CHAPTER II

REVIEW OF RELATED LITERATURE

2.0 INTRODUCTION

A journey of a thousand miles; said Confucius, begin when one puts one step forward. However this first step has to be in the right direction if one is to reach the desired goal. In the case of any research study, this right step is ensured by a through review of related literature. The review of related literature implies locating, studying and evaluating reports of relevant researches, study of published articles, going through related portion of the encyclopedia and research abstracts, study of pertinent pages of comprehensive books on the subject and going through related manuscripts, is a very significant aspect of the research process. It allows current knowledge into the field or area in which one is going to conduct his research.

According to Best (1997) ‘A brief summary of previous research and writing of recognized experts provide researchers familiar with what is already known and with what is still unknown. Since effective research must be based on past knowledge this step helps to eliminate the duplication of what has been done already and provides useful hypothesis and helpful suggestion for significant investigation’.

This chapter deals with the findings of a few research studies in India and Abroad. The suggestions and recommendations made by the other researchers motivated the investigator to carry out the present study with certain limitations. This chapter comprises of two sections viz., studies done in India and Abroad. Critical review of related literatures also finds its place at the end of this chapter.

2.1 STUDIES DONE ABROAD

Fernandez Dianne Jody (2008) conducted a study on Living and earning with Information and Communication Technologies in the 21st century.
The major findings were:

i. Students deserve culturally relevant curricula with responsible ICT use, and a well-educated 21st century society demands it for our schools.

ii. Educators of today are needed to embrace the culture of today’s students and teach ICT literacy to develop responsible consumers and producers in the age of Web 2.0 and beyond.

Chen Long Gow (2008) conducted a study on the presence and usage of computer technology and the internet in the classroom: An examination of Secondary School students’ and Teachers’ Attitude.

The major findings were:

i. Positive attitudes of both students and teachers have led to an increased demand for more computer-based technologies. However, positive attitude does not led to higher usage of classroom technologies due to lack of accessibility was found as primary reason.

ii. There is still an ambivalent attitude exists among the students and teachers towards the usage of computer technology and the internet as instructional and learning tool.

Johnson Deonne (2008) conducted a study on, an intrinsic comparative case study of Teachers’ usage of on-line learning resources in a technology-rich environment.

The major findings were:

i. It was an important to take a holistic approach and look at how the innovator, context and innovation intertwine to impact technology integration.

ii. Constructivist professional development played an integral part of teachers’ technology integration.
iii. Participants reported that a. finding online resources via Google, e-themes and other teachers, b. selecting online resources that were core-related, covered the topic and met their learning objectives and c. using resources to promote students research and increase their mathematics and English Knowledge.

**Meredith DiPietro et al (2008)** conducted a study on Best practices in teaching K-12 online: Lessons learned from Michigan Virtual School teachers. The major findings were:

i. Classroom management is an area of future research concern. Anecdotally, teachers sometimes suggest that the beauty of online instruction is that one need not to worry about classroom management. It helped to build a community of practice within the classroom. Although these issues have been explored in depth in face-to-face environments, they are—as of now—unexplored domains in online K-12 classrooms.

ii. The attention of virtual schooling has gained from the K-12 arena leads to the consideration of blended, or hybrid learning environments where aspects of online learning are integrated into traditional, face-to-face settings. Having an established, research based set of practices associated with successful virtual school teaching can facilitate the exploration of the best practices for teaching in blended, or hybrid environments.

iii. Finally, there are general characteristics that seem to be true of all of the online teachers interviewed in this study.

**Fowler Elizabeth Laurie (2007)** conducted a study on Teacher use and integration of technology in Alabama K-12 public school classrooms: Influence and barriers. The major findings were:

i. Teachers use technology for personal and professional use, but do not use for instructional purpose.
ii. Lack of resources and time to plan technology lessons and teacher characteristics.

iii. Teachers with 11 to 20 years of experience showed highest technology integration use.

Macklin Alexises Smith (2007) conducted an exploratory study on integrating Information and Communication Technology (ICT) literacy into the first-year composition course: impact on teaching learning outcome, and assessment.

The major findings were:

i. Problem-based learning environment supported students’ ICT skill acquisition and ICT literacy education is effective when librarians collaborate with subject matter faculty, assessment practices for ICT skills should be on-going, throughout higher education.

ii. Instructions can be revised, if needed and faculty and administrators should accept the ICT skills as necessary and appropriate for higher education.

Chang (2006) conducted a study on the perceptions of Taiwanese undergraduate students of Interactive Multimedia-Based Instruction.

The major findings were:

i. The learning styles of students and acceptance of multi-media based instruction were the most important variables among the eight variables surveyed; ease of learning, consistency, perception, support, and acceptance, learning styles, attitudes and satisfaction.

ii. The types of institution from which a student came and major were significant in relation to learning styles and acceptance of multi-media based instruction.
Cullen Thereasa (2006) conducted a study on the role of technology in pre-service teachers’ images of their future classrooms.

The major findings were:

i. Teachers were not fully aware of their influence of their own experiences and would benefit from reflection activities that help them to make sense of their own experiences, observations from field experiences and their values and beliefs related to their future classrooms.

ii. Pre-service teachers need access to different models of technology use in schools and need guidance on how to deconstruct these experiences and relate them to their own future teaching.

iii. Drawing provides a unique and effective method to encourage pre-service teachers to explore their beliefs.

Gilbert David Wayne (2006) conducted a study on effectiveness of computer assisted instruction blended with classroom teaching methods to acquire automatic psychomotor skills.

The major findings were:

i. There are distinctive differences between the control and experimental group that could be attributable to CAI blending methods.

ii. Blended teaching methods experimental group demonstrated a comparatively higher level of psychomotor electrical diagnostic skill capability of the two groups such as students in the lower Rio Grandy Valley Who have participated in CAI and the students who did not participate in CAI.
Kien Janet (2006) conducted a study on Literacy and laptops: Usage and impacts of one-to-one computing on teaching-learning.

The major findings were:

i. Students in the one-to-one computing program at school have access to computers and/or internet access at home.

ii. One-to-one computing program yield important and useful information for decision making and to establish accountability.

PSA (2006) conducted a survey on are students ready for a technology rich world?

The major findings were

i. Only a minority students reported frequent use of specific educational software, but one-half of the students surveyed reported frequent use of the internet as a research tool and frequent use of word processing software, both of which have educational potential.

ii. The vast majority of students are confident in performing basic ict tasks such as opening, deleting and saving files and students are generally confident about their internet abilities.

iii. While fewer 15-year –olds are confident performing high-level tasks-such as creating a multi-media presentation or wiring a computer program unaided most think they could do so with some help.

iv. Only 44% use computers frequently in art school.

v. Computer use appears to be most beneficial to students’ performance in mathematics. Overall, even when socio-economic disadvantage is controlled for, there is a sizeable positive effect from regular computer use.

The major finding was:

i. There were no statistically significant differences between the mathematics achievement of the two groups such as students in the lower Rio Grande Valley who have participated in CAI and the students who did not participate in CAI.

Smith Donnal Odle (2006) conducted a study on the factors contributing to teachers’ acquisition and use of technology.

The major finding was:

i. The teachers who integrated technology into their teaching were not only skilled, but also possessed high comfort levels for using technology in teaching and it also indicted that technology competency does not promote technology integration.

Allred (2005) conducted a study on the use of computer aided learning in chemistry laboratory instruction.

The major findings were:

i. Using technology to aid in the instructional process is definitely of benefit and students were more successful in learning.

ii. It is important to note, through that one single type of instructional method is not the best way to inspire learning.

iii. It seems multiple methods provide the best educational experience for all.

The major finding was

i. Experimental group students showed high performance in both the achievement test and in cognitive understanding interview.

**Bishop et al. (2005)** studied the effectiveness of computerized spelling training in children with language impairments

The major findings were:

i. Trained children learned an average of 14 novel spellings per session.

ii. Trained groups did not differ from the untrained control group in terms of gains made standardized tests of spelling or word and non-word reading

**Bosseler Marcia (2005)** conducted a study on how can students use the potential of technology and the internet in an elementary science club as the conduct for conducting scientific inquiry.

The major finding was:

i. This study related that product based simulation and strategies for scaffolding higher-level learning elicited inquiry oriented problem –so living skills using the internet, thereby enriching the synthesis information they found on the internet and make a step towards becoming lifelong learners.

The study result of **Brettt and Nagra(2005)** inform how best higher education institutions might provide computer access to learners so as to encourage collaborative working and positively affected student approaches to their learning

**Cannon and Tina Rence (2005)** conducted a study on student success: A study of Computer-Based Instruction in developmental mathematics at a Tennessee Community College.

The major finding was:

i. The lecture method students’ achievement rate was significantly higher than the
students who received computerized instruction.

**Dyer (2005)** conducted a study on evaluation of physical chemistry in practice (PCIP) DVD modules.

The major findings were:

i. The PCIP modules designed to supplement classroom and laboratory instruction and to engage students in order to help them increase their understanding of physical chemistry concepts.

ii. These modules use context rich, situated learning environments, providing anchored instruction in a student-guided setting.

**Hennesy et al (2005)** studied on the teacher perspectives on integrating ict into subject teaching, commitment, constraints, caution and change

The major findings were:

i. Teachers were developing and trialing new strategies specifically for mediating ICT-supported learners.

ii. Evident commitment to incorporating ICT was tempered by a caution, critical approach and by the influences of external constraints.

**Hoskins and Vanhooff (2005)** studied on motivational and ability: which students use online learning and what influence does it have on their achievement?

The major findings were

i. The number of hits, length of access and use of the bulletin board was predicted by age, with older students using Web CT more. These factors were also influenced ability and achievement orientation.

ii. Only bulletin board use influenced achievement with those posting messages outperforming those not using, or passively using bulletin boards.
iii. Online quiz improvement was more in lower achievement orientation.

**Kelly Resa (2005)** conducted a study on exploring how animations of sodium chloride dissolution affect students’ explanations.

The major finding was:

i. Students incorporated some of the microscopic structural and functional features from the animations into their explanations and many were able to connect how the microscopic process of dissolution related to the macroscopic disappearance of the salt.

**Ozer (2005)** conducted a study on factors associated with computer and internet technology implementation in biology, chemistry and physics education in Turkish secondary schools.

The major findings were:

i. Computer and internet use has not occurred effectively. Computers were first introduced to Turkish schools in 1984; unfortunately the current situation of computer and internet use in science education is not at the projected earlier point in time.

ii. Considering the fact that science teachers’ participation in technology-related professional development program is higher than other subject teachers, the use of computer and internet technologies in Turkish secondary schools is still at its early stages.

iii. Lack of computer knowledge and not knowing how to integrate computers into education were the major factors reported.

**Zaked and Lori (2005)** conducted a study on differences in affective learning and perceived immediacy of instructor between traditional college classrooms and classrooms incorporating student use of computer–mediated communication.

The major finding was:
i. Significant differences did exist between the treatment and control groups for affective learning’s.

**Bill Pelz, CAS (2004)** formulated three principles of effective online pedagogy from his study. They are:

i. Let the students do (Most of) the work.

ii. Interactivity is the heart and soul of effective asynchronous learning.

iii. Strive for presence.

**Blickenstaff Jacob Arin (2004)** conducted a study on Framework for effective physics education applied to secondary and university physics courses.

The major finding was:

i. Students remembered specific, dramatic events from their physics classes, not the regular repetition of lab procedures, and this provides teachers with an opportunity to connect real physics knowledge to dramatic demonstration or class events.

**Bump and Douglas Edwin (2004)** conducted a study on the effect of a computer multimedia interactive mathematics program on the mathematics achievement of developmental mathematics college students.

The major finding was:

i. The result indicated that the mathematics achievement of students participated in a computer multimedia program was higher than the other group.

**Callaway Rebecca (2004)** conducted a study on Faculty and teacher candidate computer self-efficacy and the relationship of faculty computer self-efficacy, technology professional development, and technology use.

The major findings were:

i. There was a significant relationship between the computer self-efficacy and the extent of technology use.

ii. There was no significant difference among faculty members’ computer self-
efficacy and teacher candidates’ computer self-efficacy.

**Campbell and John Paul (2004)** made a study on compression of computerized and traditional instruction in the area of elementary reading.

The major finding was:

i. There were a few significant differences in critical thinking skill improvement between students who received CAI and students who did not.

**Casanova Ana (2004)** conducted an analysis of computer mediated communications technologies as tools to enhance learning.

The major findings were:

i. The faculty was mainly using CMC technology to support teaching practice and to improve teacher productivity.

ii. Its target was to increase interactivity open awareness for feedback and provide online resources but less used for inquiry based and active learning.

iii. CMC promoted the achievement of goals and objectives with different degree of success mainly in two different areas content delivery and course management.

**Cox et al (2004)** conducted a study on investigating the effects of ICT on educational attainment.

The major findings were:

i. Found positive effects of ICT on pupils’ attainment in almost all the national curriculum subjects, particularly regarding mathematics and English at all key stages.

ii. ICT has positive impact on pupils’ learning when the use of CIT is closely related to learning objectives and when the choice of how to use ICT is relevant to the teaching and learning.
**Donell (2004)** made a study on the relationship between students and faculty members attitude towards computer technology in advanced arts classes.

The major findings were:

i. There was no significant relationship between faculty members and student attitudes towards computers, however a significant positive relationship was found between faculty members and students attitudes towards computers were significantly related to the perceived level of computer expression.

ii. Because of the student exposure to computer, preconceived attitudes tended to dominate student attitudes towards computers. The overall response from both arts and students towards computers were positive however the responder level suggested only conservative attitudes towards computers that were consistent with the arts academic discipline culture.

**Jamillah (2004)** conducted a study on Teachers' instructional use of technology in middle school classrooms.

The major findings were:

i. Rural teachers used the internet or CD-Ram, computers to solve problems, and spreadsheets and database more than urban or sub urban teachers.

ii. Sub urban teachers used email more than the teachers of other areas.

iii. Instructional tools such as games were used more by urban teachers than rural or suburban teachers.

iv. Urban, suburban, rural teachers used multimedia more than either urban or suburban teachers.

v. Urban and suburban teachers were significantly different in regards to their assignment of creating web pages and web sites.
Jones (2004) studied on barriers to the uptake of ICT by teachers

The major finding was:

i. The uptake of ICT is most commonly prevented by lack of confidence, recurring technical faults and resistance to change

Mellar et al (2004) studied on ICT and adult literacy, numeric and ESOL

The major findings were:

i. Using ICT: About half of the observed activity involved the use of office software and half the use of educational software. The majority of ICT use was directed towards practice, but some use related to the creation of new materials or working in small groups.

ii. Integrating ICT: Various activities involved the use of ICT to support the teaching of basic skills. At one extreme, ICT was seen as just another teaching tool and the technological demands were kept to a minimum. At the other extreme, ICT skills were seen as important elements of new literacy.

iii. Teaching with ICT: Teachers adapted the use of CIT to their own styles of teaching. Different patterns of ICT use were found in numeracy, literacy and ESOL. Tutors’ level of ICT skills had an impact on their ability to make effective use of the technology. It was also true that specific characteristics of certain technologies affected the way in which these were used in the classroom.

iv. Teaching ICT Skills: Talking about a procedure, demonstrating it and then asking the student to try it on their own was the most frequent method adopted to teach ICT skills. A majority of tutors encouraged learners to experiment and discover for themselves how the software worked.

v. Learning style: The visual element of ICT presentation was useful to many learners, but we saw few attempts to accommodate students’ learning styles in
other ways. Individual and whole group works were the dominant styles but small group work was encouraged in some literacy and ESOL classes.

**Passey et al (2004)** studied the effects of ICT on pupils’ motivation

The major findings were:

i. Internet, interactive whiteboards, writing and publishing software and presentation software were the most useful motivating components.

ii. ICT positively influenced attitude towards school work and school behaviors


The major finding was:

i. There was a significant difference in the pre-test performance between the two groups. The students taught through computer scored more than the students taught through traditional method. This shows that teaching through computer is more effective than the traditional method.

**Scrimshew(2004)** studied on enabling teachers to make successful use of ICT.

The major finding was:

i. The uptake of ICT is most frequently facilitated by leadership and planning, sharing of resources, technical support and schools with each other and with the local community

**Sellers** and **Rebecca Giles (2004)** conducted a study on the effects of Computer-Assisted Instruction and changes in instructional methods on Mathematical Achievement for low-income and African - American students.

The major finding was:

i. The result showed that the students of 2003 outperformed the students of 2002
in the final school examination.

**Corbin and Jain Frederic (2003)** made a study on the integration of technology into the middle and high school science curriculum.

The major finding was:

i. The teachers had not received enough technology training to integrate technology seamlessly in the science curriculum.


The major findings were:

i. Significant mean effect sizes in favor of computers in relation to the quantity as well as the quality of the writing.

ii. The writing process is more collaborative, iterative and social in computer classrooms as compared to paper and pencil environments.

iii. Pupils who use computers when learning to write are not only more engaged and motivated in their writing but also produce written work that is of greater length and high quality.

**Hunter and Laura Groussman (2003)** made a study on internet use in constructivist classroom.

The major findings were:

i. The teacher’s use of constructivist pedagogy was consistent across all aspects of their practice.

ii. They used Meta cognitive and purposeful teaching strategies, they were leaders in their profession.
iii. Paradoxically, the teacher understood the importance of teaching with technology, but exhibited limited knowledge of how to incorporate the internet into their teaching. Teachers also experienced time constraints, a conflict between their constructivist philosophy and expectations placed upon them and the need for information literacy skills curricula and technical support.

Khan (2003) conducted a study on teaching chemistry using guided discovery and an interactive computer tool.

The major findings were:

i. The instructional strategies in the guided discovery case were successful in sustaining student engagement with several fundamental processes of scientific inquiry and had led to the development of important inquiry skills.

HSU (2003) conducted a study on the effectiveness of computer assisted instruction statistics education, a Meta analysis.

The major findings were:

i. The different modes of CAI programs produced significantly different effects on students’ achievement in learning statistics.

ii. Expert systems and drill and practice programs were the most effective modes and were followed by multimedia, tutorials and simulations.

iii. Computational programs were the least effective modes. The teacher made CAI programs were significantly more effective than the commercially developed CAI programs.

iv. The effectiveness of CAI program in teaching statistics did not differ significantly according to the study characteristics of the publication year, the publication source, the educational level of participants, the level of interactivity of CAI program the instructional role of CAI program and the sample size.
Meade (2003) conducted a study on the effects of inquiry instruction on student learning in technology-based undergraduate chemistry laboratory.

The findings of the study were:

i. Pre-test to post test conceptual gains were significant for both treatment groups.

ii. Low-inquiry students performed significantly better on exploration questions than high-inquiry students.

iii. Process skills developed at higher levels for high inquiry students than low-inquiry students.

iv. Positive attitudes decreased significantly for all students from pre-test to post-test. More favorable attitudes toward science enjoyment and the ability to do well in science were found for high-inquiry students.

v. More favorable attitudes toward the nature of science caused by use of the learning cycle were reported by high-inquiry students.

vi. Low inquiry students reported more favorable attitudes toward technologies in the laboratory than did high-inquiry students.

vii. More formal reasoning skills were reported by high-inquiry students.


The major finding was:

i. The medical students are the major users of palmtops because their learning involves placements in hospitals and community surgeries where the need to access clinical information and record their experiences for later reflection and access.
**Tiwari and Deborah (2003)** made a study on factors affecting collaboration among learners in a web-based learning environment.

The major findings were:

i. Some factors that could have facilitated collaboration were evident; however the barriers to it were insurmountable in this case.

ii. Some factors that primarily prevented learners from collaborating among themselves as they constructed their learning in a web-based environment.

**Herzing and Rozalind Gail (2002)** made a study on the effects of the level of computer technology use in the classroom on the at-risk student’s grade and attendance.

The major finding was:

i. The teacher technology use, student’s technology use and overall technology use had no significant positive effect on the grades and attendance of at risk students grades and attendance schools must be prepared for technology use in the classroom.

**Eardley (2002)** conducted a study on a study of the effects of gender and different instructional media (CAI tutorials vs Textbook) on student attitudes and achievement in a team-taught integrated science class.

The major finding was:

i. Contradictory to the findings of this study, anecdotal information from personal communication, course evaluations, and homework assignments indicated favorable attitudes and higher achievement scores for majority of the students in the treatment group.

**Ziegler Christina Blauer (2002)** conducted a study on the effect of technology rich learning environments on instructional practice, student behavior and achievement in general education settings.
The major finding was:

i. No significant difference was measured with respect to student achievement in the basic skill areas of Reading, Spelling and Mathematics.

Planznella Pal Elizabath (2001) made a study on effects of computer assisted writing instructions on fourth grade students.

The major findings were:

i. The computer assisted writing instruction showed no significant difference in raising the achievement level of the participating students.

ii. There was no significant difference in different survey scores between students (n=15) who received computer assisted writing instruction in the experimental group and the students (n=15) who received traditional methods of writing instruction in the control group.

Rivet and James (2001) conducted a study on Student achievement in middle school mathematics: Computer-assisted instruction versus traditional instruction.

The major finding was:

i. The result shows that a significant increase in student achievement by the students utilized the Computer-Assisted Instruction than the students’ utilized Traditional method.

Zumwalt and David (2001) conducted a study on the effectiveness of CAI in 8th grade pre-algebra classrooms in Idaho.

The major findings were:

i. Students of the Computer Aided Instruction showed more achievement than the traditional method.

ii. Students using Accelerated Math CAI scored significantly higher than the other two method of instruction.
Hamtini and Thavi (2000) made a comparative study on the impact of the computer facilitated instruction versus non computer facilitated instruction in developmental mathematics on university students’ attitudes and achievement.

The major findings were:

i. The traditional and computer facilitated groups realized improvement in mathematics achievement following instruction.

ii. The degree of improvement, as measured by the difference between pre and post -test scores for the traditional group was significantly greater than that of the computer facilitated group.

Koroghlanian, Carol May (2000) conducted a study on Animation, audio spatial optimizing multimedia for scientific explanation.

The major findings were:

i. There is no significant difference for any attitude item was found for participants in the text as compared to those in the Audio treatments.

ii. Significantly differences were found by spatial ability for three attitude items concerning concentration and interest.

iii. The low spatial ability participants reported greater mental effort than high spatial ability participants.

Lark et al (2000) studied the impact of information and communication technology initiatives

The major findings were:

i. ICT improved motivation, enhanced learning and teaching; improved communication and access to information, and improved efficiency and feelings of independence.
ii. Teachers perceived ICT to be useful for streamlining current teaching procedures, gaining access to new professional opportunities and new exciting teaching opportunities

**Lewin et al (2000)** prepared a report on the KS1 literacy evaluation project using low cost computers

The major findings were:

i. The used of portables significantly improved keyboard skills, presentation skills, motivation and ICT confidence.

ii. It also shows that word processors had a positive effect on writing skills.


The major findings were:

i. Quantum Science across Disciplines (QSAD), was designed to promote inquiry learning. Qualitative research methods were used for this multiple case study.

ii. Data from surveys, interviews and extended classroom observations revealed a close correlation between a teacher’s model of the learner and his or her model of teaching.

iii. Combined models of learner and teacher had the greatest influence on their decisions about implementing QSAD software.

iv. Teachers who exposed a constructivist model of learning and related models of teaching used the software to promote student investigations and inductive approaches to learning.

v. Other factors that appeared to support the use of inquiry methods included sufficient time for students to investigate phenomena, the extent of the teacher’s pedagogical content knowledge, and the amount of training using QSAD software.
vi. All these case revealed that the teachers acted as agents of the school culture. In schools that promoted development of critical thinking, questioning and self-direction in students, teachers were more likely to use a variety of instructional methods and emphasize construction of knowledge.

Rothman Alan (2000) conducted a study on the impact of computer – based versus “traditional” textbook science instruction on selected student learning outcomes.

The major findings were:

i. Non-traditional computer based instruction is significantly improved students’ attitudes towards science learning and their level of English Language development.

ii. Non- significant positive trends were found for the student learning outcomes, overall science achievement and development of critical thinking inquiry skills.


The major finding was:

i. There was no measurable improvement in the students who used the computer-assisted instruction.

Skov (2000) conducted a study on assessment of student learning with hypermedia tools in first year college chemistry.

The major findings were:

i. Though there is no significant effect on course grade, the second analysis shows statistically significant learning from students’ work with instructional hypermedia. Both causal models demonstrate that students with poorer preparation for college chemistry used STC more than students with better preparation, which matches the designers’ interest.
ii. Become better prepared students were relatively more motivated to use the hypermedia system.

iii. Other findings show positive effects of high school science and college laboratory coursework on concept learning.


The major findings were:

i. There was a significant gain in scores from pretest to post test that combined groups.

ii. There was not a significant difference in the post scores between the two groups.

**Kovarik Thomas (1999)** conducted a study on comparing the effects of traditional and reformed instructional methods on math anxiety and learning at community college.

The major finding was:

i. The reformed method resulted in significantly greater decrease in anxiety scores (P=0.018), while there were no appreciable gains in learning as measured by the final exam and the general placement test.

**Michael Shawn (1999)** conducted a study on a comparison of students’ achievement, self-esteem and class-room interactions in technology – enriched and traditional elementary classrooms with low socioeconomic students.

The major findings were:

i. CAT reading analysis was statically significant.

ii. Regarding student self-esteem, the areas of composite self-Esteem, School self-Esteem and general self-esteem were found to be statistically significant although
no statistical significance was found for either home self-esteem or social self-esteem.

iii.  Regarding student self-esteem, the areas of composite self–esteem, school self-esteem and general self-esteem were found to be statistically significant although no statistical significance was found for either home self-esteem or social self-esteem.

iv.  Classroom Interaction Analysis during the fall and spring of the school year found a significant difference between type of classroom and type of verbal interactions occurring within those frameworks with treatment groups being more students centered and control groups being more teacher-centered.

**Walters Lauren** (1999) conducted a study on Development and evaluation of a simulation software package for teaching.

The Major finding was:

i.  The software content and scenarios were relevant for novice and student teachers. The evaluation also revealed that the software package was user friendly and could be used in multiple sites.

**Yang Li-hsuan** (1999) conducted a study on college students perceptions of interpersonal relationships related to the development of their interest in science.

The major findings were:

i.  Interest in science is a rich and complicated entity most students had different levels of interest in different areas of science.

ii.  All participants in the interested group reported interesting experiences with an influential figure(s).

iii. Nine out of the twelve students mentioned influential figures who were interested in science and/or practiced in a science–related field, and with whom the student
had good relationships similar to those mentioned by the students in the interested groups.

iv. One student in the interested group and three students in the uninterested group mentioned interest-lowering relationships with influential figures.


The major findings were:

i. There were no significant differences in mean CAI effectiveness between published studies and dissertations.

ii. There is no significant trend in CAI effectiveness over the period of this study.


The major finding was:

i. The result showed there was no significant difference in the Mathematics achievement between both the groups.

**Hazelbaker, Deborah Jean (1997)** conducted a study on examining the effects of alternative methods of teaching mathematics on mathematics achievement and attitudes towards mathematics: Comparing the lecture-cooperative learning method to the Computer-Assisted method.

The major finding was:

i. The result indicated that students participated in the Cooperative learning method outperformed students in the Computer-Assisted learning students.
2.2 STUDIES DONE IN INDIA

Amutha & Karpaga Kumaravel (2008) conducted a study on ICT knowledge of the prospective teacher educators.

The major findings were:

i. The prospective teacher educators of the Department of Educational Technology and the affiliated colleges do not differ in their ICT knowledge.

ii. The teacher educators are not adequately informed about the ICT practices.

iii. The students of the Department of Educational Technology might have been given better exposure in strengthening their ICT knowledge than the students of the affiliated colleges of Bharadhidasan University.

Arunkumar (2008) conducted a study on Effectiveness of CAI package in teaching geometry among standard IX.

The major findings were:

i. There is significant difference between the control and experimental groups in the gain scores. That is, students of experimental group are better than the students of control group.

ii. There is significant difference between the control and experimental groups in the attainment of objectives: Knowledge, understanding and application in gain scores.

Magam Madhusudhan (2008) conducted a study on Analyses of Internet Use by Research Scholars in University of Delhi, India.

The major findings were:
i. Boolean logic truncation and wildcards are the most often used navigational tools, and the researches are set with the problems of inadequate computers with internet facilities, slow internet connection and lack of skills and training.

ii. The survey also revealed that 57 percent of the respondents are facing retrieval problems.

iii. Some research scholars lack research techniques and training.

Kumar jasmine and Begum Mumtaz (2008) conducted a study on the professional competency of teachers and teacher educators in relation to their ICT usage.

The major findings were:

i. Website resource support, academic activity with ICT involvement facilitate professional competency among teachers and teacher educators.

ii. The high, moderate and low achieving groups in professional competency among teachers and teacher educators exhibit differential styles of ICT usage displaying predominantly website resource support and English as the medium of instruction.

Radha (2008) conducted a study on Effectiveness of CAI package in Basic Electronics teaching among undergraduate physics students.

The major findings were:

i. There is significant difference between the control and experimental groups in the gain scores.

ii. There is significant difference between the control and experimental groups in the attainment of objective: Knowledge in their gain scores.
iii. There is significant association between the habit of reading computer journals and the gain scores of the control group students.

**Anisha & Annaraja (2007)** conducted a study on awareness on Information and Communication Technology of secondary teacher education students.

The major findings were:

i. 18.8% of secondary teacher education students have high level of information and communication technology awareness.

ii. There is significant difference between male and female secondary teacher education students in their ICT awareness.

iii. There is significant difference between aided and unaided college secondary teacher education students in their ICT awareness.

iv. There is a significant difference between internet user and non-user secondary teacher education students in their ICT awareness.

v. There is a significant difference between computer journal reader and non-reader secondary teacher education students in their ICT awareness.

**Anvar Islam & Panda (2007)** conducted a case study on Web-based information retrieval trends of researchers in Sambalpur University(India)

The major finding was:

i. In an Indian University, traditional library and printed materials are still more effective to researches than web-based information and resources.


The major finding was:

i. There is a significant difference between control and experimental group students in
their gain scores. The Experimental group students are better than the control group students in their gain scores.


The major findings were:

i. There is significant difference between the multimedia group students who read computer journals and those who do not in their attainment of gain scores.

ii. There is significant difference between the multimedia group students who read computer journals and those who do not in their attainment of knowledge objective in their gain scores.

iii. There is significant difference between the control group students who read computer journals and those who do not in their attainment of the objectives: understanding and skills, in their gain scores.

iv. There is significant difference between the CAI group and the control group students in their gain scores.

v. There is significant difference between the CAI group and the control group students in the attainment of the objectives; Knowledge, understanding and skill in their gain scores.

vi. There is significant difference between the multimedia group and the control group students in their gain scores.

vii. There is significant difference between the multimedia group and the control group students in the attainment of the objectives; Knowledge, understanding and skill in their gain scores.

viii. There is significant difference between the CAI group and the multimedia group...
students in their gain scores.

ix. There is significant difference between the CAI group and the multimedia group students in the attainment of the objectives; Knowledge, understanding and skill in their gain scores.

x. There is significant difference among the CAI, Multimedia and the control group students in their gain scores.

xi. There is significant difference among the CAI, Multimedia and the control group students in the attainment of the objectives; Knowledge, understanding and skill in their gain scores.

*Antony Gracious (2006)* conducted a study on development of VRML based learning package in chemistry for XI standard students and its effectiveness.

The major findings were:

i. There is significant difference between the control and experimental group in the gain scores.

ii. There is significant difference between the control and experimental group in the attainment of objectives: Knowledge, Understanding and application objective in their gain scores.

iii. There is significant difference between the control and experimental group boys in their gain scores.

iv. There is significant difference between the control and experimental group girls in their gain scores.

v. There is significant difference between the students of control and experimental groups with html knowledge in their gain scores.
Meenu (2006) conducted a study on utilization and effectiveness of educational television programmed at primary school level.

The major findings were:

i. The ETV lessons in Math and EVS (SC and SS) taught to students of both class III and V significantly improved their learning achievement as compared their counterparts taught through traditional method.

ii. The ETV lessons developed more favorable teacher attitude and learner reactions towards ETV programs

Gandole (2006) conducted a study on effectiveness of computer software for laboratory practical learning.

The major findings were:

i. The computer software was found effective in communicating laboratory activities in a better way compared the traditional method

ii. The students who used the computer software integrated into laboratory activities performed significantly better on knowledge, skills and overall competency that the students who were taught through the traditional laboratory method of instruction.

iii. It was found that the time taken by the experimental group to complete the experimental criteria was less than that taken by the control group.

iv. Students belonging to the experimental group took more time for critical thinking and drawing conclusions.
Kaliammal and Nirmala Devi (2006) conducted a study on ICT usage among students.

The major findings were:

i. Male and female students differ in the usage of ICT tools and their feelings towards various features of internet.

ii. The percentage of female students is found to be higher for almost all the statements given in the tool.

iii. Arts and science students differ in the usage of ICT tools and their feelings towards various features of Internet.

iv. The percentage of Arts Students is found to be higher for more number of statements given in the tool.

Rajeev Kumar & Amritpaul Kaur (2006) conducted a study on Internet Use by Teachers and Students in Engineering Colleges of Punjab, Haryana, and Himachal Pradesh States of India.

The major findings were:

i. Internet has become a vital instrument for teaching, research and learning possesses of these respondents.

ii. Suggestions were set forth to make the service more beneficial for the academic community of the engineering colleges under study.

Vinodhkumar (2006) conducted assisted instruction in teaching economics at the school level.

The major findings were:

i. Students taught by PPAI scored higher than the students taught by traditional lecture method in other word, PPAI is superior to the traditional method for teaching the topic ‘National Income’.
ii. There is no gender difference in the scores of boys and girls in the PPAI and TM.

**Jothikani and Thiagarajan (2004)** conducted a study on the Effectiveness of CAI in Mathematics among B.Sc Degree students.

The major finding was:

i. The mean gain scores of the control group are significantly higher than that of the experimental group. Hence it is concluded that the conventional method is more effective and efficient than CAI method.

**Warudkar and Sunil Baviskar (2002)** conducted a study on the Relationship between Computer Based Teaching-Learning and Achievement in Mathematics of III standard students.

The major finding was:

i. Computer Based Teaching-Learning method is more effective than traditional method as the achievement of experimental group is more than that of control group.

**Panda et al (2000)** conducted a study on Effect of computer Assisted learning in achieving higher cognitive skills.

The major findings were:

i. Computer assisted learning resulted in greater achievements in all, hierarchies of cognitive domain.

ii. Male students were found to be superior to female students in learning physics.


The major findings were:
i. In the control group 38.63% of students got desirable level of gain score and 60.87% experimental group students got desirable level of gain scores.

ii. There was a high effectiveness in experimental group, when it compared with the control group in their knowledge, understanding and application.

**Meera (1999)** conducted a study on effectiveness of computer assisted instruction in biology learning.

The major finding was:

i. There was no significant difference among different modes of computer based instruction viz. tutorial, drill and practice and lecture method in their effectiveness in realizing the instructional objective in teaching biology at standard XI.

**Rangaraj (1997)** conducted a study on Effectiveness of computer assisted instruction in teaching physics at higher secondary stage.

The major finding was:

i. CAI as support system (CAISS) was much better than CAI as individualized instruction. Retention also higher when taught through CAISS.

**Rama (1996)** conducted a study on the Effectiveness of Computer Assisted Instruction in teaching Mathematics for Standard IX.

The major finding was:

i. Student taught through computer showed greater achievement.

**Sarasa (1992)** conducted a study on supremacy of computer assisted instruction over traditional method in teaching mathematics.

The major finding was:
i. There was a significant difference between the control group and experimental group in their achievement in Geometry.

**Saravanan (1992)** conducted a study on development and validation of a computer assisted instructional package on matrices.

The major findings were:

i. Learning through CAI package produced significant results on the achievement in matrices.

ii. Using the local resource material available, a CAI package on matrices can be synthesized.

iii. The CAI package can serve as a means for repeated drill on matrices till the complete mastery of the concept is achieved.

iv. There was a significant difference between the pre-test and post-test.

**Singh (1992)** conducted a study on the effectiveness of teaching Mathematics through Computer Assisted Instruction and conventional Method of Instruction on Cognitive and Non-cognitive variable.

The major finding was:

i. The group taught through CAI in all the schools showed a substantial progress. Hence teaching mathematics through CAI method was more effective than traditional method.

**Jeyamani (1991)** conducted a study on developing Computer Assisted Instruction (CAI) package in physics for class XI students.

The major finding was:

i. The experimental group performed better on the post test. The difference was insignificant in terms of sex and medium of instructions.

The major finding was:

i. The students taught using computers scored significantly higher than those taught Mathematics through the Conventional method.

ii. The students who used the computer showed a more favorable altitude towards mathematics than those who did not use the computer.

Goel and Agbebi (1990) conducted a study on learning physics through lecture – demonstration method (LDM) and individualized instruction methods.

The major findings were:

i. A significant difference was observed but the groups which followed an individual laboratory method and the lecture demonstration method.

ii. The group of students following the individual laboratory method achieved significantly better on the psychomotor Skills than did the lecture – demonstration group.

iii. Students who followed the demonstration method achieved at a higher level related cognitive skills than did the group of students which followed the individual laboratory method.

Bhattacharya and Madhumita (1989) conducted a study on the use of computers as an instructional tool for teaching chemistry.

The major findings were:

i. The most of the available software adopted the lecture cum demonstration method.

ii. CAI could be applied most effectively to an individual or to a small group.
Celin Mary (1987) conducted a study on the effectiveness of teaching botany through computer programming and comparative study of its use against the traditional method.

The major findings were:

i. There was no significant difference in achievement in the study of the unit on “photosynthesis” between the group taught by programmed material through computer and the group taught through traditional method.

ii. There was no significant difference in the higher level achievement (application level) in the study of photosynthesis between the control group and the experimental group.

Menon (1984) conducted a study on evolving a multimedia approach to teaching at post-graduate level.

The major findings were:

i. In the initial year, around 90% Ph.D students and M.Sc students scored 60% and above marks on the comprehensive criterion test and more than 50% M.Ed students scored more than 60% marks.

ii. In the subsequent year around 90% students scored 75% and more marks.

iii. An improvement trend was witnessed with regard to discussion sessions.

iv. At different stages of implementation of the strategy, the students’ attitude toward the multimedia approach went period of try-out of the strategy of 2 years, the relationship between intelligence and academic achievement was found not significant.

v. The relationship between English comprehension and academic achievement was found significant at 0.01 levels.

vi. The unit cost varied from Rs. 47/- to Rs.32/- for a range of 25 to 50 students if software suitable to be presented through hardware was to be incorporated. The
strategy worked within prescribed periods of time.

**Vardhini (1983)** conducted a study on development of a multimedia instructional strategy for teaching science (Physics and Chemistry) at secondary level.

The major findings were:

i. Almost all the units indicated average/high level of performance on the total test.

ii. The strategy was found valid against the criterion of scientific attitude in that significantly higher performance was noted for the group in the post test over the pre-test.

iii. Validity of the strategy was established from reactions expressed by students for its continuance and also their improvement in science achievement.

iv. Intelligence and achievement using the strategy presented a significant relationship.

v. A significant relationship was found between scientific attitude and achievement for the experimental group and control group.

vi. Visual projection with teacher explanation and those with taped commentary were equally effective in terms of achievement.

vii. Programmed material and discussion sequence were equally effective on the total test.

viii. The strategy was found feasible when seen in terms of its reproducibility and the cost management by individual schools.

**Ravindranath (1982)** conducted a study on the development of multi-media instructional strategy for teaching science (Biology) at secondary school level.

The major findings were:

i. The instructional strategy was effective to the extent that 70% of the experimental
group students obtained 60% and above in all the unit tests and in comprehensive test.

ii. The experimental group students performed better than the control group in the comprehensive test and also in the annual examination conducted by the school authorities.

iii. Development of scientific attitude was significantly higher for the experimental group students.

iv. About 70% students expressed favorable reactions to all the components except towards team teaching.

v. There was positive and significant correlation.

**Basu (1981)** conducted a study on effectiveness of multimedia programmed materials in the teaching of physics.

The major findings were:

i. There were significant differences among the different strategy means on the criterion on overall achievement. It was found that on the criterion of overall achievement the multimedia semi-programmed instruction was better than the strategy of programmed teaching; the multimedia linear programmed instruction was better than the multimedia, semi-programmed instruction; the multimedia branching programmed instruction was better than the multimedia linear programmed instruction; and the multimedia hybrid programmed instruction was better than the multimedia branching programmed instruction.

ii. The strategies of multimedia programmed instruction enabled learners to reach the level of mastery learning.

iii. It was found that a significant difference existed in the achievement through the different strategies due to differences in ability.

The major findings were:

i. The multimedia method is more effective than either the programmed learning method or expository method.

ii. The programmed learning method was more effective than the expository method.

iii. Retention in learning by the multi-media method was higher than by the other two methods.

iv. Retention in learning by the programmed learning group and the expository group was equal.

v. There was no interaction between the three methods of instruction and the levels of intelligence.

2.3 CRITICAL REVIEW

The investigator made a broad review from dissertation abstracts international, Indian Abstracts, Research Journals and found 66 International studies and 36 Indian studies which are closely related to the topic. It is further stated that among 66 international studies, 5 studies were done in teaching General Science, 5 studies were done in knowing awareness on ICT, 8 studies were done in teaching chemistry, 16 studies were done in Mathematics, 15 studies were done in finding the effectiveness of Computer Assisted Instruction in teaching and learning process, but only one was conducted in physics. Out of 36 Indian studies, 9 studies were in teaching mathematics using CAI, 7 studies were done in knowing the awareness level of the teachers, teacher educators and the research scholars, 7 studies were in finding the effectiveness of CAI package in general teaching and learning process, 5 studies were in teaching physics through CAI, 3 studies were in general science and Biology and 2 studies were in chemistry. From the above review it is revealed that no study has been done in finding the effectiveness of teaching computer science through Computer Assisted Instruction.
Rosales (2006) showed that there was no statistically significant difference between the mathematics achievements of the two groups such as students in the Lower Rio grand valley who have participated in CAI and the students who did not participated in CAI. But the finding of Bump, Douglas Edwin (2004) revealed that the mathematics achievement of students participated in a computer mediated program was higher than the other group. These two findings were contradictory to each other and which made the investigator to go deep into her research in this area. With respect to the variables selection the study result of Vinodhkumar (2006) showed that no significant difference was found between boys and girls in their gain scores in both the experimental and control group. These findings were also contradictory to each other. Thus these variations in the findings led to the investigator to choose these variables for her investigation. Further, the study results of Kaliammal and Nirmala Devi (2006), Panda et al (2000) showed that significant difference was found between boys and girls in learning. Michael Shawn (1999) had taken Self-esteem and Classroom interaction as one of the variables in his study. Rothman Alan (2000) proved that non-traditional computer based instruction is significantly improved students’ attitude towards science learning and their level of English language development.

From the review, the investigator came to know that no study was conducted to find the effectiveness of CAI package in teaching computer science. Thus the investigator decided to do choose the topic on teaching pointers concept in C-language. No study has been done in finding the effectiveness of CAI package in developing Computer-efficacy, Meta cognition, Brain dominance, Mathematical and Logical intelligence and Error analysis. Therefore, the investigator decided to include all the above mentioned variables in her study, in addition to the background variables. She entitled her study as “Development of pointer software and its effectiveness on program writing skill among computer science graduate students”.