation not to be promoted. The teachers devoted little time to the teaching of group work skills. In general, the implementation of cooperative grouping was found to lack the features recommended in the literature for effective cooperative learning.

Krishnaraj and Kalaiyarasan (2002) conducted a study on effectiveness of cooperative learning approaches in learning science at secondary level. They reached the conclusion that the application of cooperative learning not only helps in achieving excellence, but also in achieving good interpersonal relationship and high self-esteem of learners.
Henry (2003) conducted a study to investigate the effectiveness of cooperative learning techniques combined with case study on nursing students' self-perception of problem-solving and decision making skills in comparison with other teaching-learning methods. The results of the study showed that the experimental group obtained scores indicating somewhat better self-perception of both problem-solving and decision making skills.

Kramarski (2003) studied enhancing mathematical reasoning in the classroom. The purpose of this study was to investigate the effects of four instructional methods on students' mathematical reasoning and meta cognitive knowledge. The instructional methods were cooperative learning combined with meta cognitive training, individualized learning combined with meta cognitive training, cooperative learning without meta cognitive training, and individualized learning without meta cognitive training. Results showed that the cooperative learning combined with meta cognitive training group significantly outperformed the individualized learning without meta cognitive training group, which in turn significantly outperformed the cooperative learning and individualized learning groups on graph interpretation and various aspects of mathematical explanations.

Gillies (2004) investigated the effects of cooperative learning on junior high school students who worked in structured or unstructured cooperative groups. The results showed that the children in the structured groups were more willing to work with others on the assigned tasks and they provided more elaborate help and assistance to each other than their peers in the unstructured groups.

Hancock (2004) studied cooperative learning and peer orientation effects on motivation and achievement. Students with high and low peer
orientation were exposed to cooperative-learning instruction that involved face-to-face promotive interaction, positive interdependence, individual accountability enforced by group members, collaborative skills, and group processing. At the end of the course, the students' achievement and motivation levels were assessed. Differences in the achievement of students with high and low peer orientation were not statistically significant. However, students with high peer orientation were significantly more motivated to learn than were students with low peer orientation.

Beck et al., (2005) studied a set of cooperative learning exercises which were designed for use in a Java-based CS1 course. The exercises used specific roles to focus students' attention on key concepts of the Java language, and on key mental processes of programming and problem solving. A controlled experiment was conducted to evaluate the effectiveness of this approach. The results showed that the cooperative learning experience had a significant positive effect on student performance, and may have been of special benefit to women and minority students.

Siegel (2005) used qualitative research methods to explore an 8th-grade mathematics teachers' personal definition of cooperative learning and the enactment of cooperative learning in his classroom according to that definition. Results revealed that while the teacher implemented a research-based model of cooperative-learning instruction, he adapted the model for use in his classroom. Results also identified the teachers' prior experience and teaching context as factors that influenced his implementation of cooperative-learning instruction.
Preston (2005) observes that pair programming is a form of collaborative learning; the pair works together to achieve a common goal. Recent research has clearly documented the benefits of pair programming on student performance. Collaborative learning research has established two things: (i) the effectiveness of having students work together and, (ii) the critical attributes common to successful collaborative learning approaches.

Gillies and Robyn (2006) conducted a study on Teachers' and students' verbal behaviours during cooperative and small-group learning. The results showed that teachers who implement cooperative learning in their classrooms engage in more mediated-learning interactions and make fewer disciplinary comments than teachers who implement group work only. They concluded that when teachers implement cooperative learning, their verbal behaviour is affected by the organizational structure of the classroom.

Thangarajathi (2006) studied cooperative learning approach in learning mathematics. She stated that the students perform well when taught through cooperative learning approach. The performance of high, average and low achievers differed when taught through the conventional method. The performance of high, average and low achievers were equal when taught through cooperative learning approach.

Hijzen's (2006) study examined the relationships between the quality of cooperative learning and students' goal preferences and perceptions of contextual factors in the classroom. The study focused on four different types of goals: social support, belongingness, mastery, and superiority goals. It was found that social support goals had the strongest relation with the quality of cooperative learning. Female students' preferences for mastery and social goals were stronger than those of male students, whereas male
students had a stronger preference for superiority goals. Program types functioned as a moderator variable within the relation of students' superiority/individuality goals and the quality of cooperative learning.

Arulraj (2007) conducted a study of the effect of cooperative learning on the achievement of B.Ed. students. His findings revealed that there was significant improvement in the educational philosophy scores of rural and urban students. There was significant difference in the achievement of arts and science group students and also the UG and PG students. There was no significant difference in the gain scores of men and women B.Ed. students. The rural students performed better than the urban students.

Gillies and Robyn (2008) investigated the effects of structured and unstructured cooperating groups on students' behaviors, discourse and learning in junior high school. The results indicated that the students in structured cooperating groups demonstrated more cooperative and helping behaviors such as giving more elaborated help and guided directions to assist understanding than their peers in the unstructured groups. Moreover, they demonstrated more complex thinking and problem-solving skills both in their discourse and their responses on the follow-up learning probe. These findings are discussed in the context of the importance of structuring cooperative learning experiences if students are to attain the benefits widely attributed to this approach to learning.

Law (2008) conducted a study to investigate the effects of cooperative learning on second-graders' motivation and learning from text. The results revealed a statistically significant difference between the two groups, with more favorable perceptions of teachers' instructional practices and better
reading comprehension in the instructional intervention groups than in the traditional instruction groups.

In another study by Law (2008), 51 second-graders participated in the instructional intervention programme. The results showed that students' positive cooperative behaviour and attitudes were related to their motivation and reading comprehension.

G. STUDIES ON COMPUTER ASSISTED INSTRUCTION AND COOPERATIVE LEARNING

Simon (1992) studied cooperative learning and computer-based instruction and examined the origins of small-group learning to distinguish cooperative learning from computer-based instruction. Highlights include assessing the effects of cooperative learning, including cognitive effects; designing effective software for cooperative groups, including accountability, interdependence, interaction, ability grouping, age, collaborative skills, and group processing; and recommendations for future research.

Mary (1993) conducted a study on cooperative learning and computers in social studies integrating special needs students into general education classrooms. Combining cooperative-learning techniques with computer-assisted instruction was an effective way of integrating special needs students into regular social studies classes. It also discusses the type of software and instructional strategies necessary for appropriate implementation of this approach.

Susan (1994) studied operative computer learning with cooperative task and reward structures three treatments were conducted with 57
computer-assisted design students: students worked individually as instructors presented new commands, a second group worked cooperatively and a third combined individual and cooperative approaches. No significant differences were found in achievement or attitudes. Cooperative learning may enable more efficient use of computers. Its success may be linked to students' level of grade motivation.

Patricia (1994) studied computer technology and collaborative learning. The principles underlying development of software for computer-based instruction and collaborative learning are examined, and it is concluded that although traditional software and hardware originate from traditions of individual learning, software designed to aid in collaborative learning originates from conceptualizations of group learning.

Xin (1996) studied on computer-assisted cooperative learning in an inclusive classroom. Outcome measures indicated an improvement in mathematics achievement of 23 percent for general education students and 38 percent for special education students. Students reported that they enjoyed working with partners and teams and developed more positive attitudes toward mathematics.

Ramakrishnan (1996) studied the effectiveness of various instructional strategies on achievement in science and interaction of high school students in Coimbatore. He stated that the achievement of the students differed to a great extent on the basis of the nature of instructional strategy. No significant difference could be noticed between the achieving patterns of students on the basis of standards. The achievement scores indicated that there was no significant interaction between the instructional strategy and standards.
Sangeeta (2004) studied the role of multimedia and cooperative learning in enhancing the writing competence of students and he found that the use of multimedia has been found to be quite effective in improving the writing composition ability of the students. The results revealed that the experimental groups I & II i.e. who were provided treatment using cooperative learning and multimedia learning respectively did not differ significantly in their performance with regard to writing composition.

Aruna (2005) studied the effectiveness of multimedia and cooperative learning strategies at secondary level. Her findings revealed that there was no significant difference between the mean gain scores of control group, experimental group I and II, in government and private school students, urban and rural students and boys and girls. There was significant difference between the mean gain scores of traditional, multimedia and cooperative learning groups. Her findings also revealed that though multimedia process is effective, the effectiveness of cooperative learning approach is highly significant.

H. CONVENTIONAL TEACHING

Joseph (1996) stated that the name conventional teaching itself explains the procedure. The teacher talks while the students listen. In the classroom teaching, conventional method dominates to a very great extent. The reason for this is that teachers have been using this method for years and it is very convenient for the teacher as no practical preparation is needed for it. The teacher is the only active participant in the teaching-learning process and students are passive listeners. They are spoon fed and their powers of observation and reasoning, the exercise which is essential in the learning process, are not stimulated at all. The method pre-supposes a class of
intelligent pupils who can understand and grasp the lecture with the same speed as they are delivered by the teacher.

The conventional pattern of education is undergoing radical revision. The harnessing of modern technology to education is giving way to a more flexible and functional arrangement. In the present context the basic process of learning is slowly being altered by new ideas about how students acquire knowledge and understanding. Special techniques have been designed to improve teaching-learning process.

This comprehensive review of related literature is followed by the methodology of the study in Chapter III.