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CHAPTER - V

SUMMARY AND CONCLUSION

The present study gave us a new method of teaching Mathematics for high school students. Having discussed all the details of the treatment for three groups in the previous chapters and effect of the treatments to different groups, an attempt is made to bring the salient point in the form of summary in this chapter.

Mathematics is one of the compulsory school subject of the curriculum in India. The students study Mathematics from the beginning of their schooling. The attainment of the students in Mathematics is found to be very poor. This has been revealed with the help of statistical facts available. To improve the standard of Mathematics in schools. A teacher has adopted effective method and techniques. Manipulation is one of the four important abilities of Mathematics learning. Since mathematical operation involved complex process, specific efforts will have to be made in order to develop this ability. For this purpose, educational technology came for assistance to introduce programmed text learning. Computer assisted learning, Discovery method etc. are being introduced in school curriculum. The present expansion of computer industry has made it possible for schools to utilise for educational purpose. The specific features of computer like visual appeal. Interactivity and storage capacity can advantageously used for teaching to the students through self instructional programmes. Computers facilitate for individualised learning in the true sense. Unfortunately very few attempts have been made by the
teachers in this regard. And at the same time imperfect commercial products are posing threat to educational field. In this situation the present study is an effort to make available quality of software package that could provide assistance to both teachers and students to develop required skills in Mathematics.

5.1 Statement of the problem

"DEVELOPMENT AND VALIDATION OF COMPUTER INSTRUCTIONAL PACKAGE ON SELECTED UNITS IN MATHEMATICS FOR IX STANDARD."

5.2 Objectives of the Study

1. To develop and validate computer Instructional package in modular style incorporating the interactivity (user friendly) features that assist school children in learning Mathematics.

2. To develop programmed instructional frame incorporating their friendly features that assist school children of IX standard to learn Mathematics.

3. Construction and Standardisation of Criterion test (Pre and post-tests)

4. Development of the socio-economic and Educational status questionnaire for the IX class students.

5. To know the effectiveness of teaching Mathematics through programmed text material to that traditional method.
6. To know the effectiveness of teaching Mathematics through programmed text material to that of traditional method.

7. To know the effectiveness of teaching Mathematics through computer instructional software package to that of traditional method.

8. To know the relative effect on the achievements of the students belonging to different socio-economical and educational status for three different treatments.

9. To know the relative effect of achievement of boys and girls towards different treatments.

10. To know the opinion of the students regarding three types of treatments.

5.3 Review of related literature

In this chapter investigator collected the following related literature:

(i) Research on Mathematics Education

This contains (a) Research in high failure rates in Mathematics, (b) Research for improvement of learning and teaching of Mathematics.

(ii) Research on individualised instruction and on programmed instruction.

Further investigator referred to the research work is related with use of computers in education and evolution of computers in education.
Research on Mathematics Education (1988-92)

We shall describe the research done during the five years and summaries. The main finding of the research, the strength and weakness of the research. The trends that the research indication that is needed and the steps to be taken.

Research in high failure rates in Mathematics


The programmed learning materials used for these studies were mainly in the subjects like Mathematics, Geography and languages. The
experiment group on ‘Solving Education’ Sharma (1966) administered a programme in Algebra through this technique. Desai (1968) studied the effectiveness of programmed learning material on teaching of Gujarati in class IX. An intensive study was made by Shah (1969). She programmed the whole syllabus of Algebra through this technique.


Number of research work in computer education and also teaching learning process through computer have been carried out mostly in foreign countries, whereas few Indian research studies have been prepared.


The above research studies revealed that very few research work has been done on computer assisted teaching and its effectiveness on conventional method has been reported. Hence the investigator located this problem for the doctoral study.

5.4 Design of the Study

The design of the study included formation of three groups. The groups are formed by controlling the intelligence of the students which means selection of the students having similar intelligence amongst the total strength of IX class of each school.

1. Formation of three groups:
   i. Control group - Traditional method of teaching
   ii. Experimental-1 group- Programmed text material
   iii. Experimental-2 group- Computer software package

2. Selection of Units

The investigator selected three common units from State government syllabus, CBSC and ICSC syllabus for IX class students. The units chosen are:

   i. Theory of computing
   ii. Commercial Arithmetic
   iii. Statistics
5.5 Sampling Procedure

1. Selection of schools: The investigator randomly selected three schools, namely:
   
i. University Public School, Dharwad
ii. Lions' English Medium School, Haveri
iii. Rotary English Medium School, Mundagod

2. Selection of class and students

In each of the below three schools there are four IX divisions the investigator administered group intelligence tests and calculated the IQ. Then he selected 25 boys and 25 girls from each school having similar intelligence. The same is presented in the following table.

<table>
<thead>
<tr>
<th>School</th>
<th>Class</th>
<th>Total No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. UPS, Dharwad</td>
<td>IX D</td>
<td>50 (25 Boys &amp; 25 Girls)</td>
</tr>
<tr>
<td>ii. Lions' English Medium</td>
<td>IX A</td>
<td>50 (25 Boys &amp; 25 Girls)</td>
</tr>
<tr>
<td>School, Haveri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Rotary English Medium</td>
<td>IX</td>
<td>50 (25 Boys &amp; 25 Girls)</td>
</tr>
<tr>
<td>School, Mundagod</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Selection of teachers: The Mathematics teachers teaching the above classes have been selected.

4. Treatments:
   
i. UPS Dharwad - Traditional Method of Teaching (TMT)
ii. LES Haveri - Computer Software Package (CSP)
iii. RES Mundagod- Programmed Text Material (PTM)
5.6 Tools used for the study

1. Programmed instructional materials.

2. Computer software package and standardisation

3. Questionnaire of SEES for students

4. Group Intelligence test

5. Achievement test (pre-post test) identical form.

1. **Programmed Instructional Material:** Programmed instructional material has been developed for three selected units of IX standard. Mathematics Linear frames were prepared based on the content with unit. The tool was standardised by pilot study. The try-out I & II results show the t-value of the three units on pre and post test i.e. 26.3, 26.4 and 26.6 respectively. The test has content and concurrent validity.

   The reliability was calculated by test and retest method and found it is reliable.

   The investigator approaches software engineers and computer experts for preparation of blue print. Computer languages style of writing programme etc. accordingly a software package was also prepared.

2. **Computer self instructional software package:** One of the important objective of the study is to know the effectiveness of computer self instructional software package, on learning of Mathematics for IX standard students keeping in view the three units:

   (a) Theory of Computing
   (b) Commercial Arithmetic
   (c) Statistics
The investigator approaches software engineers and computer experts for preparation of blue-print, computer languages, style of writing programme etc. and accordingly a software package was also prepared.

3. SEES Questionnaire for students: The tool was prepared to know the socio-economic and educational status of the students. Initially there were 15 items for each aspect. Writing items: The questionnaire was prepared by writing open ended questions. The investigator written 15 items for each aspect of the students. So 45 items were prepared and the same was shown to guide and experts and a tryout was made in IX class students of Karnataka High School, Dharwad. The results revealed that some of 30 items retained for final data collection.

4. Group Intelligence test: To know the IQ of the students group intelligence test constructed and validated by Dr. R.T.Jantli was used. The test contained so many sub-tests.

5. Achievement test: To know the effectiveness of three types of treatment achievement test was prepared. To use them as pre and post test this test was constructed taking the contents of three units, namely theory of computing, commercial arithmetic and statistics. The content was analysed according to the objectives kept for the construction of achievement. The blueprint was also prepared accordingly. The types of items are:

i. Fill in the gaps

ii. Multiple choice
iii. Match the following

iv. Short answer type

v. Essay type

The items were written and was shown to subject experts and scoring key was also prepared. The test was validated by using proper validation procedure.

5.7 Data gathering procedure

The investigator collected the data required for the study in three stages.

First stage

i. Pre-Pretest scores (PPT): This means the marks scored by individual student of the sample at the previous class of Mathematics i.e. VIII class annual examination marks.

ii. Administering Socio-Economic and Educational Status (SEES) Questionnaire to the students involved in the study so as to categorise them in to HSEES, MSEES and LSEES respectively in each group.

iii. Administering the group intelligence test to know the IQ of the students.

iv. Training of the Teachers: The teachers teaching the IX classes of the sample were invited to University College of Education and given training in particular treatment.

Sri Bolishetty, a Mathematics teacher in University Public School requested to handle the IX D class with chosen three units with
traditional method or usual teaching method using minimum teaching aids and minimum particular students. Hence the students of IX D class have treated as control group. The time (total periods) allowed was six periods for each unit.

The IX class Mathematics teacher of Mundagod High School Sri Anand S. was requested to handle the class with three units with the help of programmed text materials. The materials were supplied to the teacher with clear cut instruction and the procedure of using them were also administered.

The teacher was requested to know the principle of programmed learning with help of programmed text material, frames as well as teacher instructions or guidance.

This group served as Experimental-I group. The IX B class Mathematics teacher of Lions English Medium, Haveri requested to use software packages materials were displayed on the computer monitor screen and necessary instruction was given to him to include them in his instruction. Three computer software packages in the form of floppy disc (25 sets for each were supplied to the teacher. Thus this group served as experimental-II group.

v. Administration pre-test in achievement: Giving pre-test to students. The students involved in the study were given Pre-test (Achievement test) on the units chosen to know the level of understanding for the units chosen one hour time was given to solve the question.
Second stage

i. During the treatment: The investigator visited to all the three schools and respective classes to know the correctness of treatment. He requested two of his friends to observe the classes at Dharwad and Mundagod. He himself was present at Lions English Medium School, Haveri to solve on spot problem. He also clarified the doubts during the learning through computers by the students.

The control group treatment was over by three weeks whereas the programmed text group completed taking one month. The computer software package group took three weeks to study and understand the units.

Third Stage

i. After the treatment: After the treatments were over the investigator requested all the three teachers to administer the post test which is a parallel form of pre-test. The investigator gathered the oral opinion of the students, teachers and observers about the various aspects like methods of teaching, programmed text material and computer software package.

5.8 Statistical techniques used

1. Mean and Standard deviation

2. F-ratio through ANOVA

3. t-test
5.9 Analysis and Interpretation

The data was analysed with proper statistical methods and conclusions are given in the form of following educational implications:

Conclusions

Educational implications

We came to know through this study that the traditional method or the conventional method of teaching Mathematics will not be effective to the students. Modern methods like programmed instruction and computer assisted instruction should be adopted. The programmed instruction pattern found to be alternative to the traditional method and it may also be used where we are unable to provide computer or computer assisted instructions. To develop programmed text material the Mathematics teacher should act as a programmer and as an Instructor. He has to prepare the frames according to the principles of programmed instructions. Similarly the computer assisted instruction may also be adopted with the help of computer instructional packages.

In India instruction through computer has just begun in big cities. The NPE (1986) enforced to provide educational technology to every village school. So we are observing some computers in most of the schools but there are no standardised software packages which are required for the instruction. These computers are being used only for the entertainment purpose. So there is an urgent need to develop standardised software packages teaching/learning Mathematics for high school students. The study also revealed that the achievement of the students in
Mathematics when learnt through computer assisted instruction have achieved significantly higher than other methods. Hence more and more standardised software packages may be developed and used in the teaching learning process.

5.10 Limitations of the Study

1. The study is limited to IX standard Mathematics.

2. The study is also limited to few units of IX standard Mathematics.

3. The software package so developed may not be generalised to prepare such software for other units.

4. The language used to prepare the software is visual basic which is becoming older since lot of innovations taking place in computer software technique.

5. The software package cannot be used as an instructional media where there are enough computers in school. If only one or two computers are there, it may not be effective all students. Hence the software is effective to such schools which are fully computerised.

6. The programmed instruction material are to be developed on large scale and is to be standardised before they will be put into cooperation which is laborious and time consuming..

7. The time factor is also limitation to the study where in the teachers have to complete the portion within stipulated time.
5.11 Suggestions for further research

1. Such study can be undertaken as a big project to prepare computer software package for all the units for high school students.

2. Such study can be undertaken for other study like Science and language and social science.

3. A comparative study of CAI to the self study through the text may be undertaken.

4. A comparative study of programmed instructional materials for the self study may be undertaken.

5. To make the programme vivid and individualistic.

6. Data basis learning frame could be developed in future instead of producing software it would be more useful to produce course wares.

7. In keeping with fast developing technology multi-media packages may be developed.