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CHAPTER - III

REVIEW OF RELATED LITERATURE

INTRODUCTION

It is essential for an investigator to know thoroughly the procedures to be followed in his research and proper understanding of the problem to find out the suitable solutions. Such an understanding is possible only when the investigator himself gets familiarised with the related literature. So before proceeding an investigation it is very essential for a researcher to make a survey of the studies made earlier, which are related to the topic on hand.

It is sure that the experienced researcher will understand the research problem with the contributions of the previous investigators. Though the search for the reference material is a time consuming one, it is a fruitful phase of research programme. This search provides further orientation to the problem, and at the same time, eliminates the possibility of unnecessary duplication of matter.

A survey of literature aims at serving the following purposes.

1. To show whether the evidence already available solves the problem adequately without further investigation and thus to avoid the risk of duplication.

2. To create ideas, theories, explanations or hypotheses valuable in formulating the problem.

3. To suggest methods of research most suitable to the problem.

4. To locate comparative data useful in the interpretation of results.
In order to obtain conceptual clarity of the variables involved in the study and to formulate needed hypotheses for the study, an attempt was made to survey a number of publications like research journals, books, periodicals, magazines and Encyclopedias. The research studies reviewed were the investigations carried out in India and abroad.

STUDIES ON COMPUTER ASSISTED INSTRUCTION

Studies done on Computer Assisted Instruction are reviewed as follows.

Alan Dale (1987) used an authoring system to develop an interactive Computer Assisted Instructional (CAI) lesson on the fundamentals of photographic exposure. A printout of the program was included in this study. The printout revealed the content, structure and the logic used in the program. A user's guide was also written to assist the students.

Jessie Hahn (1987) investigated the effects of varying the stimulus complexity in computer graphics and students prediction of graphed concepts on achievement. It was found that students who viewed the evolving graphics scored one point higher than students who viewed the static graphic. Students who predicted graphed concept scored three points higher than students who did not predict.

Concetta Charmaine (1987) studied the effects of Computer Assisted Instruction program on peer acceptance, teacher acceptance and self-concept of mainstreamed mildly handicapped students. It was found that one significant difference existed between the experimental group and control group on the Piers Harris subscale for physical appearance and attributes. Though a significant difference was found, the CAI group scored lower than the non CAI group.
Paul McDonald (1987) investigated the effect of mode of Computer Assisted Instruction (CAI) and individual learning differences on the understanding of science concept relationships. The results showed that the tutorial treatment was superior to the simulation for developing concept relationships on the achievement test and the concept web.

Kawesa (1987) studied the effects of Computer Assisted Cooperative learning on the science achievement and retention and attitudes of American Indian students. Results revealed that Computer Assisted individualistic learning was better than Computer Assisted Cooperative learning in improving student’s science achievement and retention.

Lee (1987) made an attempt to find out whether factors like age, gender and reading ability might contribute to the success or failure of students using the computer assisted instruction system. The results indicated that no significant difference was found to exist between the mean of final basic mathematics grades of the students receiving computer assisted instruction and the students receiving traditional lecture-text book instruction. There was no significant difference found between the final grades of students in selected age groups.

James Clifford (1987) compared the effectiveness of Computer Assisted Instruction (CAI) in terms of academic achievement and learning retention. Results indicated that there were no significant differences found between chapter I and conventional chapter I instruction test scores for academic achievement and learning retention.

Hugh (1987) investigated the effects of computer assisted instruction on the academic gains of students. The data showed that the students
receiving direct CAI had significantly higher academic gains in both reading and singing when compared to students in the control group who were taught without the benefit of computers.

**Deltrate Judith (1987)** studied the computer literacy backgrounds of teachers of secondary schools and determine whether there were significant relationships between teacher’s computer literacy backgrounds and their use of computers in the classroom. Results indicated that teachers in the sample had positive attitudes towards computers. Teachers felt that computers could help them do better, should be used in almost all subjects area and could make learning more interesting for students. Teachers who had previous experience on computers were more likely to utilise computers in their programe.

**Planiappan (1988)** investigated the effectiveness of CAI on mathematics learning. The result indicated that the group which was exposed to CAI performed significantly better.

**Nancy (1988)** studied the relationship between student learning style and computer assisted instruction on Pharmacology mathematics. The findings revealed that there were no significant differences in the proficiency of baccalaureate nursing students taught pharmacology mathematics and modified mastery and compared to those taught by CAI and modified mastery.

**Lowery (1988)** compared the two teaching strategies viz. Computer assisted instruction (CAI) and traditional lecture discussion (TID) and found the relationships among student achievement, cognitive styles and teaching strategies. He identified that CAI proved mastery of course content
regardless of student's cognitive styles. It saved time for student and the faculty. It was also found that there was interaction between cognitive styles and teaching strategies.

Anne Julie (1988) studied that the computer graphic instruction would be more efficient than other instructional modalities. The effective subject area were: geometry, physics, chemistry and health education. The higher level learning tasks obtained mostly from the graphic-enhanced instruction.

Charlotte Jan Roberson (1988) investigated the effect of CAI for enhancing reading vocabulary performance of first and second grade students in an urban school. This study revealed that computer assisted instruction is accepted to primary grade students, is an effective tool for individualised drill and practice and has the potential to be a useful adjunct to classroom reading instruction.

Robert James (1988) compared four sections of the college algebra course at the University of North Carolina at Greensboro during the spring 1988 semester. The results established that the four classes were comparable in prior knowledge of the topics selected for the study. There was no significant difference in mean scores between the control and experimental classes for each instructor on either the post test or the delayed post test.

Jonathan Jay (1989) studied the effects of two computer programs, developed to enhance decoding ability, on the long-term reading performance of learning disability students. Findings indicated that the computer-guided practice led to significant gains in decoding accuracy and efficiency but these gains did not translate into broader enhancement of reading performance.
Clandia Jean (1989) investigated whether geometry students with selected learning style indicators achieve better than others in classes with supplemental CAI, regardless of displacement. It was concluded that (i) students in honours level geometry classes with supplemental CAI show significant achievement differences compared to students in regular classes, (ii) variables maximising predictability in post test achievement were honours placement, pretest achievement and spatial skill.

Olive Westrey (1989) studied the impact of computer assisted instruction upon student achievement in an elementary computer science magnet school. The results revealed that science subtest yielded a statistically significant difference in student achievement favouring the control group whose curriculum included no special focus. The analysis of the other five subtests yielded no statistically significant difference in the three groups.

David Carol (1989) investigated the effects of one to one and small group methods of formative evaluation of micro computer courseware on learner post test scores after using CAI packages. The results revealed a significant difference in learner post test scores on the CAI products revised using the two methods of formative evaluation over the original version. There was no significant difference between post test scores of CAI products revised based on one-to-one or small group method of formative evaluation.

Radha Ravi (1989) developed curricular materials to teach the limit concept using the computer as a tool in senior high school and to examine effect of using the computer in teaching this concept. Observations of student’s performance in this study indicated that all the instructional goals
were achieved with most students. The use of the computers were found to be more beneficial to the weaker students.

**Philip (1989)** investigated the patterns of peer interaction that take place when students work cooperatively in small groups within a computer based learning environment. The results indicated that the students tempted to interact quite frequently with their group members; further more, their interactions were mostly task-related, collaborative and positive.

**Judy Boswell (1990)** investigated the effects of computer assisted biofeedback on the Electro Magneto Graphic (EMG) activity and on the on-task behaviour of three children with Attention Deficit Dis order (ADD) employing alternating treatment design. The findings of the study showed that ADD children can be made to relax through the use of computer assisted EMG biofeedback. The results indicated that those children learned to relax quickly and the effects were lasting for some time after the biofeedback session.

**Gail Renee (1990)** studied to examine the effect of computer education on student's achievement, attitude and self-esteem. The main result of the study indicated that there were no sex-related differences in achievement, attitude and personality characteristics.

**Godwin Oboh (1990)** investigated the need for computer literacy education in the secondary schools of Nigeria. The findings of this study indicated high computer awareness but low computer experiences among the respondents. The educational administrators and the managers of business showed a stronger tendency to promote computer literacy education in contrast to the secondary school teachers.
Li-Li (1990) studied the computer attitudes, experiences, and notions of Chinese students. Chinese students who majored in education programmes had more anxiety, less confidence and liking in using computers, and perceived less usefulness of computers. Prior computer experience, exposure to computers, unfamiliarity with computer system, software, Jargon and Chinese thinking style all affected their attitude towards computers.

Alice Whipple (1990) studied the relationship between computer use in instruction and increased academic achievement. It was found that more than five hours of training of teachers in the use of computers in instruction is a significant indicator of increased academic achievement of computer-use by elementary school students.

Barbara Clinton (1991) analysed the effect of forty hours of computer-based review in basic mathematics and reading skills upon basic skills of under prepared college students. An attitudinal survey administered to subjects in the first two groups. The conclusion of the study indicated that the subjects enjoyed using the computer courseware were found it useful; however, the responses were stronger for the mathematics component than for the reading component.

Delvin (1991) studied the sex role self-concept and attitude towards computers. The aim of the study was to determine the extent to which attitudes towards computers (i.e. anxiety, confidence, liking and usefulness) and sex role variables (i.e. masculine and feminine) might explain this bias among high school students. The results indicated that attitude and sex role variables could be used to differentiate the type of
computer users. It was found that male programmers tend to have more positive attitude than their counterparts and female programmers tend to balance both masculine and feminine attributes.

Hung Jen (1991) studied about the current status of computer use and the existence of computer networks used in secondary school's industrial education. The results showed the differences between current and ideal numbers of computers and network equipment in secondary schools.

Ann Teresa (1991) studied whether pairs of students, each seated at a computer, could learn as effectively and efficiently as could individuals who had his or her own individual computers. A t-test showed 5% significance for greater achievement scores for the paired versus individual treatment. An analysis of variance did not find an Aptitude Treatment Interaction between learning style and cooperative pairing.

Judith Body (1991) investigated the effects of integrating two forms of computers-based education on overall mathematics achievement, attitude towards mathematics and attitude towards computer-based education. The results showed that varying the instructional method resulted in no significant difference in overall mathematics achievement. The computer tool group scored significantly higher in the conceptual achievement and the control group scored significantly higher in computational achievement. The computer tool group showed a significantly more positive attitude towards mathematics after the treatment.

Robert (1991) investigated the effects of the process of note taking during computer-delivered instruction by examining two methods of note
taking during computerized instruction and the resulting on learner achievement. The result of the study showed that the learners who created their own notes during computer-delivered instruction experienced a significantly higher level of achievement than learners who captured notes on both immediate and delayed post tests.

Yong-Chill (1991) studied the relationship between the level of self-regulatory skills and the type of instructional control in a computer-based instruction. The results revealed that the learner control group was more affected by the level of student's self-regulatory skills than the programme control group. In program control, no effects were found between students with low and high self-regulatory skills. Students with high self-regulatory skills under learner control tended not only to learn more but also to take less time to complete the lesson than did those under programme control.

Serie (1991) identified the circuler status of implementation of Computer Assisted Instruction (CAI) in Korean secondary schools in relation to teacher's attitude towards computers and using computers. The results revealed that the teachers with higher level of CAI implementation showed more positive attitudes towards computers and using computers. Sex was found to be significantly related to teachers' computer anxiety and computer confidence. Further the results indicated that there was a significant difference in teachers' computer anxiety, computer confidence and their computer liking related to the amount of previous computer experience, the quantum of support and encouragement from the head of the institutions of administrators and student's parents and the available communication channels.
Rebecca Ann (1991) investigated the factors that were associated with computer utilisation for education. The results of the study revealed that characteristics of students such as anxiety, primary language and severity of handicaps and the teacher characteristics such as age, years of experience and preferred teaching methods along with the characteristics such as size and location are not significantly associated with the utilization of computerised resource specialist programs.

Krisana (1991) investigated the colour preferences of Thai and American students for text and background computer colour combinations. No significant differences were found in the colour preferences among age groups of Thai students. The Thai and American student's computer colour combination preferences were identical. White text with blue background was the preferred colour combination. The students also preferred white, yellow and green text with black background and black text with yellow background. White text with blue background should be used on computer screens or Video display terminals to present information in the form of text.

Tsai (1992) conducted a study to find out the effects of different systems of positive reinforcement on computer-based learning. It was found that computer-based learning of this type made be effective in improving the achievement of the student. It was also found that the positive reinforcement need not be provided for every correct response. Further it was also suggested that software designers should stress the quality of instructional content rather than entertaining the student.

Ko, Chih-En (1992) conducted a study to find out the interactive effects of timing of feedback and learner's prior knowledge of the achievement
and retention of a computer-based mathematical work. The result of the study was stated that the immediate feedback was superior to delayed feedback for immediate achievement but not delayed retention.

Ming (1993) studied how programming languages were introduced in CAI textbooks from 1979 to 1993. Logo was the most introduced language frequently among the eight programming languages included in CAI text books. Basic was secondly used. The number of pages used to present BASIC language was reduced and the inclusion of programming languages was also decreased.

Robert James (1993) investigated the attitudes of Special Education teachers toward the use of Computer Assisted Instruction. The conclusion stated that over 90% of the participants had positive attitudes toward CAI and computer technology.

Bosede Oluremi (1994) investigated how a group of professors perceive computer use in their teaching and its impact on teaching and learning. The major findings of this study are as follows: Computer use among the professors studied is idiosyncratic, influenced by personal and institutional factors. Positive changes were taken place as a result of computer use. Computer education offers opportunity to redefine educational goals. Computers cannot replace the teacher in the class room.

Mary Ann (1994) studied whether an instructional strategy that combines computer assisted instruction, computer mediated lecture and instructor modelling would be effective for facilitating the integration of computers into instructional programs. Results indicated that the experimental
group obtained higher scores on the achievement test when CAI was employed.

**Mahajan (1994)** conducted a study to find out the effectiveness of CAI for teaching singular and plural at II grade. A comparison between traditional lecture method and CAI was done. It was found that the CAI was effective for teaching singular and plural as compared to traditional method.

**Balasubramanian (1995)** made an investigation to find out the cognitive attainment of pupils in computer education specifically in computer literacy, range of computer applications and computer programming. The findings stated that pupils studying in the higher standard have more computer literacy and higher cognitive attainment in computer applications when compared to those studying in lower classes.

**Rangaraj (1995)** made an experimental study to find out the effectiveness of Computer Assisted Instruction in teaching physics at the Higher Secondary Stage. The findings revealed that CAI serves as an effective agent in achieving the instructional objectives in teaching physics at Higher Secondary Level. It was also found that CAI is a support system to teachers in the classroom instruction was more effective when compared to conventional lecture method and CAI as individualised instruction.

**Su chao-ya (1995)** studied the effectiveness of a computer-based lesson used before versus after formal lecture and examined student's difficulties in learning the functional concepts of the C programming language. The conclusion stated that student's post-test scores were not significantly affected by whether the computer-based lesson was performed before or
affer the regular lecture. Further the study reported about the student's difficulties in syntax, semantics and debugging of C programs on the functional topics.

**Theodore Thomas (1996)** investigated the academic impact of classroom computer usage upon middle-class primary grade level elementary school children. It was found that a significant difference was demonstrated in favour of the computer assisted instruction students. It was also indicated that the reading, vocabulary, spelling and math problem solving achievement scores of this experimental group had better adjusted mean scores in comparison to the traditional instruction students.

**Susan kay Rose (1996)** studied through a multi method study, evaluated the effectiveness of a computer assisted instruction program on vocational high school student's reading comprehension skills. There were no significant differences found between pre and post test scores of those students who did not attend the CAI program. Daily average attendance was similar among groups. Most of the students believed that the lab was useful in helping them to increase their reading skills.

**Mitchell (1997)** investigated the effect of visual-only, verbal-only, and visual/verbal instructional methods utilizing Computer-Based Instruction (CBI) as the vehicle, on the performance of psychomotor skills and knowledge. The study revealed that during instruction the level of performance of the psychomotor task increased with the use of visual/verbal CBI. Gender did not significantly influence the level of performance. Secondary analysis of the data suggested that visual/verbal CBI had no significant influence on the level of performance after a time interval of 11 days.
Participants had a higher level satisfaction with the visual / verbal CBI as per the post treatment survey results.

**Helen Johnson (1997)** investigated the effects of Computer Enhanced Instruction (CEI) on college level mathematics. Procedural achievement had a slight adverse effect when students were denied use of technology when being tested. Overall achievements did not increase even during favourable technology (computers and graphing calculators) had been used. Students not allowed to use computers during testing were significantly and favourably affected on overall achievement.

**Harriett Gibbs (1998)** studied the relationship between frequency of use of school computers and five dependent variables - language achievement, mathematics achievement, Computer skills, and attitudes toward learning with computers. The important conclusions of the research were: (i) significant differences in language achievement were found by gender and by home computer use, but not by frequency of school computer use; (ii) significant differences in reading achievement were found by frequency of use of school computers; (iii) significant differences were found in mathematics use; (iv) students who had more frequent access to computers at school developed higher levels of computer competence and (v) all students almost displayed favourable attitudes toward learning with computers regardless of the frequency - of - use provided in school.

**Kadhiravan (1999)** investigated the effectiveness of computer assisted instruction in relation to student's use of Self-Regulated learning strategies. The major conclusions of the study are (i) there is significant difference among different instructional strategies viz. LM, CAI CAIPI in terms of their
effectiveness in realising the instructional objectives in physics and in enhancing the retention of what already learnt in physics at Higher Secondary stage.

(ii) The CAIPI is more effective when compared to the LM and CAI in enhancing the retention at knowledge, understanding, application levels and total score in physics and

(iii) There is a differential effect on the cognitive development of the students in physics due to their use of self-regulated learning strategies.

Eva Jin (1999) found that home school families expected to use the computer to gather educational resources and information, to motivate their children's learning, to train their children's problem solving skills, and to teach computer literacy. Further, this research identified the seven ways in which these families used actually the computer in home schooling. The seven ways are (1) supplementing home school instruction (2) Supplementing home school research; (3) using multimedia for multiple representation information; (4) initiating student-centred learning; (5) disseminating home school information on the Internet; (6) e-mailing for support and socialization; and (7) participating in online learning groups on the Internet.

Begum (2000) made a study on development and validation of a CAI package on "Light Reaction of Photosynthesis" and influence of Locus of control for XII Standard students. The findings of the study stated that is CAI was effective in the achievement of cognitive skills in Biology. (ii) Locus of control as a variable was found to have no influence in learning light reaction of photosynthesis through CAI package as resulted by the post-test score.
Teong (2002) made a study to demonstrate, how explicit metacognitive training influences the mathematical word problem solving of forty 11-12 year old low achiever in a cognitive apprenticeship computer-based environment. Results showed that experimental students outperformed control students on ability to solve world problems on their individual written measures; experimental students developed the ability to ascertain when to make metacognitive decisions and elicit better regulated metacognitive decisions than control students; knowing when and how to use metacognitive strategies is an important determinant to successful word problem solving; and the cognitive-apprenticeship-computer-based environment appears to amplify low achiever's metacognitive and cognitive behaviour during word problem solving.

Chiu (2002) studied whether a collaborative team setting benefits secondary science learning in a networked support learning environments. Ninety four 10th grade girl students in two earth science classes in Taiwan were assigned to two settings; collaborative teams and individuals. The student's scientific process skill development, attitude towards school science and attitude towards using and learning about computers were compared. It was found that both groups showed significant improvements in skills and attitudes. However, the students in the team situation did not demonstrate significantly better skills or attitudes than the student in the individual situation.

Chang-Yu-Tai (2004) studied about the impact of positive feedback and communication on attitudes and self-efficacy beliefs of adult learners in introductory computer course in Taiwan. The results showed a significant
interaction effect between attitudes and self-efficacy scores, indicating that the experimental group's mean ACT (Attitudes Toward Computer Technology) and SCT (Self-Efficacy with Computer Technology) scores increased significantly more than the control group’s.

**Bhuvaneshwari (2004)** studied the Effectiveness of the Computer Assisted Evaluation package Deployed in Internet and Intranet as measured by Tamil Nadu Professional Course Entrance Examination. The major findings of the study were:

1. It was found that there was significant difference among the different instructional strategies viz internet, Intranet with feedback from teachers along with long term and short term in entrance coaching programme.

2. It was found that there was significant difference in the performance of the students under the different instructional strategies in achieving mastery learning in subjects Mathematics, Physics and Chemistry.

3. It was found that self-evaluation did not result in mastery learning with regard to subjects viz Mathematics, Physics, Chemistry and Biology.

**Teresa Kay (2004)** made a study on effect of learning styles, computer attitude, and classroom technology on student performance and motivation”. This study examined the effects of computer assisted instruction and a course management system on student’s performance and motivation, after controlling for learning style, cognition and computer attitude. The results from the analysis of variance indicated student performance was
significantly affected by the treatments and student motivation was not significantly affected by the treatments. Computer attitude did influence motivation, after controlling for cognition and learning style, but did not influence performance.

Franklin (2004) Studied about "Teacher professional development and their concerns about using computers: Do they match?". The purpose of this study was to investigate the concerns of Indian teachers regarding adoption of computers in their classrooms and whether their concerns were addressed by recent professional development opportunities. The result showed that most Indian teachers are unlikely to adopt computers and integrate them into their classrooms until their professional development activities match their levels of concern.

Foreman Kenneth (2005) made a study on Design and evaluation of computer-assisted instruction in the health sciences. Results showed that the CAI tool for the PDA (Personal Digital Assistant) was more convenient to use than a paper, desktop, and/or laptop atlas. Despite that result, use of the PDA histology application did not affect post test scores.

Zakel, Lori, (2005) studied about Differences in affective learning and perceived immediacy of instructor between traditional college classrooms and class rooms incorporating student use of computer-mediated communication. The results showed no significant differences were found between the treatment and control groups on either immediacy scale (verbal or nonverbal). Significant differences did exist between the treatment and control groups for affective learning.
SUMMARY

The studies reviewed in this section revealed effectiveness of Computer Assisted Instruction (CAI) as an instructional tool mostly in the discipline of mathematics, physics, chemistry, biology, social studies, language, trigonometry etc. No one study revealed the effect of CAI on Intelligence of the students.

STUDIES ON MULTIMEDIA TECHNOLOGY

Studies done on multimedia applications are reviewed as follows:

Jennifer (1991) conducted a study to find out whether or not there would be a relationship between the use of multimedia and the development of higher level thinking skills in a group of seventh-grade students who had multimedia included into the curriculum during the sixth and seventh grades. Results showed that there was no significant difference between the two groups in improvement of higher-level thinking skills over the period. However, in all phases of testing the experimental group improved significantly.

Bonnie (1991) conducted a series of empirical studies on the effectiveness of the Advanced Technology Classroom (A computer integrated, multimedia, learning environment). A quasi-experimental design was conducted to find statistical comparison to tradition instruction methods. Surveys were conducted on reaction of students and instructor to ATC throughout the system's from the first year of implementation. Responses were positive generally and demanded the need for instructional technology in engineering education.
Michael (1992) investigated the extent to which problem-solving abilities, specifically the integrated science process sub skills of data interpretation and hypothesis's formulation to be enhanced through the implementation of an instructional strategy comparing two- and three-dimensional computer-based graphic techniques. The study also examined acquisition of domain-specific knowledge. The results of the three-factor analysis of variance revealed that (1) there was no significant differences existed on measures of the integrated science process sub skills of data interpretation; (2) there was no significant differences existed on measures of the integrated science process sub skill hypothesis formulation; (3) a significant difference existed on a measures of domain-specific science knowledge with the transitional operational thinkers outperforming the concrete operational thinkers; (4) the effects of two- and three-dimensional computer-based group methods were consistent across levels of cognitive ability and specific orientation ability.

Lesa Perzylo (1993) made a study how multimedia CD-ROM technology guides the learners actively to engage more of their senses in the learning process as well as to develop their information searching skills and strategies. The conclusions of the study are given as follows: multimedia CD-ROMs, as a user-friend, have exciting potential for acquiring information. However, for effective learning and research to be conducted in this area, the learners should be involved in this area, the learners should be involved in purposeful learning, they must be given suitable instruction regarding to searching and sufficient time to navigate through such resources. It has been said that the difficulty of researching how people navigate through interactive multimedia can be compared to the difficulty involved in measuring the development of black holes in space.
Yuh Soon Yun (1994) explored the use of interactive multimedia language learning material within a classroom. The study showed the significant role of a whole and Cohesive learning environment in which the teacher, students and computer interacted together so that the students could have independent and responsible learning in this environment.

Joseph Thomas (1995) studied the effect of text-to-speech in a multimedia learning environment on science achievement for students with learning disabilities in reading. The science achievement scores of the treatment group were not significantly higher than the post-test scores of the control group students.

William (1996) made a study on the impact of Interactive multimedia Technologies (IMT) on broadcast education over the next three years at 4-year colleges and universities in the United States. The important findings: (1) Interactive multimedia technologies are likely to introduce in broadcast education curriculum reform at both the undergraduate and graduate levels (2) Instructional applications of IMT in broadcast education would likely to be reduced over the next three years with the most probable applications in the teaching of video production. (3) Broadcast researchers are most likely to focus on the impact of IMT on the other media.

D'Maris Anne Lumpkin (1997) investigated whether computer-based multimedia lecture presentation could affect community college microbiology student's achievement, attitudes toward learning microbiology and the retention when compared with traditional lectures. The responses of the students showed positive attitudes toward the multimedia presentations. The findings indicated that incorporating multimedia lecture presentations into the
microbiology class room contributed to improved student satisfaction as shown by significantly more positive attitudes toward learning microbiology with the computer based multimedia lecture presentation when compared with traditional lectures.

Abbas (1998) studied the effects of two inductive multimedia programs on including graphs, on subjects' ability to create linear functions and conceptualize variables from word problems. The results showed that students scored significantly higher on the post test than on the pre-tests on both function construction and variable conceptualization.

John O.T (1998) developed multimedia based courseware for computer aided instruction in selected units in English curriculum for polytechnic students. The study was undertaken to investigate how far the multimedia based computer instruction could bring about an improved situation in language learning in Polytechnics in Tamil Nadu. The conclusion of the study stated that there was significant improvement at the level of the student's acquisition of the language skill in the chosen area. The developed multimedia package helped the slow learners in the learning of the conversion of graphics into language and attains the mastery level according to their own pace and time. When the slow learners were exposed to the multimedia computer aided courseware, their cumulative learning ability was increased.

Hirschbuhl (1999) found the effectiveness of Interactive multimedia Instruction upon the variables of achievement and problem solving skills on non-science majors in an Environmental Science course at Mid-Western University.
Suresh, Thillaka and Pramilla (2000) made a study on use of computer multimedia programme in Learning Trigonometry among High School students. The study aimed to find out the impact of computer based multi-media programme to teach the basic principles of Trigonometry at standard IX from high school in Chennai, Tamilnadu. The results showed that (i) there was no influence of computer based multimedia programme on the achievement in mathematics among high school students (ii) There was no significant change in their attitude towards mathematics after learning Trigonometry through computer based multimedia and text-based self material. (iii) There was no significant difference in achievement of mathematics between high achievers and low achievers for both experimental group and control group (iv) There was no significant difference in the retention of learning in mathematics between the experimental group and control group.

Dubois and Vial (2000) made a study on multimedia design: the effect of relating multimedia information. The study examined the cognitive psychology concerning the increase in the ability to form mental images of words: The aim of the study was at defining how different multimedia presentation modes affect the learning of foreign language vocabulary (Russian). A significant effect was observed on word memorization in the different information presentation modes. The results suggested that better processing when and where was co-referencing of the different sources, especially when the encoding and tests made are the same.

Natesan (2001) made an attempt to study the Teaching concepts in mathematics through video cassette was the most effective media in
teaching mathematical concept at primary level. The result showed that the increased level of academic achievement of experimental group was due to the teaching of mathematics concept through video cassette. There was a significant difference between boys and girls in all groups (i.e.) between control and experimental 1, control and Experimental 2 and Experimental 1 and Experimental 2. In all, the girls performances were superior to boys.

Chan Lin (2001) studied the effects of presentation format (animation, still graphics, text) and the student's prior knowledge on learning a computer based physics lesson of 9th std. students. The significant interaction effect found between presentation format and prior knowledge in both descriptive and procedural learning revealed that the use of specific presentation format was not novices/experienced students. The use of still graphics was better than text in descriptive learning, and better than text and animation in procedural learning.

Mai Neo and Ken Neo (2001) made a study on using multimedia technology as an innovative teaching and learning strategy in a problem-based learning environment. Results of the study showed that the students were very positive toward problem based learning environments; enjoyed team work, able to think critically and became active participants in their learning process. The study pointed out that multimedia based learning environment could be used alternatively as an innovative and effective tool in a problem-based learning for the acquisition of problem solving skills.

Rajendran (2001) made a study on the Development of multimedia based computer animation courseware and computer assisted instructional courseware for integrated mass and Individualised instruction in teaching
biology at high school level. The results proved that the greater application of multimedia animation technology would lead to improved academic performance of the learners in biology. The two coursewares do not create any variation among boys and girls in learning biology through multimedia coursewares. The students who were exposed to multimedia coursewares expressed positive attitude towards the computer animation technology.

Asan (2002) made a study on interactive and self-paced multimedia tutorial programe that provides pre-service teachers with a complete range of school systems and teaching strategies. The study evaluated the impact of a multimedia tutorial program on pre-service teachers school experience course. Two methods of information delivery were investigated (i.e.) traditional lecturing and multimedia. The results showed that using the multimedia tutorials leads to positive differences in the school experience course over participants in traditional lecturing. The conclusion of the study stated that using multimedia in teacher education enriches pre-service teachers learning and provides them an opportunity to collectively view and critique of various teaching methods and classroom activities.

Malliga (2003) investigated the relative effectiveness among different strategies of computer mediated multimedia presentation in Teaching and Learning of Chemistry at Higher Secondary stage. The major findings of the study:

1. It was concluded that Interactive Individualizing Learning supported by Multimedia Presentation (IILMMP) was found to be the most effective strategy among all the three different instructional strategies viz PBL (Peer Based Learning), ILMMP (Individualised Learning
Supported by Multimedia Presentation) and IILMMP (Interactive Individualized Learning supported by Multimedia Presentation) in term of cognitive skills such as knowledge, understanding and application in realizing the instructional objectives in chemistry at std IX.

2. PBL was found to be coming between IILMMP & ILMMP in enhancing the retention of what has already been learnt.

3. It was inferred that irrespective of the difficulty level of the content, IILMMP is to be most effective one, while ILMMP is the least effective one.

4. It was found that while the subjects of all the three experimental groups are identical in terms of their scientific attitude, the same was found to be non-identical terms of their Computer Attitude.

5. The results of the study indicated that the enhancement of learning chemistry was only due to the media effectiveness.

SUMMARY

This subsection gives an insight into the number and range of how Computer Animation Technology and Multimedia based CAI have been administrated for the development and implementation of coursewares in different disciplines. The literature review made in this subsection clearly shows that not a single study has been explored using multimedia based computer assisted instructional strategy to study its effectiveness regarding intelligence of the students.
DISCUSSION

From the review of the studies on “Computer Assisted Instruction CAI” it was found that CAI was found to be effective in increasing the academic achievement of the students compared with the traditional lecture method (Hugh, 1987; Lowery, 1988; Clandia Jean, 1989; Radha Ravi, 1989; Mary Ann, 1994; Mahajan, 1994; Rangaraj, 1995; Theodore Thomas, 1996; Kadhiravan, 1999; Zakal, Lori, 2005). Further it was found that CAI is effective to master the subject area: geometry, physics, chemistry and health education (Anne Julie, 1988); geometry (Clandia Jean, 1989); science subject (Olive Westery, 1989); basic mathematics (Barbara Clinton, 1991); mathematics (Judith Body, 1991; Harriett Gibbs, 1998 & Planiappan, 1998); physics at Higher Secondary stage (Rangaraj, 1995 & Kadhiravan, 1999); college level mathematics (Helen Johnson, 1997) and health education (Foremankenneth, 2005) to the students of different age and grades. It was also found that CAI is an effective tool for individualised drill and practice reading and learning process (Charlotte Jan Roberson, 1988; Yong - Chill, 1991 & Foreman kenneth, 2005).

Some of the studies revealed that CAI was effective when it was supplemented with the regular classroom instructions (Hugh, 1987; Mahajan, 1994; Rangaraj, 1995; Theodore Thomas, 1996; Clandia Jean, 1989; kadhiravan, 1999; Teresa, 2004).

It was found that computer assisted individualised learning was better than computer assisted cooperative learning in improving student’s science achievement and retention (Kawesa, 1987; James Clifford, 1987). Further, it was observed that pupil studying in the higher standards has more
computer literacy and higher cognitive attainment in computer applications (Balasubramanian, 1995). It was noted that an interactive computer assisted instructional lesson was found to be effective to understand thoroughly about the fundamentals of photographic exposure (Alan Dale, 1987). It was also noted from the review of study that in the mode of CAI tutorial treatment was superior to simulation for developing science concept relationships on the achievement test and the concept (Paul McDonald, 1987). It was also observed that the effect of computer education did not show any sex related differences in achievement, attitude and personality characteristics (Gail Renee, 1990).

It was observed that computer based learning environment in small groups were effective to have interaction quite frequently with their group members, cooperatively, collaboratively and positively (Philip, 1989). It was also found that computer assisted biofeedback is effective for ADD children (Attention Deficit Disorder) to relax through the use of computer assisted EMG (Electro Magneto Graphic) biofeedback (Judy Boswell, 1990).

Attitude towards computers and anxiety about the computers are considered as the factors affecting the performance of the individual in a computer based learning environment. Studies on computer attitude revealed that computer-based learning environments influence the students and teachers attitudes (Barbara Clinton, 1991; Delvin, 1991; Deltrate Judith, 1987; Serie, 1991; Robert James, 1993 & Li-Li, 1990). It was found that students who viewed the evolving graphics on computer scored one point higher than students who viewed the static graphic (Jessie Hahn, 1987). Some of the studies revealed that CAI group is less significant than the

The study of Alice Whipple (1990) found that more than five hours of training of teachers in the use of computers in instruction is a significant indicator of increased academic achievement of computer use by elementary school students. It was found in the study of Ann Teresa (1991) that there was 5% significant difference by t-test between paired versus individual treatment in computer learning. Further it was observed that the learners who created their own notes during computer-delivered instruction experienced a significantly higher level of achievement than learners who captured notes on both immediate and delayed post tests.

It was found in the study of Yong-Chill (1991) that the learner of control group was more affected by the level of student's self-regulatory skills than the programme control group. In program control, no effects were found between students with low and high self-regulatory skills. Students with high self-regulatory skills under learner control tended not only to learn more but also to take less time to complete the lesson than did those under programme control.

It was found from the study conducted by Tsai (1992) that computer-based learning based on different systems of positive reinforcement was found to be effective in improving the achievement of the student. It was also found that the positive reinforcement need not be provided for every correct responses. Further it was also suggested that software designers should stress the quality of instructional content rather than entertaining the student. From the review it was found that most of the studies suggested
that computer based instructions are used as an effective tool to enhance the learner’s performance.

From the review of the studies on “Multimedia Technology” it was found that Multimedia based instruction was found to be effective in increasing the academic achievement of the students compared with the traditional lecture method (Abbas, 1998; Natesan, 2001; Rajendran, 2001 & Asan, 2002)

It was found that ATC (Advanced Technology classroom) (A computer integrated, multimedia learning environment) Instructional technology was found to be effective over the traditional methods of instruction. (Bonniey 1991)

It was explored the use of interactive multimedia language learning material within a classroom. The study showed the significant role of a whole and cohesive learning environment in which the teacher, students and computer integrated together so that the students could have independent and responsible learning in this environment. Yuu Soon Yun (1994)

It was found that the scores of the students with learning disabilities in reading, who were given multimedia environment, were not significantly higher than the post-test scores of the control group students (Joseph Thomas 1995)

From the study of Malliga (2003), it was found that interactive individualised learning supported by multimedia presentation (IILMMP) was found to be most effective strategy among all the three different instructional strategies viz PBL, ILMMP & IILMMP in teaching and learning of chemistry at higher secondary stage.
The study of Mai Neo and Ken Neo (2001) pointed out that multimedia based learning environment could be used alternatively as an innovative and effective tool in a problem based learning for the acquisition of problem solving skills.

Mostly all the research works carried out prove that computer assisted instruction and multimedia based computer assisted instructional technology contribute significantly for better instructional process.

The research studies, reviewed are from Dissertation Abstracts International, British Journal of Educational Technology, etc., many studies employ, Computer Assisted Instruction in different disciplines such as Mathematic, Physics, Chemistry, Biology, Social Science, Psychology, Engineering graphics, English language etc., That too at secondary level, post secondary level, elementary level, college level etc. Out of those research studies only two studies relate to computer assisted instruction in physics teaching. Moreover, very few number of such studies have been carried out at higher secondary level. It is also observed from the review of literature that computer assisted instructional coursewaves developed with multimedia technology are very scanty in number in the discipline of physics at higher secondary school level. This inference has motivated the investigator to develop a multimedia based computer assisted instructional coursewave for teaching and learning physics at higher secondary stage.

This review of literature helped the investigator from the methodological point of view also. It was learnt that most of the research studies cited in this chapter for review relied on content analysis and experimental design
as the appropriate methods for finding out the lapses and remediation. For the present study also, the validity of the Experimental design was deemed, significant for evaluating the effectiveness of the multimedia based Computer Assisted Instructional Courseware.

On the basis of the review of related research studies from the above discussion bringing in newer teaching aids such as multimedia based computer courseware and improving the teaching of physics at higher secondary stage become a significant need. Besides that, the investigator was a Post-graduate teacher for 19 years and 10 years as Headmaster in the discipline of physics and in the discipline of Education. He possesses ample computer knowledge also. The significant need felt through the review of related literature, qualification and in-depth knowledge in relevant subject area and functional knowledge in computer programming promoted the investigator to turn his attention towards computer education in general and multimedia based courseware development with audio, video clipings and animation with graphic technologies in particular.

The review of literature shows the significance of research works carried out in administering computer based coursewares and multimedia based CAI coursewares for teaching and learning physics, that too at higher secondary level. The utilisation of computers and the application of multimedia based educational softwares in different disciplines for teaching and learning are becoming wider. Moreover the propagation of computer based sophistications are also getting newer colour of technologies. The use of computers in teaching as well as learning is yet to receive the required emphasis in India. Multimedia based computer assisted instruction
is becoming prevalent in U.S.A, U.K and in certain developed countries. In India, multimedia based computer assisted instruction at school level is slowly getting its form.

CONCLUSION

The research work carried out so far in India is only through multi- media where different teaching aids were used to teach a lesson and not through computer, which provides audio and video effects simultaneously through computer mediated interactions and with the integration of newer technologies computer animation and graphics. The investigator has developed a multimedia based CAI packages where in the learner learns his lessons at his own pace and the learner is appreciated as soon as he completes each and every frames of the modules and at the end of each modules of the lesson also. This sort of programming is carried out in the developed multimedia based CAI packages and this motivates the learner in learning the modules of the lesson effectively and the subject matters get reinforced in his mind in a very strong manner. Once the review of related study is completed, the next step on the part of the investigator is to plan for logical and sequential execution of the development of the coursewares. This is precisely dealt with in the next chapter.