CHAPTER-VI

SUMMARY AND SUGGESTIONS
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6.1 SUMMARY

The research work carried out by the investigator, and the findings arrived at the summed up in this chapter under appropriate headings along with delimitations, implications of the study and suggestions made for further research.

6.2 INTRODUCTION

Perhaps the most difficult problem of classroom organization is dealing with the fact that students come into class with different knowledge skills, learning rate and motivation. This problem requires teachers to provide appropriate levels of instruction. Teaching a class of thirty students or even a class of eight is fundamentally different from one-to-one tutoring because of the inevitability of student to student differences that affect the success of instruction.

Teachers can always be sure that if they teach one lesson to the whole class, some students will learn the material more quickly than others, in fact some students may not learn the lesson at all because they lack important pre-requisite skills or are not given adequate time (because to give them enough time would waste too much of the time of those students who learn rapidly). Recognition of these instructionally important differences leads many teachers to search for ways of individualizing instruction, adapting instruction to meet student’s different needs or groping students according to their abilities. One such way is CAAP which very much caters to individual differences.

Also, one cannot conceive of any all around national development without ensuring adequate human resource development. Effective and optimum utilization of
other resources also depend on the degree of human resource development. Children of today are the citizens of tomorrow and they are going to be the pillars of this country. Hence it is very essential to ensure that each pillar is as strong as the other. This warrants a special instructional strategy for all the categories of students’ i.e. below average, average and above average students. The traditional lecture method does not serve this purpose well. It does not cater to individual differences. So there us a greater need for a strategy which can be effective both to the endowed and the ignored. Since education functions as the king pin of national development, we have to ameliorate the learning process all the categories of students. This warrants a special instructional strategy. Computer Assisted Activity Package (CAAP) is such a strategy.

The traditional teacher depends on verbal exposition. But considerable visualizations of objects and process are essential for formulation of accurate concepts. What impact a visual presentation can do, any amount of verbal exposition cannot do. An appropriate educational technology in the hands of a competent teacher can ensure better teaching learning process. Moreover, in a fast developing world where knowledge explosion is taking place in every sphere, it is unreasonable to expect that the spoken or written words alone could convey the volume of relevant information to all the categories of students. The need of the hour is auto learning by students. So the instructional strategy which emphasizes auto learning can alone accommodate student’s differences and promote mastery learning. Such an instructional strategy is Computer Assisted Activity Package (CAAP).

Mathematics has its roots deep in the soil of everyday life and is basic in our highest technological achievements. We use mathematics when we count the lumps of sugar for our breakfast cup of coffee. Build our houses, erect lofty skyscrapers, construct imposing bridges, assemble radios or put together supersonic airplanes. It is reputed to be
and actually is the most abstract and the moot hypothetical of the science. Hence, it is but natural that students encounter varied problems in learning mathematics. The worst suffers in this respect are the backward children who lack the capability and the skills for abstract thinking and problem solving skill required for learning mathematics. Moreover, the very fact that mathematics is the mother of all sciences emphasizes the need to probe into the causes of learning difficulties in mathematics and to evolve a special instructional strategy for the backward students so that they can circumvent their weak or deficient areas and make an adequate learning of mathematics. Computer Assisted Activity Package (CAAP) is such an instructional strategy.

Computer Assisted Activity Package (CAAP)’s are self-contained and auto-instructional material. It caters to individual differences. Each student can take his own time to complete the Computer Assisted Activity Package (CAAP). Here, what matters much is mastery of the subject, not the time. So this Computer Assisted Activity Package (CAAP)’ is very suitable to even backward students.

All the research studies reviewed have established that the computer assisted instruction is effective not only to bright students but also to backward students. There is only one study conducted by Reddy and Ramar which measures the impact of Computer Assisted Activity Package on achievement of low achiever in mathematics. Only few studies were attempted to develop CAAP for slow learners. Apart from this study there are only few attempts were made Computer Assisted Activity Package (CAAP) to teach mathematical concepts. Hence in this study an attempt is made to find out and measure the effectiveness of Computer Assisted Activity Package (CAAP) on the achievement of slow learners in learning mathematical concepts at eighth standard level.
6.3 TITLE OF THE PROBLEM

“Effectiveness of Computer Assisted Activity Package (CAAP) in Learning Mathematical Concepts by Middle School Slow Learners”

6.4. OBJECTIVES OF THE STUDY

GENERAL OBJECTIVES

1. To develop and apply Computer Assisted Activity Package (CAAP) to teach Mathematical Concepts to the Middle School Slow Learners.
2. To find out the achievement of the students in Standard VIII when Mathematical Concepts is taught through Computer Assisted Activity Package (CAAP).
3. To assess the relative effectiveness of Computer Assisted Activity Package (CAAP) with reference to various categories of students.
4. To assess whether Computer Assisted Activity Package (CAAP) has any distinct advantage over the traditional lecture method.

SPECIFIC OBJECTIVES

1. To develop a diagnostic test to identify slow learners at middle school level
2. To identify slow learners at middle school level
3. To develop the Computer Assisted Activity Package (CAAP) for teaching Mathematical Concepts to the Middle School Slow Learners.
4. To find out the significant difference between the pre-test mean achievement scores of slow learners of control group students and experimental group students’
5. To find out the significant difference between the post-test mean scores of the control group slow learners and the experimental group slow learners’
6. To find out the significant difference between the pre-test mean scores of the above average students in the control group and the experimental group’

7. To find out the significant difference between the post-test mean scores of the above average students in both the group

8. To find out the significant difference between the pre-test mean scores of the average students in the control group and the experimental group’

9. To find out the significant difference between the post-test mean scores of the average students in both the group

10. To find out the significant difference in the performance of the control group slow learners in the pre-test and the post-test’

11. To find out the significant difference between the pre-test and the post-test scores in respect of slow learners in the experimental group’

12. To find out the significant difference in the performance of the above average students between the pre-test and the post-test’

13. To find out the significant difference between the pre-test and the post-test scores in respect of above average students in the experimental group’

14. To find out the significant difference in the performance of the average students between the pre-test and the post-test’

15. To find out the significant difference between the pre-test and the post-test scores in respect of average students in the experimental group’

16. To find out the significant difference between the pre-test mean scores of control group students and experimental group students as a whole
17. To find out the significant difference between the post-test mean scores of the control group students and the experimental group students as a whole’

18. To find out the significant difference in the pre-test performance among the control group various categories of students i.e. above average students, average students and slow learners

19. To find out the significant difference in the post-test performance among the various categories of students i.e. the above average students, average students and the slow learners in the control group’

20. To find out the significant difference in the pre-test performance among the experimental various categories of students i.e. above average students, average students and slow learners’

21. To find out the significant difference in the post-test performance among the various categories of students i.e. the above average students, average students and the slow learners in the experimental group’

22. To find out the significant difference in the mean gain achievement scores of slow learners of control and experimental group

23. To find out the significant difference in the mean gain achievement scores of above average students of control and experimental group

24. To find out the significant difference in the mean gain achievement scores of average students of control and experimental group

25. To find out the opinion among experimental group students towards computer Assisted Activity Package (CAAP)
6.5 ASSUMPTIONS

1. It is possible to develop and apply computer assisted activity package to teach mathematics’ at Eighth standard level
2. Achievement of the slow learners increases when mathematics is taught through Computer Assisted Activity Package (CAAP).
3. Computer Assisted Activity Package (CAAP) is effective to various categories of students but the relative effectiveness may differ from category to category.
4. Computer Assisted Activity Package (CAAP) has distinct advantage over the traditional lecture method.

6.6 HYPOTHESES OF THE STUDY

1. There is no significant difference between the pre-test mean achievement scores of slow learners of control group students and experimental group students’
2. There is a significant difference between the post-test mean scores of the control group slow learners and the experimental group slow learners’
3. There is no significant difference between the pre-test mean scores of the above average students in the control group and the experimental group’
4. There is significant difference between the post-test mean scores of the above average students in both the group
5. There is no significant difference between the pre-test mean scores of the average students in the control group and the experimental group’
6. There is significant difference between the post-test mean scores of the average students in both the group
7. There is no significant difference in the performance of the control group slow learners in the pre-test and the post-test’

8. There is significant difference between the pre-test and the post-test scores in respect of slow learners in the experimental group’

9. There is no significant difference in the performance of the above average students between the pre-test and the post-test’

10. There is significant difference between the pre-test and the post-test scores in respect of above average students in the experimental group’

11. There is no significant difference in the performance of the average students between the pre-test and the post-test’

12. There is significant difference between the pre-test and the post-test scores in respect of average students in the experimental group’

13. There is no significant difference between the pre-test mean scores of control group students and experimental group students as a whole

14. There is significant difference between the post-test mean scores of the control group students and the experimental group students as a whole’

15. There is a significant difference in the pre-test performance among the control group various categories of students i.e. above average students, average students and slow learners

16. There is a significant difference in the post-test performance among the various categories of students i.e. the above average students, average students and the slow learners in the control group’
17. There is a significant difference in the pre-test performance among the experimental various categories of students i.e. above average students, average students and slow learners’

18. There is a significant difference in the post-test performance among the various categories of students i.e. the above average students, average students and the slow learners in the experimental group’

19. There is a significant difference in the mean gain achievement scores of slow learners of control and experimental group

20. There is a significant difference in the mean gain achievement scores of above average students of control and experimental group

21. There is a significant difference in the mean gain achievement scores of average students of control and experimental group

22. There exist positive opinion among experimental group students towards computer Assisted Activity Package (CAAP)

6.7 SCOPE OF THE STUDY

The investigator intended to find out the effectiveness of computer assisted activity package for middle school slow learners in learning mathematical concepts. It is evident that the teachers should develop some innovative instructional package to teach the slow learners. Nowadays, it is very essential for the teacher to update themselves to prepare computer based instructional materials which will be flexible enough to meet out the challenges in educating slow learners. In this technology era computer plays a vital role in the teaching and learning process. Computer based education and computer based instruction are the broadest terms and can refer to
virtually any kind of computer use in educational settings. Computer assisted instruction is a self learning technique which involves interaction of the student with programmed instructional materials. It is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place. The slow learners are those who have the ability to learn necessary academic skills at a rate and depth below average of same age peers. They need more time, more repetition and often more resources from teachers to be successful. Modular instruction proves to be suitable for slow learners. It is conducive to slow learners as it provides unique experience to the learners in respect of the presentation of the content. It caters to the individual differences. It ensure the need of slow learners to learn at their own pace and computer assisted activity package will certainly help the slow learners to proceed on their own speed. Realizing this investigator had intended to introduce the computer assisted activity package for the slow learners. The prime focus of the study is to develop computer assisted activity package for the slow learners. The study also aimed at identifying the slow learners. It also focuses its attention to find out the effectiveness of Computer assisted activity package for slow learners. This study also tried to find out the relative effectiveness of computer assisted activity package for above average and average students. Thus the present study assesses the effectiveness of computer assisted activity package for slow learners at secondary level.

6.8 NEED AND IMPORTANCE OF THE STUDY

The computer is one of the most wonderful inventions of the twentieth century. It has significantly changed many aspects of human life. The effects of this invention have also been seen in education. During the 1990’s computers took over many significant roles of human life. Ever since their invention, computers have been utilized for
everything from a basic calculator to the most complex of work in the aerospace industry. This is why many researchers considered computers as the best invention of the twentieth century. Computers have not only been playing many roles in different professional fields but have also made many things possible such as: saving huge amount of data, easing communication, easily doing complex calculations, examining artificial intelligence, and even controlling/running huge plants and factories. Their storage capacity and functionality have been ever increasing. A computer can store everything from a news article to a whole three-hour long movie in their internal or external storage devices. A hugely important function of the computer is that it is designed to enable people to access information quickly. It does not matter whether information is stored within a computer or available online – it can be accessed with ease. Computers are popular because they are user friendly. With just a basic level of training anybody may learn to work a computer. Even children may be able to use them comfortably. Because of these qualities, computers have been widely used in the field of education at all levels. The incorporation of computer technology in education has also triggered many kinds of discussion among educators and researchers. What might be the proper role of computers in education and how much instruction might be based on computers are a few of the questions researchers have been studying recently. Recently studies are being designed to answer some of those questions.

Teaching effectively is the most important of all the competencies required of a successful teacher. Since effective teaching deals with the needs, interest and abilities of pupils as individuals, it requires knowledge of the environment in which the pupil lives. The development problem he or she faces and his / her mental abilities. It is more true so when the teacher is dealing with below average students. It also calls for an understanding of the learning process essential for creating an environment where learning can take
place and for making instruction so stimulating that every pupil will be motivated to
learn. Stimulating pupils to think critically independently and creatively is essential for
effective teaching.

Effective teaching in any subject depends largely upon the introduction of newer
methods of instruction. There is growing need for trying out newer methods of instruction
and establishing their effectiveness in teaching. Now-a-days a teacher cannot depend on
any single method of teaching. The teacher has to try out several innovative methods to
present the content to the students. When they are taught by innovative methods the
students are able to understand the concept, principles and content in an effective manner.

Computer Assisted Activity Package (CAAP) helps to stimulate interest in
learning. It economizes time and effort, reduces verbalism in teaching and imparts broad
education to pupils.

In the era of instructional technology it is not proper to devise any instructional
strategy without media application. The impact made by Computer Assisted Activity
Package (CAAP) on achievement of students is immense. Hence there is an urgent need
to experiment the effectiveness of Computer Assisted Activity Package (CAAP) and to
assess their advantages over the Traditional Lecture method. In Indian setting, studies
have been made by Ramar (1996) to establish and to measure the effectiveness of
substantiated the effectiveness of Computer Assisted Activity Package (CAAP) Approach
in teaching mathematics, science and social science to low achievers at class V level. But
no study has been taken up covering all the categories of students. Systematic researches
are therefore necessary to develop Computer Assisted Activity Package (CAAP)
programmes as to assess their effectiveness in teaching mathematics.
The present study is an attempt to develop Computer Assisted Activity Package (CAAP) for Mathematics and to measure their effectiveness at VIII and also to assess their advantage over the chalk and talk method. Presently this study will help future researchers to get information and conduct further research in the field of Computer Assisted Activity Package (CAAP). Using this study, educators will be able to develop ideas on working with computer based instructional materials. This study would be an addition to the knowledge in the field of computer assisted instruction. This study will help planners to plan courses that require the use of computer based instructional materials in Middle schools in Tamil Nadu.

6.9 METHODOLOGY

The various steps followed in the methodology of study, are development of modules for certain units of math’s at Eighth standard level, construction of achievement test, sampling technique, design of the study. Administration of tool for pre-test and post-test was done and employing appropriate statistical technique.

6.10 RESEARCH DESIGN

Pre test – Post test Equivalent group Experimental design was adopted in the present study. Sixty students of standard VIII of Govt. Higher secondary school Puthamboor were selected for this study. Thirty of them constituted the control group and the rest of them formed the experimental group based on the rank order of half yearly mathematics marks. These two groups were further divided in with equal number of slow learners, average students and above average students. In the experimental group experimental group I consisted of slow learners, experimental group II contained average students and experimental group III comprised above average students. The main focus of this study is to measure the effectiveness of Computer Assisted Activity Package (CAAP)
in learning mathematical concepts by middle school slow learners and to assess its advantage over the traditional lecture method in promoting the achievement of slow learners in Mathematics at Eighth standard. To compare its effectiveness over other categories of students above average and average students were also taken for the study. For this purpose three experimental groups and three control groups were formed.

6.11. DEVELOPMENT / APPLICATION OF COMPUTER ASSISTED ACTIVITY PACKAGES (CAAP)

To examine the effectiveness of Computer in teaching Mathematics, the Computer Assisted Activity Package (CAAP) was developed to teach selected portion of mathematics to the students of Class VIII. A computer expert was consulted for the purpose and it was discussed with him how to develop software for Computer Assisted Activity Package (CAAP) for the Eighth standard mathematics. Though there are various Computer Assisted Activity Package programmer such as “drill and practice programer” “tutorial programer”, the investigator decided to follow the first one i.e., drill and practice programer since this is the most widely used type of computer programmer (Slavin, 1986). The purpose of this programmer was to provide practice on skills and knowledge so that students can remember and use they what have been taught.

The methodology involves repetition of a format in which the computer presents an exercise, the student types in response, and the computer informs the student if the answer is correct. Diagrams and sketches were also incorporated in the software in appropriate places through scanning procedure. For subjects and units different codes were allotted. The software was prepared in such a way that it ensured the following

1) Letting students work at their own place.
2) Providing immediate feedback and reinforcement
3) Measuring performance quickly and giving students information on their performance.

The software had to be developed in Tamil language since it is a rare phenomena here. The software had to be developed in Tamil language since it was meant for Tamil medium students. Once the programming was over, it was subjected to tryouts. In the tryouts the students expressed that it was more conducive for learning at their own pace. Also they found it more effective since the interaction with the computer had a motivating quality of its own. After this, the software for Computer Assisted Activity Package (CAAP) programmer was made ready for the use of the experimental group students.

6.12. CONSTRUCTION OF ACHIEVEMENT TEST

To measure the performance of the students before and after the experiment, an achievement test was constructed by the investigator on basis of item analysis. Out of 140 objective type items, 100 items were finally selected on the basis of item analysis for the final form of the achievement test. Each item was scored ‘one’ mark for the correct response and ‘zero’ for the wrong response. The duration of the test was 2 hours. The same achievement test was used as pre-test and post-test for all the groups mentioned in the study.

6.13. SAMPLE DESIGN

For the purpose of the investigation 60 students of VIII standard from Governmentt High School. Puthamboor were selected. They were divided into two halves to constitute the experimental group and the control group. They were selected on the basis of their performance in the half yearly examination. It was ensuring that each group had 10 numbers each of above students, average students and slow learners forming
experimental group and control group I, experimental group and control group II and experimental group and control group III.

6.14 DATA COLLECTION

At the end of the experimental period to assess the effectiveness of the experimental treatment an achievement test known as post-test was administered to the experimental group students and the control group students. The responses given by both the groups formed the vial data required for analysis. The scores of the control group and the experimental group are given in appendix – VI.

6.15 SCORING PROCEDURE

The achievement test consisted of 50 objective type questions. The total score of the test is 50. For each correct answer, the score is ‘one’ and for each wrong answer the score ‘zero’. The answer key to the achievement test is given Appendix – IV. English version of the key to the achievement test is given in Appendix- V.

6.16 STATISTICAL TECHNIQUES USED IN THE STUDY

The data thus obtained were analyzed by using appropriate statistical techniques such as mean, standard deviation, ‘t’ test, ‘F’ test and Chi-Square technique .

6.17 FINDINGS AND CONCLUSIONS

There is no significant difference between the control group and the experimental group slow learners in the pre-test performance. Therefore, both groups were equal before the treatment phase. It implies that the control group and the experimental group in the present study were matched ones before the experiment.
There is a significant difference in the post-test performance between the control group slow learners and the experimental group slow learners. The achievement of the experimental group slow learners is higher than the achievement of the control group slow learners. The progress made by the experimental group slow learners in the post-test performance is the resultant product of the experimental treatment i.e. Computer Assisted Activity Package (CAAP). It substantiates the effectiveness of Computer Assisted Activity Package (CAAP) in teaching Mathematics at Eighth standard level. The control group and experimental group were matched ones before the experiment. After the experimental treatment, there is gulf of difference between the two groups. The gulf of difference between the control group and the experimental group bears testimony to the advantage of the computer assisted instruction over the traditional lecture method.

There is no significant difference between the above average students in the control group and the experimental group. The above average students in both the groups have evinced same degree of achievement in the pre-test. Above average students in the control group are on par with their counterparts in the experimental group in the pre-test performance. It bears testimony to matching of the groups and it substantiates the reliability of classification of students into above average in both the groups.

There is a significant difference between the post-test mean scores of above average students in both the groups. The achievement of above average students in the experimental group is higher than the achievement of their respective counterparts in the control group. The progress made by above average students in the experimental group can be attributed to the effectiveness of the applied instructional strategy i.e. Computer Assisted Activity Package (CAAP). The
above average students in both the groups were matched ones before the experiment. But after the experimental treatment, there is a gulf of difference between both groups. The gulf of difference between above average students in the control group and the experimental group beings to light the advantage of Computer Assisted Activity Package (CAAP) over the traditional lecture method.

- There is no significant difference between the average students in the control group and the experimental group. The average students in both the groups have evinced same degree of achievement in the pre-test. Average students in the control group are on par with their counterparts in the experimental group in the pre-test performance. It bears testimony to matching of the groups and it substantiates the reliability of classification of students into average in both the groups.

- There is a significant difference between the post-test mean scores of average students in both the groups. The achievement of average students in the experimental group is higher than the achievement of their respective counterparts in the control group. The progress made by average students in the experimental group can be attributed to the effectiveness of the applied instructional strategy i.e. Computer Assisted Activity Package (CAAP). The average students in both the group were matched ones before the experiment. But after the experimental treatment, there is a gulf of difference between both groups. The gulf of difference between average students in the control group and the experimental group brings to light the advantage of Computer Assisted Activity Package (CAAP) over the traditional lecture method.

- There is a significant difference in the performance of slow learners of students in the control group between the pre-test and the post-test. It shows that the
traditional lecture method, as an instructional strategy, could enable the slow learners of control group to improve upon their pre-test score. Thought it has been effective for the slow learners, it cannot be said that it has been very effective. This can be understood from the meagre percentage of the rate of progress shown by them.

There is a significant difference in the performance of the slow learners in the experimental group between the pre-test and the post-test. Their performance in the post-test is far better than their performance in the pre-test. The slow learners in each group have shown a marked progress in their post-test performance. Slow learners have made much impressive mean gains amounting to 19.75 respectively. In terms of rate of progress, the slow learners stand first showing 52.4%. In term of relative effectiveness of the applied strategies i.e. Computer Assisted Activity Package (CAAP) is most effective to the slow learners. This substantiates the effectiveness of computer assisted instruction in teaching Mathematics to slow learners at Eighth standard level. Further, a comparison of table –5.7 and table –5.8 brings to light the advantage of Computer Assisted Activity Package (CAAP) over the traditional lecture method.

There is no significant difference in the performance of above average students in the control group between the pre-test and the post-test. It shows that the traditional lecture method, as an instructional strategy, could not enable the above average students in the control group to improve upon their pre-test score. The analysis of this table indicates the need for introduction of innovative methods in teaching Mathematics to above average students at Eighth standard level.

There is a significant difference in the performance of the above average students in the experimental group between the pre-test and the post-test. Their
performance in the post-test is far better than their performance in the pre-test. The above average students in each group have shown a marked progress in their post-test performance. Above average students have made much impressive mean gains amounting to 5.90 respectively. The above average students could evince a rate of progress amounting to 7.35% only. In term of relative effectiveness of the applied strategies i.e. Computer Assisted Activity Package (CAAP) is just effective to above average students. This substantiates the effectiveness of computer assisted instruction in teaching Mathematics to above average students at Eighth standard level.

- There is a significant difference in the performance of average students in the control group between the pre-test and the post-test. It shows that the traditional lecture method, as an instructional strategy, can have a meagre impact on the average students in the control group to improve upon their pre-test score. The analysis of this table indicates the need for introduction of innovative methods in teaching Mathematics to average students at Eighth standard level.

- There is a significant difference in the performance of the average students in the experimental group between the pre-test and the post-test. Their performance in the post-test is far better than their performance in the pre-test. The average students in each group have shown a marked progress in their post-test performance. Average students have made much impressive mean gains amounting to 9.55 respectively when compared with above average. In terms of rate of progress, the average students with 19% rate of progress. In term of relative effectiveness of the applied strategies i.e. Computer Assisted Activity Package (CAAP) is more effective to average students. This substantiates the
effectiveness of computer assisted instruction in teaching Mathematics to average students at Eighth standard level.

- There is no significant difference between the control group and the experimental group students as a whole in the pre-test performance. Therefore, both groups were equal before the treatment phase. It implies that the control group and the experimental group in the present study were matched ones before the experiment.

- There is a significant difference in the post-test performance between the control group students and the experimental group students as a whole. The achievement of the experimental group students is higher than the achievement of the control group students. The progress made by the experimental group students in the post-test performance is the resultant product of the experimental treatment i.e. Computer Assisted Activity Package (CAAP). It substantiates the effectiveness of Computer Assisted Activity Package (CAAP) in teaching Mathematics at Eighth standard level. The control group and experimental group were matched ones before the experiment. After the experimental treatment, there is gulf of difference between the two groups. The gulf of difference between the control group and the experimental group bears testimony to the advantage of the computer assisted instruction over the traditional lecture method.

- There is a significant difference in the pre-test performance among the various categories of students in the control group. The above average students are on the lead followed by average students. But the difference between the two categories is very significant. The slow learners are at the lowest rung. There is a vast gulf of difference between them and the students of other two categories. From the mean values it can be inferred that the traditional lecture is effective to the above
average students only. It is not at all effective to slow learners. The average students also have got only moderate effect. It justifies the need for this study.

- There is a significant difference in the post-test performance among the various categories of students in the control group. Despite the progress made by the slow learners and the average students, they could not cope with the above average students. So the difference that existed between them and the above average students continued in the post test stage also. The continuance of the gulf of difference between the above average students and the students of other two categories indicates the need for innovative instructional strategy i.e. Computer Assisted Activity Package (CAAP) for all the categories of students.

- There is a significant difference in the pre-test performance among the various categories of students in the experimental group. The above average students are on the lead followed by average students. But the difference between the two categories is very significant. The slow learners are at the lowest rung. There is a vast gulf of difference between them and the students of other two categories. From the mean values it can be inferred that the traditional lecture is effective to the above average students only. It is not at all effective to slow learners. The average students also have got only moderate effect. It justifies the need for this study.

- There is a significant difference in the post-test performance among the various categories of students in the experimental group. A close look at the mean values revealed that the progress made by the slow learners is much higher when compared with above average and average students. Thus it is proved that the computer assisted activity package is more effective to the slow learners when compared with other categories of students.
There exists a significant difference between the mean gain scores of the achievement of slow learners of control and experimental group Middle School Slow Learners.

There exists a significant difference between the mean gain scores of the achievement of control and experimental group above average students at Middle School level.

There exists a significant difference between the mean gain scores of the achievement of control and experimental group average students at Middle School level.

An opinionnaire was given to the students’ of the experimental group to get the feedback regarding Computer Assisted Activity Package (CAAP). After counting the frequencies the analysis was done employing Chi-Square technique. The results are presented in Table No. 5.12. By studying the table 5.12, it is derived that the chi-square value of all the statements were significant at 0.01 levels. The Chi-Square value of statement 1 is 14.889 and is significant at 0.01 level. It is indicating that the students were in favour to learn other subjects by this method. The obtained Chi-Square value of statement 2 is 11.556 and is significant at 0.01 levels. It indicates that the students felt no difficulty in understanding the subject through this method. The Chi-Square value of statement 3 is also significant (12.667). It clarifies that the students experienced it easy to remember the subject learnt by this method. For statement 4 the Chi-Square value is 32.889. It is significant at level of 0.01. It indicates that the students didn't find it tiresome to learn through this method. Statement 5 is significant at 0.01 level, its Chi-Square value is 8.222. It shows that the students were of the view that their concentration increased by learning through this method. On the other hand, the Chi- Square
value of statement 6 is 32.889. It is also significant at 0.01 levels. It expressed that this method of learning was more interesting than the traditional learning method. The Chi-Square value of statement 7 is 28.222 and it is highly significant too. It was noted by the students that the classroom discipline was maintained while learning through this method. Statement 8 is also significant. Its Chi-Square value is 6.259. It shows that the students did not experience tension or stress during learning through this method. By studying the statement 9 it derived that the Chi-Square value of this statement is significant. According to the students it is convenient for self-learning through this method. Its Chi-Square value is 23.148. For statement 10, the Chi-Square value is 18.667. It is significant at 0.01 level. The students agreed regarding occasional learning through this method. Thus, on the basis of the observed frequencies, it can be noted that the students responded favourably towards learning through Computer Assisted Activity Package (CAAP).

It is observed with the analysis of the opinionnaire that learning become more interesting and lively by Computer Assisted Activity Package (CAAP). And students' demonstrated positive opinions towards the Computer Assisted Activity Package (CAAP).

6.18 DISCUSSION OF THE RESULTS

To examine the effectiveness of Computer in teaching Mathematics, the Computer Assisted Activity Package (CAAP) was developed to teach selected portion of mathematics to the slow learners of Class VIII. It was proved effective in for slow learners. Eventhough, a perfect teacher cannot be replaced by any technology, the Computer Assisted Activity Package (CAAP) was found to be effective in the education of slow learners as it allows them to learn on their own pace.
The students responded positively towards learning through Computer Assisted Activity Package (CAAP). They wished to learn other subjects through this method. They experienced it more convenient, easy to understand and more interesting. It helps to grasp the content easily for a long period of time. According to their observation it increases concentration, and its leads to self learning.

6.19. EDUCATIONAL IMPLICATIONS OF THE STUDY

On the basis of the findings of the present study, following educational implications are mentioned.

- Computer Assisted Activity Package (CAAP) can be helpful to create positive teaching-learning situation in classroom as it provides visual experiences which bring novelty to the subject. So it can be more useful and effective for the learners. Hence, it has to be designed for all other subjects and to all categories of students.

- Computer Assisted Activity Package (CAAP) helps each student to proceed with his own speed & capacity of grasping power. It is also helpful to increase their concentration & interest towards learning process. Thus, every teachers should be encouraged to use in their teaching learning process.

- Since Computer Assisted Activity Package (CAAP) is an individualized instruction and as it caters to the diverse needs of students steps has to be taken to design new package to meet the needs of diverse groups.

- Expertise of resources persons can be utilized for development of computer Assisted Activity Package (CAAP) software’s for various subjects and various standards and thus their expertise can be made available to a wider range of student population
• Teachers of middle schools and high schools can be given orientation as to how to prepare and apply Computer Assisted Activity Package (CAAP). This will give them a better preparedness to ensure optimum human resource development.

• Keeping the result of the study in mind, the NCERT and SCERT may take up the task of developing Computer Assisted Activity Packages for each subject and these can be supplied to all the schools so that the teachers can effectively make use of this Computer Assisted Activity Package (CAAP)’s.

• Since the use of Computer Assisted Activity Package (CAAP) approach enhances the achievement of even average and slow learners, it will diminish wastage and stagnation in our schools. So the teachers should be adequately prepared by means of orientation programme and such orientation may be given at DIET level also, so that awareness about Computer Assisted Activity Package (CAAP) approach can be developed among primary school teachers also.

• Principals and school management should utilize such programmes in their school and also inspire the teachers to develop and to use such Computer Assisted Activity Packages (CAAP).

• Such Programmes or Packages can be introduced in teachers’ training programmes to develop teachers’ efficiency. The achievement of the students will naturally be positively effective through skilful teachers.

6.20 OBSERVATIONS

• Computer Assisted Activity Packages (CAAP) attracts them naturally and arouses their curiosity & draws their attention. Thus, readiness to learn is induced.

• It has brought in a lot of variety and novelty in the teaching and the learning process. It provides a vast exposure to the students and they can learn on their own.
• Graphics help the students to memorize the content of the unit easily.
• They were enthusiastic to give response to the test: "Test your understanding".
• They were of the opinion that the method and the style can be fruitful if it is available for all the topics of their syllabus and they can score better in their examinations.
• Their experience of learning through Computer Assisted Activity Packages (CAAP) is enjoyable, meaningful and personally satisfying.
• Students could learn on their own, correct their own mistakes and they become independent learners.

6.21 DELIMITATIONS OF THE STUDY

The delimitations of the study are as follows

1. This study is confined to the Eighth standard students studying Mathematics at Government Higher Secondary school, Puthamboor.

2. The sample consists of only 60 students selected on the basis of their performance in half yearly examination.

3. Only five units from Eighth standard mathematics subject are included for the study.

4. The experiment is conducted for a period of 30 working days at the rate of one hour per day.

6.22 SUGGESTIONS FOR FURTHER RESEARCH

After this study, recommendations for further research are cited as below:

• The effectiveness of Computer Assisted Activity Packages (CAAP) can be compared to other methods like self learning or graded learning.
• Similar research can be conducted on the other parts of the subject Mathematics such as arithmetic, algebra, coordinate geometry etc.

• Some complex units of mathematics could be taken for the development of Computer Assisted Activity Packages (CAAP) to check their efficacy for the distant learning or reinforcement learning processes.

• The effectiveness of Computer Assisted Activity Packages (CAAP) can be compared to group learning and to an individual learning.

• A similar study can be made for teaching units from other subjects too.

• With the use of Computer Assisted Instruction Programmes, diagnostic and remedial work can also be carried out in the field of education.

• In this study Computer Assisted Activity Packages (CAAP) approach has been found very effective to teach Eighth standard Mathematics for all the categories of students. To ensure more dependable conclusion the experiments may be conducted on wide range of schools.

• A parallel study can be made to find out the effectiveness of Computer Assisted Activity Packages (CAAP) at high school and primary school levels.

• A parallel study can be undertaken to study the effectiveness of Computer Assisted Activity Packages (CAAP) at college level.

• A parallel study can be made to find out the effectiveness of Computer Assisted Activity Packages (CAAP) to teach various subjects of all the standards at primary and secondary level.

• A parallel study can be made covering the full syllabus of a particular subject and internal or micro analysis can be done
• A separate study can be undertaken to assess the effectiveness of Computer Assisted Activity Packages (CAAP) with teacher support system (TSS) and without teacher support system.

• A comparative study can be made in rural and urban areas, selecting students from both the areas.

• A study can be undertaken to assess the attitude of the students and teachers of middle schools, high schools and higher secondary schools towards Computer Assisted Activity Packages (CAAP).

• A similar study can be carried out in teaching other units of Eighth standard mathematics.

• A comparative study can be undertaken to study the relative effectiveness of Computer Assisted Activity Packages (CAAP) learning different subjects and at the different levels i.e. primary, secondary, higher secondary and college levels. Since it is an auto instructional / learning strategy. A study of this sort is essential and pertains.