CHAPTER III

REVIEW OF RELATED LITERATURE
**CHAPTER III**

<table>
<thead>
<tr>
<th>3.1</th>
<th>Introduction</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>Effectiveness of Programmed Learning Material And Computer Assisted Instruction</td>
<td>42</td>
</tr>
<tr>
<td>3.3</td>
<td>Effectiveness of Computer Assisted Instruction In terms of achievement and attitude of students</td>
<td>43</td>
</tr>
<tr>
<td>3.4</td>
<td>Use of Computer Simulation in Labs</td>
<td>51</td>
</tr>
<tr>
<td>3.5</td>
<td>Effect of different modes of Computer Assisted Instruction on achievement.</td>
<td>54</td>
</tr>
<tr>
<td>3.6</td>
<td>Use of feedback by Computers</td>
<td>55</td>
</tr>
<tr>
<td>3.7</td>
<td>Use of Computer Assisted Instruction to improve Reading Skills.</td>
<td>57</td>
</tr>
<tr>
<td>3.8</td>
<td>Effect of Animation on students Visualisation</td>
<td>59</td>
</tr>
<tr>
<td>3.9</td>
<td>Construction and Validation of Computer Based diagnostic model</td>
<td>59</td>
</tr>
<tr>
<td>3.10</td>
<td>Effects of computer upon the computer literacy of teachers.</td>
<td>60</td>
</tr>
<tr>
<td>3.11</td>
<td>Use of Computer Based Evaluation</td>
<td>61</td>
</tr>
<tr>
<td>3.12</td>
<td>Use of Computer as a Professional Tool</td>
<td>61</td>
</tr>
<tr>
<td>3.13</td>
<td>Use of Computer in Special Education</td>
<td>62</td>
</tr>
<tr>
<td>3.14</td>
<td>Conclusion.</td>
<td>62</td>
</tr>
</tbody>
</table>
3.1 INTRODUCTION

All human knowledge can be found in books and in libraries. For any kind of study in the field of knowledge, the research worker needs an adequate familiarity with the related literature.

The study of the previous research done in the concerned field would definitely throw light on the scientific approach of the present investigation. It would also aid the methodology of the present study to the large measure.

At present the teaching-learning process is dominated by the teachers activities. That is to say the teacher is active and the students most of the time are passive. This has led to dissatisfaction both among the teachers and students. Researchers have attempted to modify the teaching-learning process in such a way so that it is dominated by the child rather than by the teacher. This approach lays more emphasis on the child in the teaching-learning process. Because of this different type of instructional materials were developed. These instructional materials although made the child an active learner but the instruction was not child centered. That is to say each child is different and therefore a different type of instructional material be developed with the help of which the child can learn to its maximum capacity. This deficiency to a great extent can be met with the help of the use of computers.
in teaching-learning process. The computers have vast memory, speed and can be used in any manner one likes. It can work without any error.

Computer provides a learning environment that encourages the child. It permits each child to progress at his own pace and helps each child to learn according to his interest, ability and mode of learning.

Due to the impact of educational technology some new ideas have acquired in education. One such idea is that education should be an individual act to a much greater extent. All children should not be forced to go through the same steps of learning at the same speed. The fast learners will move faster in their learning, whereas slow learners will need more time. As Skinner (1968) pointed "one of the great sources of inefficiency in modern education is due to our effort to teach a group of students at the same rate". Thus, the concept of 'individualised instruction' originated which gave way to the idea of Programmed Instruction. But Programmed Instruction has not been a static concept. In 1960, Programmed instruction got identified with programmed material in a linear or experimental purpose as advocated by Skinner. Today emphasis is on mathematical programme and Computer Assisted Instruction. But the broad purpose of Programmed Learning have remained the same. According to Markle (1964) "It is a method of designing reproduceable sequence of instruction events to produce a measurable and constant effect on the behaviour of each and every acceptable student". This
designed sequence may be represented through a variety of devices like a book, machine, TV, Computer etc.

3.2 EFFECTIVENESS OF PROGRAMMED LEARNING MATERIAL AND COMPUTER ASSISTED INSTRUCTION

The effectiveness of Programmed Learning material presented through text and computer came out with the result that individualised instruction can bring one programmer into contact with an indefinite number of students and that this effect on each student would be surprisingly like that of a private tutor. At the same time it was found that programmed material help greatly the students in their conceptual understanding.

Beth Eddinger Wesley, Gerald H. Krockover and Alfred Deveto (1984) studied the effects of Computer Assisted Instruction versus a text mode of Programmed Instruction (PI). 81 Preservice elementary teachers in six section of a science methods class were classified as internally or externally controlled. The sections were randomly assigned to receive instruction in the integrated science process skills via a micro computer or printed text. The study used a pre-test Post Test control group design. Before assessing main and interaction effects, analysis of covariance was used to adjust Post Test scores using the pretest scores. Statistical analysis revealed that main effects were not significant. Additionally, no interaction effects between treatments and loci of control were demonstrated. The results suggest that printed
Programmed Instruction and tutorial Computer Assisted Instruction are equally effective modes of instruction for teaching internally and externally oriented preservice elementary teachers the integrated science process skills.

These findings highlight that incorporation of Computer Assisted Instruction into a classroom may help the students to gain computer literacy.

3.3 EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION IN TERMS OF ACHIEVEMENT AND ATTITUDE OF STUDENTS

As the teaching of mathematics at the school levels through the Computer Assisted Instruction method has been a focus of attention in many countries across the world for the past several years, many research work and studies have been carried out on Computer Assisted Instruction effectiveness.

Sansanwal and Prabhakar (1989) studied the effect of Computer Assisted Instruction when compared to traditional method in terms of achievement of students in the subject maths. The sample comprising of 58 students were randomly divided into two groups. One group was taught through Computer Assisted Instruction called as Experimental group while the other through traditional method called as Control group. Data was collected in respect of Achievement and Intelligence. Achievement was measured with the help of criterion test developed by the investigator. They
concluded that Computer Assisted Instruction was significantly superior to the traditional method. But no significant difference was observed, when the groups were matched with respect to intelligence.

Collenback (1982) reported that no evidence was found to support the conjecture that subjects with the computer programming experience, outperform those with no such experience in problem solving situations in the subject mathematics.

Wright Pamela (1983) conducted a study on Computer Assisted Instruction for remediation in Maths on the secondary level and found Computer Assisted Instruction produced significantly higher achievement as compared to conventional classroom instruction in two selected schools.

Abraham Sandma (1984) proved that the results for criterion reference Mathematics test showed that all the Computer Assisted Instruction students scored higher than the control group students.

Sasser, John Easter (1984), reports that when the study investigated the relationship between methods of Computer Assisted Instruction in Maths and in learning modality preferences of students, it was concluded that the Computer Assisted Instruction group achieved significantly higher gain scores than the visual tutorial group.
Levy, Max Hansy's (1985) research revealed that there was significant gain for the Computer Assisted Instruction group for learning mathematics.

Grady (1986) reported that computer based instruction, used for selected topics for which quality software was available and with effective support from teachers, had significant impact on student's achievements in Maths.

Lalitha and Shailaja (1986) conducted a study on Computer Assisted Instruction in relation to traditional teaching and came out with conclusion that Computer Assisted Instruction was more effective than traditional teaching with reference to imparting knowledge but not so as regards to developing understanding.

Stella (1989) studied that Computer Assisted Instruction material was more beneficial to the average and low achievers when introducing the learning material 'Language of Sets' to standard VIII and there was a significant difference between the performances of the Computer Assisted Instruction group and the traditional Group.

Padma and Chakrabarthy (1990) studied the attitude of high school students towards Computer Assisted Instruction and concluded that significant difference existed between the attitude of boys and girls towards
computer education. They further concluded that there was no difference between tribal and non-tribal students as regards their attitude towards computer education.

Singh, Ahluwalia, Verma (1991) studied and compared the results of the Computer Assisted Instruction and conventional methods of instruction in teaching Maths in the selected 3 units of Maths curriculum of Class IX. In order to study the impact of the sex factor on achievement and attitude, new experimental and control groups were formed by one to one matching on IQ scores. The data obtained on the Pre-Test and Post-Test were processed by calculation 't' of correlated means. In order to confirm any real difference in the relative merits of the methods from school to school, the ANOVA method of analysis was used on the pooled data. Within the confines, set by the conditions of this experiment, the Computer Assisted Instruction method of teaching proved more effective in teaching class IX maths in comparison to the conventional method in each of different categories of schools.

Edward (1978) found that using Computer Assisted Instruction in a college maths class improved the attitude of students towards maths compared to the attitude of students in a non-Computer Assisted Instruction class.
Computer Assisted Instruction can also produce an improvement in students' attitude towards instruction method. Mathis-Smith and Hansen (1970) in order to assess the attitude toward Computer Assisted Instruction, the computer, and subject matter as a result of using Computer Assisted Instruction with the students who used interactive Computer Assisted Instruction for a brief time with other students who read for regular length of time. They found that the attitude of Computer Assisted Instruction group toward Computer Assisted Instruction improved academically when compared to the attitude of the control group. No significant differences in the attitude toward computers or subject matter were found.

Lee (1973) found significant difference between the attitudes of male & female students in a geology class before using Computer Assisted Instruction and after using Computer Assisted Instruction and there was no significant difference after using Computer Assisted Instruction. The change in attitude in this case resulted in improvement in the attitude of female students. Although in the research cited the use of Computer Assisted Instruction did not produce an improvement in the students towards computers in general, it seems possible that such a change might occur if Computer Assisted Instruction were used over an extended period of time and that there might be difference in the attitude of male and female students. Hence Computer Assisted Instruction enhance interest in the subject taught.
Claudis Caven, Caven and Lagowski (1981) studied the effect of use of Computer Assisted Instruction programs on the attitudes towards chemistry and computers. The results of the analysis of covariance for computer attitude showed a significant difference between groups and a significant interaction between groups and sex. Examinations of the means shows that the attitude improvement in chemistry for women in the Computer Assisted Instruction group is the major factor responsible for the significant difference between the groups. No significant difference were found for attitude towards chemistry.

A study was conducted by Zita M. Simutis (1979) to determine the instructional effectiveness of supplementary Computer Assisted Instruction for high school equivalency training in the military. Students in the experimental group scored higher on all measures than did those in the traditional group. Finding indicated that Computer Assisted Instruction can be implemented successfully at an Army education center for use with the students in the lower abilities range.

Carroll, Susan, Balckwell (1995) attempted to study whether teachers were using computers in the instructional process or not and the relationship between attitude towards computer use and the amount of time that these tools were actually used. The subjects included 1175 randomly selected teachers and 70 school principals. The analysis showed that 86% of teachers used computers in the instructional process. The study indicated that
Principal and teachers have positive attitude towards computer. However Principals have more positive attitude towards computers than teachers.

Sampson (1983) studied the difference in achievement of undergraduate students on Computer Assisted Instruction and the traditional lecture type in the learning of counselling. He reported that no significant difference in achievement. However he reported that Computer Assisted Instruction group had significantly more involvement in learning than the other group.

Dvarskas (1983) studied that instruction through Computer Programming had positive influence over the learning ability of Maths word problem.

Ryser, Gail Renee (1990) designed a study to find the effects of computer education on student's achievement, attitude and self esteem. Also to find the relationship between success on computer instruction and personality characteristics. Scores from measure on each of this was gathered. The results showed that there was no significant gain in learning Maths, language but there were interesting student's gain in affective areas such as attitude and self esteem. No sex related difference in achievement, attitude and personality characteristics found. It was concluded that computer
education can be implemented in elementary school in order to reduce sex related difference.

Cosnos, George John (1988) compared the computer based individual instruction with traditional group learning on the performance of 11th and 12th grade students. 52 students of 11th and 12th grade were divided into experimental and control group. A two way analysis of variance indicated that the improvement in achievement in arithmetic in control group but not so in other. Males score higher than female in both the groups.

The study by Hayes Hugh (1987) revealed that the students receiving Computer Assisted Instruction had high gains. Grade level was found to have a significant effect. He concluded that Computer Assisted Instruction can increase the academic gain when delivered in an organised and well planned approach covering the same elements of curriculum through traditional.

Liver Lore Rohert (1987) studied that there was a significant effect on type of learning combined with presentation method on achievement and retention. Achievement and retention scores on memory based was higher than rule based through Computer Assisted Instruction.

Sze, Ding - KUO (1988) analysed the effects of different mastery skills which were used to terminate adaptive computer guided practice (ACGP)
exercises on student achievement on a final exam and attitude towards learning. Results showed that all groups improved from pre to post test but no significant difference among groups on students post test achievement, students time spent on the computer during practice. Overall, students appear to benefit cognitively and affectively from using ACGP with mastery levels of 70%, 80% and 90%.

Schmidt, Susan Carol (1991) studied the effects of an integrated distributive computer network system on student achievement. Significant difference in achievement gains were indicated and found to be effective than traditional in increasing reading, Maths and language achievement.

From the broad review of research studies, it is clear that the Computer Assisted Instruction is related with the achievement and attitude of the students and Computer Assisted Instruction helped the students to achieve better.

3.4 USE OF COMPUTER SIMULATION IN LABS

Laboratory work using a Computer Simulation, of course, may not be effective as hands-on experience for learning specific science concepts. The students work directly with lab equipment. However it is not necessary to discover everything in the lab. Some lab investigations may involve excessive work in setting equipment and in gathering data. They may also involve large
measurement errors that often obscure generalizations students need to make and inhibit the attainment of instructional objectives. Hence students could acquire a wider variety of desirable lab experiences if some conventional lab work were replaced with Computer Simulated Experience.

The study reported by Byung Soon Cho (1989) and Eugene Genna Aro (1989) here compared the effectiveness of using micro computer simulation with that of parallel hands on lab experience in teaching the concept of volume displacement to junior high school students. The study assessed the differential effect on understanding of volume displacement concept by sex of the students related by each method. Sex related differences, favouring boys have been reported. Also the study compared the degree of retention. After 45 days, those students who received instruction using the Computer Simulation experience and those who received instruction using lab experiments and then compared the degree of retention of male and females in both groups. It was found that there were no significant differences in performance when comparing with females using the computer simulation in the learning of displacement concepts. Also showed that there were no significant differences in the retention levels when the scores were compared with those who had the hands-on laboratory experience.
Jones (1972), Caven and Lagowski (1978) found that computer simulated experience was as effective as hands on lab experiences. Hence it is possible to use a Computer Simulated Experience (CSE) in place of lab experience in the teaching of some concepts such as volume displacement concepts and obtain comparable results. In examining the scores on the post test, it appeared that the girls in the Computer Simulated Experience group were helped in their understanding of volume displacement concepts but this assistance is relatively short lived since it seemed to diminish during the 45 days period after the post test. It does not appear that the sex difference in the understanding of volume displacement can be eliminated by the use of computer.

In "A Comparison of Student Achievement Across Three methods of Presentation of Computer based Science Simulation" Sherwood (1985) concluded that large groups of presentation of Computer Simulations were at least effective as were experiences in which students worked together at a micro computer.

An ethnographic study of a science class room using micro computer based labs and learning was studied by Kim, Hyoskin (1989). Teaching science with Micro computer Based Labs (MBL) helped the teacher to become more aware of student's diversity and to tailor his teaching to each
individual. Students became more active in using MBL. The students had their own ways of using Micro computer Based Labs.

Vensel, George's (1989) studies used regression analysis, the variable of pre test, membership in both the groups, (experimental and control) hours of use to determine the significant contribution to the post test while studying the acquisition of process skills using computer delivered science simulations. The variance calculated was low for the above three variables.

The above studies reveal that the retention capacity is improved when computer simulation is used in labs and also the use of micro computer based labs helped teachers to teach better.

3.5 EFFECT OF DIFFERENT MODES OF COMPUTER ASSISTED INSTRUCTION ON ACHIEVEMENT

Radha Mohan (1987) studied the effect of different modes of Computer Assisted Instruction on achievement in Physics of students of higher secondary class. The main objective is to find out if there was a differential effect on achievement as a result of exposure to a particular mode of Computer Assisted Instruction. Intramode comparison revealed improvement in achievement of students in Physics.
The research done by Barnsley, Graham (1989) analysed the effects of Computer Assisted Instruction used in conjunction with concrete manipulative Maths. A first study using female, trainee primary school teacher as subjects compared three treatment groups, via symbolic, pictorial and manipulative modes of presentation and found that pictorial mode to be the most effective compared to others.

Issak, Troy Joel (1988) studied the effectiveness of computerised drill and practice and bisensory input in teaching music reading skills to elementary students. 63 students in grades 2 and 4 were involved and divided as control and two experimental groups. Results indicated that computerised drill and practice was effective as the traditional method and no significant difference among the three groups in both note reading and listening skill test.

Hence from the above study, it is concluded that in learning music reading skills, computerised instruction did not help the students.

3.6 USE OF FEEDBACK ON COMPUTERS

Joseph (1986) found that the use of feedback on micro computers to teach spelling in elementary school could improve the spelling score at the start of the study, while the spelling score remained steady through the middle of the study but declined during the last phase and after completion.
Jay (1986) compared the three feedback strategies i.e., no feedback, feedback providing the correct answer and feedback containing an answer and an explanation of how to determine the answer. The variables that predicted the two feedback pattern were learner's confidence that their answers were correct and learners' success during the course in combination with unidentified sample characteristics. The learners using feedback providing the correct answer strategy achieved significantly higher. The best predictions of achievement were general learning, aptitude and learners' selections of correct response feedback after incorrect answers.

Ann (1987), Miller (1988) and Weaver (1984) studied that the use of word processor on writing of students was helpful for students in composing and editing assignments.

Wainwright (1985) did an excellent job in reporting her study on the effectiveness of a tutorial to teach nomenclature, balancing equation and writing formulae. The students who used the Computer Programme did receive immediate feedback regarding whether or not their formulae and equations were right or wrong with arrows pointing to the errors, but the program did not tell them why they were wrong or how they could improve. While the control group lacked the benefits of immediate feedback, they almost certainly benefited from interacting with an experienced teacher who
could provide commentary with greater depth and explanation. This is not surprising, that she found that the control group performed significantly better than the experimental group on a paper and pencil test. Therefore, Computer Assisted Instruction should enable science teachers and their students to perform activities that complement not simply replace elements of traditional instructions.

Clark Kevin Andrews (1994) studied the effect of different types of computer assisted feedback on achievement and learner response confidence. The study found that there was positive correlation between learner achievement and response confidence for each type of information.

Therefore the above studies conclude that the progress in learning is better if feedback is given by computers.

3.7 USE OF COMPUTER ASSISTED INSTRUCTION TO IMPROVE READING SKILLS

An analysis of the use of computer to teach reading in elementary schools was done by Angkurawaranon (1994). This study employed a descriptive method to analyse the use of computers in reading instructions in Illinois Public Schools with high Illinois Goal assessment programme (IGAP) reading scores. The major findings were
Computers skill do not play an important role in reading programs. Most of the schools used computer as a supplement to the curriculum. While relatively few integrated computer into the reading curriculum.

Kukuchi (1995) studied the effectiveness of Intelligent Computer Assisted Language Instruction in tutoring (ICALI Programme). The focus of the comparison was on the merits of the design features of a ICALI program which generated individualised, explanatory feedback. It includes the theoretical implementations of the current findings. The result favoured the ICALI group in general but did not support the research hypothesis and rejected in favour of null hypothesis.

Levy (1982) made an very interesting study by comparing the effectiveness of reading of the pupils exposed to Computer Assisted Instruction, prescriptive reading instruction and traditional reading instruction. He found that traditional reading was the most efficient compared to other two.

The above studies reveal that Computer Assisted Instruction was not effective in improving the reading skills of the students.
3.8 EFFECT OF ANIMATION ON STUDENT'S VISUALIZATION

The effects of Computer Animation on the particulate mental models of College Chemistry Students was studied by Vivkie M Williamson & Michael R. Abrahamo (1993). The purpose of the study is to investigate the effect of animation on students visualization of Chemistry concepts. The conclusion drawn are firstly conceptual understanding as measured by the particulate nature of matter evaluation test was significantly increased for students who viewed animated sequences depicting particulate behaviour. The animations provided a more scientifically correct visual model for sub-microscope process which are not easily visualized. Secondly students who viewed the animation held a more particulate view of matter. More conservation of particles between drawings and fewer "continuous matter" drawings were evidence of this finding.

3.9 CONSTRUCTION AND VALIDATION OF COMPUTER BASED DIAGNOSTIC MODEL

A study on construction and validation of a computer based diagnostic module on average velocity was discussed by Andaloro, Bellomonte (1993) of Italy. The study is organised in 3 stages. Stage I involves the modeling of students through interviews with students from various school levels about the average velocity concept. Stage II involves the implementation of the computer based diagnostic module. Stage III involves validation through correlation analysis between human and automatic diagnosis. The aims of the
study are to identify the various reasoning procedures used in comparing the average velocity of two moving bodies, to compare the difference in the procedures used by students at different school levels and to analyze the relationship between automatic and human diagnosis in order to identify diagnostic errors. They concluded that this automatic diagnosis can be a useful reliable instrument for high school and university students.

3.10 EFFECTS OF COMPUTER UPON THE COMPUTER LITERACY OF TEACHERS

Micheal T. Battista (1984) and Gerald H. Krockover (1984) studied the effects of Computer use upon the Computer Literacy of preservice elementary teachers using two methods of instruction: Computer Assisted Instruction in an earth science course and Computer Programming in a Maths education course. Computer literacy was measured by the Minnesota Computer Literacy and Awareness Assessment (MCLAA). For each component of Computer Literacy, differences in group post test scores were compared using an analysis of covariance with pretest scores used as the covariate. The results indicated that the treatment given to the Computer Programming Group had little or no effect upon the students Computer literacy, while the treatment given to the Computer Assisted Instruction group had significant effect upon the affective subscale of the MCLAA. A positive effect was indicated on the cognitive subscale of MCLAA. Thus it appears, that an effective method for improving Preservice elementary teacher's Computer
Literacy is to involve them in Computer Assisted Instruction possibly through a science course.

3.11 USE OF COMPUTER BASED EVALUATION

Goel, Renu Mishra (1991) developed a computer based evaluation software on Educational Technology (ET). The Computer Based comprehensive test on ET was administered to the M.Ed students in 2 batches, each having 9 students, 90 items were selected at random out of the total 203 item to be attempted in 90 minutes. The reaction scale was administered to know the reactions of the students towards Computer Based Evaluation.

It is evident from the study that Computer Based Evaluation is quite valid, objective, reliable, accurate, useful systematically organized and comprehensive. The present evaluation system is wanting in accuracy, efficiency, validity, comprehensiveness and reliability. So to increase the accuracy, efficiency and reliability of the evaluation system, it needs to be computerised.

3.12 USE OF COMPUTERS AS A PROFESSIONAL TOOL

The outcome of this study provides assistance for professional inservice trainers, technology coordinators, teacher educators and policy makers who are struggling with the issues of how best they can prepare and
encourage practising teachers to integrate the use of computers into their professional world. The results of the study provide insight for improving training to teachers and contribute to enhancing an environment where teachers are supported in their use of computers as a tool.

3.13 USE OF COMPUTERS IN SPECIAL EDUCATION

A study of micro computer technology in special education in Western Massachusetts schools was done by Hwang Menju (1990). The purpose of this study was to survey Micro Computer application in special education in Western Massachusetts Schools and to assess the extent to which special education is moving beyond drill and practice software.

Teachers used the Micro Computer as a compensatory tool to sharpen student's Maths skills, language art and reading comprehension. Teachers realized computer as a good tool to motivate students and increase self esteem and attention.

3.14 CONCLUSION

To summarize, this review focuses on various aspects of learning through computer. Many studies have been done in the field ‘Mathematics’ and very few research have been done in other subjects.
Studies on attitude towards computer indicate that achievement in the subjects learnt through Computer Assisted Instruction was better. All the studies emphasis on the importance of self activity in learning. More research work is needed in the field of Special education, using Computer Assisted Instruction. Finally the influence of feedback on learning has been analysed and it was proved that progress in learning can be improved with Computer Assisted Instruction which provides immediate feedback and reinforcement.

The review has been helpful in formulating the sample design, framing the hypothesis and deciding the statistical techniques of the present study.