CHAPTER V

Findings, Conclusions, Implications and Suggestions for Further Research
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FINDINGS, CONCLUSIONS AND SUGGESTIONS

5.1 INTRODUCTION

In the previous chapter analysis, interpretation and discussion of the results has been carried out. In this chapter outcomes of the experiment based on the findings of the study and conclusions drawn from them have been presented. Besides, it includes educational implications of research for all those who are concerned with the process of education. This chapter also includes suggestions for further research in this field.

5.2 FINDINGS

The results have been drawn keeping in mind the objectives framed for the study and by testing the hypotheses formulated thereafter. The major findings of the study are as–

A. FINDINGS RELATED TO INDIVIDUAL EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION ON PUPIL'S SELF CONCEPT.

The hypothesis H1, "There will be no significant difference in the mean Self Concept pre-test : post-test scores of the students exposed to Computer Assisted Instruction" is rejected.

This implies that Computer Assisted Instruction is significantly effective in raising the Self Concept of pupils.
B. FINDINGS RELATED TO INDIVIDUAL EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION ON PUPIL'S STUDY INVOLVEMENT.

The hypothesis H2, “There will be no significant difference in the mean Study Involvement pre-test : post-test scores of the students taught through Computer Assisted Instruction” is rejected.

The results indicate that Computer Assisted Instruction is effective in increasing the Study Involvement of pupils as indicated by the significantly higher mean score on post-test as compared to pre-test.

C. FINDINGS RELATED TO INDIVIDUAL EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION ON PUPIL'S ACHIEVEMENT IN SCIENCE.

The hypothesis H3, “There will be no significant difference in the mean Achievement pre-test : post-test scores of the students exposed to Computer Assisted Instruction” is rejected.

The statistical inference indicates that Computer Assisted Instruction is significantly effective in enhancing the Achievement of pupils in Science.

D. FINDINGS RELATED TO INDIVIDUAL EFFECTIVENESS OF COMPUTER MANAGED INSTRUCTION ON PUPIL'S SELF CONCEPT.

The hypothesis H4, “There will be no significant difference in the mean Self Concept pre-test : post-test scores of the students taught through Computer Managed Instruction” is rejected.

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This indicates that Computer Managed Instruction is effective in raising the Self Concept of pupils as indicated by the significantly higher mean score at post-test stage.

E. FINDINGS RELATED TO INDIVIDUAL EFFECTIVENESS OF COMPUTER MANAGED INSTRUCTION ON PUPIL'S STUDY INVOLVEMENT.

The hypothesis H5, "There will be no significant difference in the mean Study Involvement pre-test : post-test scores of the students exposed to Computer Managed Instruction" is rejected.

The statistical inference indicates that Computer Managed Instruction is significantly effective in increasing the Study Involvement of pupils.

F. FINDINGS RELATED TO INDIVIDUAL EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION ON PUPIL'S ACHIEVEMENT IN SCIENCE.

The hypothesis H6, "There will be no significant difference in the mean Achievement pre-test : post-test scores of the students taught through Computer Managed Instruction" is rejected.

This implies that Computer Managed Instruction is more effective in enhancing the Achievement of pupils as indicated by the significantly higher post-test mean score in comparison to pre-test score.
G. FINDINGS RELATED TO THE EFFECT OF COMPUTER ASSISTED INSTRUCTION AND COMPUTER MANAGED INSTRUCTION ON PUPIL'S SELF CONCEPT.

1. The hypothesis H7, "At the post-test stage there will be no significant difference in the mean Self Concept scores of students taught through (i) Computer Assisted Instruction and Computer Managed Instruction is rejected.

(ii) Computer Assisted Instruction and Traditional method is accepted.

(iii) Computer Managed Instruction and Traditional method" is rejected.

The statistical inference indicates that (i) Computer Managed Instruction is significantly more effective in enhancing the Self Concept of the pupils as compared to Computer Assisted Instruction. (ii) Computer Assisted Instruction and Traditional method are equally effective in raising the Self Concept of the pupils. (iii) Computer Managed Instruction is significantly more effective in raising the Self Concept of the pupils as compared to Traditional method.

2. The hypothesis H8, "At the post-test stage there will be no significant difference in the mean gain Self Concept scores of students taught through (i) Computer Assisted Instruction and Computer Managed Instruction is rejected.
(ii) Computer Assisted Instruction and Traditional method is accepted.

(iii) Computer Managed Instruction and Traditional method” is rejected.

It implies that (i) Computer Managed Instruction is significantly more effective in enhancing the Self Concept of the pupils as compared to Computer Assisted Instruction. (ii) Computer Assisted Instruction and Traditional method are equally effective for enhancement of the Self Concept of the pupils. (iii) Computer Managed Instruction is significantly more effective in enhancing the Self Concept of the pupils as compared to Traditional method.

H. FINDINGS RELATED TO THE EFFECT OF COMPUTER ASSISTED INSTRUCTION AND COMPUTER MANAGED INSTRUCTION ON PUPIL’S STUDY INVOLVEMENT.

1. The hypothesis, H9, “At the post-test stage there will be no significant difference in the mean Study Involvement scores of students taught through

   (i) Computer Assisted Instruction and Computer Managed Instruction is accepted.

   (ii) Computer Assisted Instruction and Traditional method is rejected.

   (iii) Computer Managed Instruction and Traditional method” is rejected.
It becomes evident that (i) Computer Assisted Instruction and Computer Managed Instruction are equally effective in increasing the Study Involvement of pupils (ii) Computer Assisted Instruction is significantly more effective in increasing the Study Involvement of the pupils as compared to Traditional method. (iii) Computer Managed Instruction is significantly more effective in increasing the Study Involvement of the pupils as compared to Traditional method.

2. The hypothesis, H10, “At post-test stage there will be no significant difference in the mean gain scores of Study Involvement of students taught through

(i) Computer Assisted Instruction and Computer Managed Instruction is accepted.

(ii) Computer Assisted Instruction and Traditional method is rejected.

(iii) Computer Managed Instruction and Traditional method” is rejected.

This implies that (i) Computer Assisted Instruction and Computer Managed Instruction are equally effective in increasing the Study Involvement of pupils (ii) Computer Assisted Instruction is significantly more effective in increasing the Study Involvement of the pupils as compared to Traditional method. (iii) Computer Managed Instruction is significantly more effective in increasing the Study Involvement of the pupils as compared to Traditional method.
I. FINDINGS RELATED TO THE EFFECT OF COMPUTER ASSISTED INSTRUCTION AND COMPUTER MANAGED INSTRUCTION ON PUPIL'S ACHIEVEMENT IN SCIENCE.

1. The hypothesis H11, "At post-test stage, there will be no significant difference in the mean Achievement scores of students taught through

   (i) Computer Assisted Instruction and Computer Managed Instruction is rejected.

   (ii) Computer Assisted Instruction and Traditional method is rejected.

   (iii) Computer Managed Instruction and Traditional method" is rejected.

   The statistical inference indicates that (i) The group of pupils taught Science through Computer Managed Instruction showed significantly higher mean scores on Achievement in Science than the group of pupils taught Science through Computer Assisted Instruction. (ii) The group of pupils taught Science through Computer Assisted Instruction were found to have significantly higher mean score on Achievement in Science than the group of pupils taught Science through Traditional method. (iii) The group of pupils taught Science through Computer Managed Instruction showed significantly higher mean scores on Achievement in Science than the group of pupils taught Science through Traditional method. In other words, Computer Managed Instruction is found to be significantly more effective in raising the
Achievement of pupils as compared to Computer Assisted Instruction and Traditional method.

2. The hypothesis H12, "At post-test stage there will be no significant difference in the mean gain Achievement scores of students taught through

(i) Computer Assisted Instruction and Computer Managed Instruction is rejected.

(ii) Computer Assisted Instruction and Traditional method is rejected.

(iii) Computer Managed Instruction and Traditional method" is rejected.

The results indicate that (i) Computer Managed Instruction is more effective in raising the Achievement of pupils in Science as compared to Computer Assisted Instruction. (ii) Computer Assisted Instruction is significantly more effective in raising the Achievement of pupils in Science as compared to Traditional method. (iii) Computer Managed Instruction is significantly more superior in enhancing the Achievement of pupils in Science as compared to Traditional method. In other words, Computer Managed Instruction is found to be significantly more superior and effective in raising the Achievement of pupils in Science as compared to Computer Assisted Instruction and Traditional method.
5.3 CONCLUSIONS

On the basis of the above findings, the following conclusions have been drawn –

1) It has been found that the post-test mean Self Concept score of the pupils of Experimental group E1 were significantly higher than pre-test score. This suggests that the pupils who were taught Science through Computer Assisted Instruction have significantly improved in Self Concept.

2) It has been found that the post-test mean score of the pupils of experimental group E1 was significantly higher in comparison to pre-test score. This suggests that Computer Assisted Instruction is effective in increasing the Study Involvement of the pupils.

3) The results of the study showed that the mean post-test Achievement score of the pupil of experimental group E1 were significantly higher than mean Achievement score of pre-test. This concludes that Computer Assisted Instruction is effective in raising the Achievement of pupils.

4) It has been found that the post-test mean Self Concept score of the pupils of Experimental group E2 were significantly higher in comparison to pre-test score. This suggests that the pupils who were taught Science through Computer Managed Instruction have significantly improved in Self Concept.
5) It has been found that the post-test mean score of the pupils of experimental group E2 was significantly higher in comparison to pre-test score. This suggests that Computer Managed Instruction is effective in increasing the Study Involvement of the pupils.

6) The results of the study showed that the mean post-test Achievement score of the pupil of experimental group E2 were significantly higher than mean Achievement score of pre-test. This concludes that Computer Managed Instruction is effective in raising the Achievement of pupils.

7) It has been found that the post-test Achievement score and the mean gain Achievement score of the pupils of experimental group E1 and those of the control group C differ significantly in favour of experimental group E1. This implies that the pupils who were taught Science through Computer Assisted Instruction have shown significant improvement in their Achievement in Science than the pupils who received instruction through Traditional Method. This suggests that Computer Assisted Instruction has contributed in raising the Achievement of pupils in Science.

8) It has been found that the post-test Achievement score and the mean gain Achievement score of the pupil of experimental group E2 and those of the control group C differ significantly in
favour of experimental group E2. This implies that the pupils who were taught Science through Computer Managed Instruction have shown significant improvement in their Achievement in Science than the pupils who received instruction through Traditional Method. This suggests that Computer Managed Instruction has contributed in enhancing the Achievement of pupils in Science.

9) The results of the study showed that the pupils of experimental group E2 achieved significantly higher mean score than the pupils of experimental group E1. The mean gain score of Achievement of the pupils of the experimental group E2 was also found to be significantly higher than the mean gain score of the pupils of experimental group E1. This suggests that the Computer Managed Instruction is better than Computer Assisted Instruction in raising the Achievement of pupils in Science.

10) The results of the study showed that the pupils of the experimental group E2 achieved significantly higher mean score on the test of Self Concept than the pupils of the experimental group E1. Mean gain score of the pupils of the experimental group E2 was also found to be significantly higher than that of the pupils of the experimental group E1. Thus, it can be safely concluded that Computer Managed Instruction is more effective
than Computer Assisted Instruction in improving their Self Concept.

11) It has been found that the post-test Self Concept score and the mean gain Self Concept score of the pupil of experimental group E2 and those of the control group C differ significantly in favour of experimental group E2. This implies that the pupils who were taught Science through Computer Managed Instruction have shown significant improvement in their Self Concept than the pupils who received instruction through Traditional Method. This suggests that CMI has contributed in raising the Self Concept of pupils.

12) The results of the study showed that there was no significant difference between post-test Self Concept score and the mean gain Self Concept score of the pupils of experimental group E1 and those of the control group C. This implies that pupils who were taught Science through Computer Assisted Instruction have not shown significant improvement in raising the Self Concept of the pupils than the pupils who received instruction through Traditional Method. Thus, Computer Assisted Instruction was not effective in raising the Self Concept of the students.

13) It has been found that the post-test Study Involvement score and the mean gain Study Involvement score of the pupil of
experimental group E1 and those of the control group C differ significantly in favour of experimental group E1. This implies that the pupils who were taught Science through Computer Assisted Instruction have shown significant improvement in enhancing Study Involvement than the pupils who received instruction through Traditional Method. This suggests that Computer Assisted Instruction has contributed in enhancing the Study Involvement of pupils.

14) The results of the study showed that pupils of the experimental group E2 achieved significantly higher mean score on Study Involvement than the pupils of the control group C. Mean gain score of the pupils of the experimental group E2 was also found to be significantly higher than that of the pupils of the control group C. Thus, it can be safely concluded that Computer Managed Instruction is also effective than Traditional Method in enhancing the Study Involvement.

15) The results of the study showed that there was no significant difference between post-test Study Involvement score and the mean gain Study Involvement score of the pupils of experimental group E2 and those of the experimental group E1. This implies that pupils who were taught Science through Computer Managed Instruction have not shown significant improvement in enhancing the Study Involvement of the pupils
than the pupils who received instruction through Computer Assisted Instruction. Thus, Computer Managed Instruction and Computer Assisted Instruction were equally effective in enhancing the Study Involvement of the students.

In conclusion, the Computer Managed Instruction has been shown to be an effective educational tool in teaching Science. However, it may not be able to stand alone. Though Computer Assisted Instruction was found significantly favourable yet Computer Managed Instruction was significantly more favourable.

It can be concluded that both Computer Managed Instruction and Computer Assisted Instruction improved significantly the scores of the pupils of experimental group E2 and those of experimental group E1 as far as their Study Involvement is concerned. Also, both the modes of teaching i.e. Computer Assisted Instruction and Computer Managed Instruction were helpful in raising the Self Concept of the pupils as well as the Achievement in Science.

5.4 EDUCATIONAL IMPLICATIONS
In the current scenario of education, the role of teacher and the methods of teaching are changing dynamically. The teacher is burdened with the responsibilities of imparting knowledgeable education and to encourage the students to adopt the knowledge. The computer is finding an important place in current teaching system. Multimedia instruction is currently being used in variety of ways across discipline in
elementary, secondary and higher education. The present study has a wide range of implications in the field of education. Some of the implications are given below:

1) The use of Computer Assisted Instruction and Computer Managed Instruction lead to more positive attitude towards computer. Thus when taught through computer the student feels more involved in studies which helps significantly in raising their Achievement.

2) With the help of Computer Assisted Instruction and Computer Managed Instruction, the teacher is freed of the administrative burden. They, thus would be able to devote more time to the task of helping students for which they are trained. Moreover, the students will also enjoy a course of study, which is tailored to the individual needs and enriched with ample feedback to guide them in their studies. A computer will act in supportive role in the background, where it will help to manage the learners learning and process the information quickly and accurately.

3) Educational tutorial given through Computer Assisted Instruction and Computer Managed Instruction motivates the students sufficiently to sustain their interest in the process of learning.

4) Traditional method of teaching if supplemented with Computer Assisted Instruction can prove to be more effective in enhancing
achievement. This is supported by the finding of Kulik 1983, 1985; Kulik, Bangert, and Williams 1983; Roblyer 1988.

5) Computer Assisted Instruction and Computer Managed Instruction modes of teaching needs to be introduced for teaching science as they significantly enhance Academic Achievement among pupils. This is also supported by the findings already conducted in this field by Prabhakar (1989); Himani (1990); Mahapatra (1991).

6) Quality computer program, which include colorful animations, graphic displays, form a versatile and effective alternative change in instructional strategy. An excellent science course may be taught without the use of a computer, however, the careful incorporation of computers for teaching science course will help the students to grasp the basic concepts of Science.

7) Psychomotor skills can be learnt better through electronic media and communication technology because they work as a live teacher and guide the learner more effectively.

8) There is a need for greater intervention of National and State government to give directions in planning for relevant courses, staff development and student support services with Computer Assisted Instruction and Computer Managed Instruction. The teachers at pre-service stage as well as in-service stage need to be trained in the application of Computer Assisted Instruction.
and Computer Managed Instruction so that they are able to develop tasks in their subjects according to these modes.

9) Computer Assisted Instruction and Computer Managed Instruction can make teacher instruction more informative as the teacher will take the help of software program, which will make it easier for the students to correlate the topic with day to day activities.

10) With Computer Assisted Instruction and Computer Managed Instruction students' progress at their own speed, which is particularly advantageous in mixed ability situations. This leads to individualization of instruction and students move at their own pace, thus gifted are not bored, slow learners are not rushed and shy students are not embarrassed. As such Computer Assisted Instruction and CMI modes of teaching studied here in and their discernible impact has an important bearing in the present context.

11) The failure of educational technology can be attributed to many reasons. Jalihal (1970) attributed the ineffectiveness of conventional education technology to overburdened teachers and inadequate library facilities. These shortcoming can be overcame with the help of Computer Assisted Instruction and Computer Managed Instruction.
12) Computer Assisted Instruction should find a permanent place in school time table. If teacher and teacher educator are open minded in the use of computer as a tool for education then computer machines can be better utilized for education.

13) "Science for All" and "Scientific Literacy" are matters of great concern for the under developed and developing countries like India. This requires systematic and comprehensive strategies for creating a congenial learning environment for teaching process in Science. Computer Assisted Instruction and Computer Managed Instruction modes of teaching, if used, as teaching strategies can be an effective mode as they are alternative to "Learning By Doing" or even "Child Centered Approach". Learning science through them becomes an interesting and lively activity.

14) The Computer Assisted Instruction and Computer Managed Instruction modes of teaching have an important role in bringing about an enrichment in teaching learning process; they could serve as a instructional approaches to manage the classroom activities in order to achieve a variety of educational objectives. Computer Assisted Instruction and CMI are more appropriate to particular pupil needs.
5.5 SUGGESTIONS FOR FURTHER RESEARCH

In India, the use of Computer Assisted Instruction and Computer Managed Instruction in Science education has remained almost completely unexplored. Very few number of studies has been conducted in this direction. Based on the findings of current study, some of the suggestions for further research in the area of Computer Assisted Instruction and Computer Managed Instruction are identified as follows-

1) The present study has been conducted only on limited topics of Science syllabus, more studies may be conducted involving larger content of the curriculum and different subjects.

2) The present study has been conducted on Class VII. To confirm the findings of the present study it is desirable to investigate the effect of Computer Assisted Instruction and Computer Managed Instruction on Achievement of learners of different Grade levels, Sex, Intellectual level, Socio Economic status and Subject areas.

3) The similar study can be extended to a larger sample and for longer span of time.

4) Further research can be conducted to explore the effectiveness of Computer Assisted Instruction and Computer Managed Instruction on disadvantaged groups such as backward, low achievers, mentally retarded and gifted.
5) Similar studies may be conducted to compare the effectiveness of Computer Assisted Instruction and Computer Managed Instruction with other instructional modes.

6) Effectiveness of Computer Assisted Instruction and Computer Managed Instruction may be studied in relation to other variables such as group size, creativity, economic background, age, cognitive style, personality and classroom climate etc.

7) The study indicates that Computer Managed Instruction and Computer Assisted Instruction is an effective intervention for improving students academic Achievement. Further research is needed to predict and explain how Computer Assisted Instruction and Computer Managed Instruction can become more effective instructional tool, because there are many instructional factors that positively affect student learning outcome i.e. co-operative learning, individualized instructions, sequenced lessons and class size etc.

8) The study may be replicated on rural, tribal and slum population where chances of dropouts and failures are high. The present study was carried out on a sample taken from an urban school situated at Delhi; studies can be conducted on schools located in rural areas.

9) Future researches should generate research pertaining to why Computer Assisted Instruction helps some students to learn in
some areas, more so, than in others, such research could be useful in exploring how Computer Assisted Instruction might enhance specific type of learning, singularly or in collaboration with others educational interventions.

10) Students' interest or willingness to study through Computer Assisted Instruction and Computer Managed Instruction may be probed and their effect on motivation may be studied in a longitudinal manner.