CHAPTER III

CONCEPTUAL FRAMEWORK
# CHAPTER - III

## CONCEPTUAL FRAMEWORK

<table>
<thead>
<tr>
<th>Chapter No.</th>
<th>Title</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>CONCEPTUAL FRAMEWORK</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Introduction</td>
<td>75</td>
</tr>
<tr>
<td>3.2</td>
<td>Individual difference</td>
<td>75</td>
</tr>
<tr>
<td>3.3</td>
<td>Emergence of Individualised Instruction</td>
<td>76</td>
</tr>
<tr>
<td>3.4</td>
<td>Methods of Individualised Instruction</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>3.4.1 Different modes of CAL</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>3.4.2 Advantages of CAL</td>
<td>81</td>
</tr>
<tr>
<td>3.5</td>
<td>Development of CAL Software</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>3.5.1 Developing Self-Instructional Package</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>3.5.2 Preparation of Computer Assisted Learning (CAL) Software</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>3.5.3 Saving the Programme</td>
<td>90</td>
</tr>
<tr>
<td>3.6</td>
<td>Conclusion</td>
<td>90</td>
</tr>
</tbody>
</table>
CHAPTER III
CONCEPTUAL FRAME WORK

3.1 INTRODUCTION

The conceptual framework serves the researcher to be definite and specific towards research perspectives. The scientific approach enables the researcher to explain the variables and to predict the phenomena from their antecedents which is the ultimate goal of the theory. This chapter presents a detailed conceptual analysis on Individual Difference, Emergence of Individualised Instruction, Methods of Individualised Instruction, Different Modes of CAL. Development of CAL software and conclusion.

3.2 INDIVIDUAL DIFFERENCE

Traditionally teaching refers to the act of disseminating or imparting information to the learners in the class room. It was perceived, in other words as the philosophy of someone who knows - telling those who do not know. Traditional explanation of the teaching of mere ‘telling’ is not acceptable to the educators of today, because the recent researchers in the field of psychology of teaching-learning have thrown light on some new concepts of teaching. Now the ‘giving of information’ is completely discarded. The changed concept says, teaching is to cause the child to learn and acquire the desired knowledge skills and also desirable way of living in the society.
3.3 EMERGENCE OF INDIVIDUALISED INSTRUCTION

During the 1950's the principles of Operant learning developed in psychological laboratories on the basis of experimental studies conducted for animals by B.F. Skinner of Harvard University have been applied with considerable success to the development of self instructional programmed books and teaching machines. Programmed Instruction has been one of the most popular and effective innovations in the sixties.

Chronologically the Greek Philosopher, Socrates is said to be the first programmer who developed a programme in geometry which was recorded by his disciple Plato in the dialogue menu. The first Psychologist E.L. Thorndike (1874-1949) found 'Law of effect' which states that learning which is accompanied by satisfaction for the learner's correct response is making the learner more satisfied in every stages of learning in the Individualised Instruction. Moreover, many Psychological principles like proceed from simple to complex, concrete to abstract, general to specific, known to unknown, induction to deduction have been developed by great educators.

3.4 METHODS OF INDIVIDUALISED INSTRUCTION

Efforts to individualise instruction started in the fifties. Since the inception of the concept of individualised instruction, thousands of researchers have been conducted to evolve better and effective methods of teaching. A number of methods have been developed and used with great success in
imparting instruction at different levels of education. A few among the methods of individualised instructions are explained below:

a. **Programmed Instruction (PI)**

PI involves controlled, carefully specified and skilfully arranged learning experiences. It is self-instructional and self-corrective.

PI involves the following Steps. The subject matter is logically sequenced and broken into small steps. A small bit of meaningful segment of information (frame) is presented to the learner. The learner reads the frame and is required to make a response to the information by writing a response. If the response is correct, it is reinforced and if he is wrong he may see the correct response by the immediate feedback system. Then the learner is presented with a second frame and the stimulus - response - reinforcement cycle is repeated until the series of several frames present a complete programme.

b. **Personalised system of Instruction (PSI)**

PSI means a system of instruction which is person-oriented. It was devised by Fred. S. Keller and his close associated namely J.C. Sherman, R.A.Zi and C.M. Bori in 1963 in Brazhil. PSI lays more emphasis on the importance of written work. The steps involved are:

The teacher gives practice to the learners on carefully prepared assignments consisting of sections from standard Text books. Articles are given to the students along with study questions and other instructions. When the
student thinks that he has mastered the material, he comes to the classroom to take a brief quiz. The proctor (class monitor) corrects it immediately. If there are errors, the proctor indicates what part of the assignment needs further study. The student goes off to do some more work and then comes back to try again. Students are not penalised for securing lower grade for an error.

3.4.1 Different modes of CAL

In instruction, the computer plays different roles. The computer has been recognized and hailed as a wonder writing device. In the teaching-learning environment, it is used as a multipurpose tool for typing, calculating, tabulating and presenting.

Today, computers are emerging as a major teaching-learning tool and have been found to be effective in all types of learning environments - formal classroom instruction, non-formal and distance instruction and individual programmed learning. Computers have been used very effectively in teaching physically and mentally handicapped learners. Many institutions and universities now have facilities for the faculty to teach directly with computers. Special rooms have been equipped with large projection screens where the teacher can conduct the entire lesson using a pre-prepared lesson on a floppy. CAL could make such great achievement through different modes of use. The features of some of the Improvement modes are discussed below.
a. **Tutorial Mode**

The structure of well defined principles of programmed learning are used in the preparation. The content is broken up into many entities called the 'Learning frames.' These frames are presented in a step-wise manner. Depending on the learner's responses, a corrective feedback or reinforcement could be given at every stage of learning. This helps learners to achieve higher retention rate with ease.

b. **Discovery Mode**

Using the inductive approach, the learner finds her own answers through trial and error method, specially effective for developing problem-solving skills in a learner.

c. **Problem Solving Mode**

In this mode, Computer is programmed to present a practical problem as a series of user-elicited facts. The learners have to elicit the facts, comprehend the problem, formulate a plan of action and observe the effect of the plan on the problem. These exercises are very helpful in problem-solving, the most complex process of cognitive skills.

d. **Drill and Practice Mode**

Drill and practice can be applied in CAI, if the system is programmed to handle the particular materials selected or developed by Teachers. The programmes are designed to build skills and give the practice to the students.
In short, the drill and practice mode involves learning by repetition. While it is more useful in schools, it has little place in higher education.

**e. Laboratory Exercise Mode**

Laboratory experiments which are very complex, time-consuming or hazardous to the student can be conducted through the computers. Researches show that if the same laboratory instructions and worksheets are used, it is possible to give the learner near real experience.

**f. Inquiry Mode**

Inquiry mode is another type of CAI application. CAI system responds to student enquiry with answers it has stored. As the modern day computer has a large memory capacity and high speed data processing, it is possible to store 'export' knowledge of a particular problem in a structured format of rules and algorithm. A learner could then interact with this knowledge base and get answer to queries.

**g. Simulation and Gaming Mode**

Simulation attempts to represent a real situation. To implement this mode, a computer programme must be written to process students input to get a meaningful output. This output is determined by the action of students. Students interact with their natural language. In gaming mode teachers formulate a model or real or idealistic complex situation. The students must learn to work with such complex situation and interpret it. This is meant for
mostly entertainment. In the present study, the investigator followed tutorial mode as there was the purpose to teach the content through learning frames depending on the learners response followed by feedback and reinforcement.

h. Tests and Examination Mode

Computers can be used for evaluating performance by storing and retrieving questions (in the form of question banks); scoring and providing correct responses. Learners can take tests on the computers and computers can also be used to evaluate papers.

After reviewing all the modes of Computer Assisted Learning, the investigator decided that Tutorial mode would be more suitable to this task. As the concepts are to be taught in self-instructional more, tutorial mode would be more appropriate.

3.4.2 Advantages of CAL

Amongst all technological options available to a teacher, none commands more awe and respect than a computer. However, with every new release of hardware or software, the perplexity increases. Many of us are even reluctant to discuss computers in education, let alone use them. But, the fact is that to harness the vast potential of this technological genie, a teacher needs to have at least selective information on the subject and that is the precise objective of this chapter.
What is required is more of a change in attitude rather than expertise of a higher order. An attitude of acceptance of computers as a valuable tool for teaching. Computers are as useful for a teacher as for a learner. Computers can record, store,analyse and communicate words and figures with equal dexterity. A number of accusations are levied against computers: They are known to be expensive; they generate high expectations but are able to achieve only selected learning objectives; they operate in a highly controlled environment and do not permit social interaction.

The special advantages of computers in instruction are enumerated briefly:

- Store large quantities of data.
- Offer flexibility of pace, time & place.
- Offer flexibility to retrieve the precise information without having to go through any prescribed system.
- Are compact and light in weight and do not require much space. Portable versions are very popular.
- Offer interactivity with the learner.
- Are precise and error free.
- Provide immediate feedback.
- Can be integrated with other media.
- Can simulate real life/laboratory objects, operations and situations.
- Allow individualized and private working.
- Can be linked to other learners/users around the world.
• Deliver information in a reliable and consistent, standard form.
• Can be used for any discipline, for any desired tasks.

3.5 DEVELOPMENT OF CAL SOFTWARE

The purpose of the present study was to develop a Computer Assisted Learning (CAL) package in Zoology for the +1 English medium students and to find out its effectiveness on the achievement of Zoology. Therefore the investigator had to develop Computer Assisted Learning (CAL) package in Zoology pertaining to certain units in +1 students.

Computer Assisted Learning (CAL) is a self instructional process. For developing self-instructional package, a number of techniques and methods are available viz., Programmed Learning Instruction, Auto Tutorial System, Personnalised Instruction, Learning Modules, Objectives Based Instruction etc. Out of these, the investigator followed the theory of Skinner’s Operant Conditioning. **Skinner (1954)** developed the Programmed Learning Package based on his theory which includes mainly the following four principles of learning.

i. Meaningful increment of information to be given

ii. Active participation of the learner

iii. Immediate feedback on the learning

iv. Learning at his own speed/pace
In the present study the investigator selected the Skinner's Linear type of Programmed Learning, since the programmer can control the response of the learner and give immediate feedback or reinforcement to the learner in the form of knowledge of results. In the Linear Programme only one idea is presented in a frame at a time. The frame size depends upon the nature of the idea. All the frames are arranged logically by the Psychological principles of learning, that is, like proceeding from the easy to the difficult or from simple to complex or from known to unknown etc. A frame consists of three components, such as, (i) stimulus part (ii) response part and (iii) confirmation part or the part of the correct response. For developing the frames in Zoology, the works of Holland (1959), Goldbeck and Glasser (1960), Cook et al., (1960), Green (1962), Pipe (1966), Espich and Williams (1967), Mullick and Dewal (1967), Markle (1969), Goodman (1969) were referred.

3.5.1 Developing Self-Instructional Package

Generally the development of a Programmed Learning Package consists of three phases, such as, (i) Specification phase, (ii) Drafting phase and (iii) Tryout phase. The investigator being a Zoology teacher, she had selected the topics (Cell biology, Nucleic acid, Protein synthesis and Cancer biology).

To develop the self-instructional package, first the investigator prepared a list of ideas to be taught under the topics selected. A few more Zoology Text books were referred. The points thus collected were arranged in a sequence. The sequence was verified with the Zoology teacher who approved of it. Based on the sequence, each idea was considered for the development of the frame.
As pointed out earlier, in a frame, the new information is given as stimulus to the students. In the response part of a frame, a learner was expected to give the correct answer. The question was focused on the central idea of the stimulus presented.

Each frame was written on a single page. The correct answer of the question written on the top of the successive page so that a student can verify his answer. When a student responds with the correct answer, he was encouraged with reinforcement 'very good.' Thus a positive immediate feedback of reinforcement was incorporated in almost all the frames.

While constructing the frames in the self-instructional package, different types of frames were prepared on the basis of their purpose. The constructed self-instructional package on Zoology was edited in three phases, viz., technical accuracy edit, Programming Technical edit and composition edit.

The Preliminary draft of the Programmed Learning Package was shown to two Researchers in Education to determine whether the material was technically accurate. Besides regular consultation was made with the guide and on the basis of his guidance, the self-instructional package was edited to keep up the technical accuracy of the programme. Mullick and Dewal (1967) recommended three stages, such as, (i) Individual Tryout (ii) Group Tryout and (iii) Field try-out for refining the Programmed Learning Package. In the present study, the investigator followed the above three stages of try-outs.
3.5.2 Preparation of Computer Assisted Learning (CAL) Software

Any computer programme for a given problem includes input statements, instructions on how to process them and the instructions to bring the outputs in desired manner. First they are to be fed into the computer's main memory where they are stored and acted according to the instructions. Then the self instructional package text was fed into the computer through the keyboard which is one of the input devices of the computer. As discussed in 3.12, there were 4 units identified for preparing the CAL software. Each file was allotted to every unit's file so as to process it quickly and correcting the mistakes, if any. While developing the CAL package, some of the important programming statements were used. They are presented in the following paragraphs. The investigator selected 'VISUAL BASIC' for the development of CAL Software. The logic followed in the software is depicted in Figure 3.1.

The prepared self instructional package on different topics in Zoology consisted of different frames. Each frame written in separate paper is to appear in the monitor, while it is converted into Computer Assisted Learning Software. To make the frame appear in the monitor, 'Text Box' and 'Command Button' were used in the programme. The text box was used to give the content of the unit. The label box was used to give the question which will appear on the monitor and the command button was used to give 'Enter' command. When the 'Enter' command is clicked the 'Question' will appear in the monitor with a space for answer. This question will be in the coding sheet. So the question will appear in the monitor.
Fig. 3.1 LOGIC FOLLOWED IN THE SOFTWARE

Start

Display of Investigator's Introduction

Entry of Students Name

Welcoming the students by Computer

Instruction to the students

Display of four units for selection

Display of concept from selected units

Is the response correct

Move to the same frame

3 times

Move to the next frame

Is end of the Unit

Exit

End
The individualised instructional package should allow a student to take his own time to learn the content. It means the information presented to the learner should be available till he/she achieves mastery over it. This is known as self pacing. Under Computer Assisted Learning situation, the teaching frame likes to have it till the learner presses the Enter Key or Clicking the mouse. This Visual Basic programme allows a student to take his own time to read the content which is presented in the computer monitor. Thus the self learning could be achieved in the present Computer Assisted Learning Package. To make the frame appear in the monitor "Text Box", "label box" and "Command button" were used in the "Project" and "Form". The "text box" was used to give the content of the unit. The "label box" was used to give the question which will appear on the monitor and the command button was used to give the 'Enter' command.

When the learner clicks the topic 'CELL BIOLOGY' the first frame will appear on the monitor. The learner can read the content till she/he achieves mastery over it. When the learner presses the 'Enter' key or mouse clicks over command button, the question will appear within a space where answer is to be fed. The question will be given in the coding sheet. The syntax is

```vbnet
Private Sub Command1_Click()
A = Input Box("The structural and functional unit of the organism is ______")
A = Format(A, ">")
For I = 1 To 2
```
When the question appears, the learner has to give the answer in the space provided. If the answer is correct "OK, VERY GOOD" will appear on the monitor; otherwise "Incorrect" "Sorry", "Try again" will appear on the monitor. For this the IF.... ELSE. Condition is used to execute the condition.

```
If A = "CELL" Then
    Exit for
Else
    MsgBox "Incorrect" V b OK only."
```

Now the learner can press the 'Enter' key to get the text and the question once again. Likewise the learner can try three times.

```
A = Input Box ("Qn............")
A = Format (A, ">")
End If
Next I
If I> = 3 Thewn
    MsgBox "Correct Answer is "CELL"
Else
    MsgBox ("Very good")
End if.
```

If he/she gives the "Go ahead" correct answer "VERY GOOD" "Proceed" will appear on the monitor. Then the learner will press the 'Enter' key to get the next frame and it will go on in the same pattern.
Here "If...... then" and "If..... Else" conditions are used to execute the program. "Load" and "Unload" were used to get next frame continuously till the last frame. A few frames of the Programme Output Print-out and Programme Print-out are given in Appendix - 3 and Appendix - 4.

3.5.3 Saving the Programme

Magnetic tape of the computer disk device either reads or writes on to the surface of nylon tapes. The information of characters are recorded on it in magnetic spots along this tape. The magnetic tape storage is inexpensive and provides a medium method and storing and retrieving data. After all the 4 units were converted into Computer Assisted Learning Package in separate files, they stored and converted into single file named SS.PRO. By clicking the command "save", the whole edited Self Instructional Package is saved in the hard disk. Thus the investigator saved the CAI package in the name of SS.PRO.

3.6 CONCLUSION

After the completion of preparation of the software, it was presented to the experts in developing CAL. The panel of experts scrutinised the steps of of the model and gave their opinion in the fitness of the software and commented to conduct a pilot study. Their suggestions were incorporated. The revised version of the CAL software was then ready for pilot study and it was tested with fifteen students individually. The +1 students of Government Higher Secondary School, Kaveripatnam were selected for the try-out. Since the
students already acquired sufficient exposure to computer, they did not feel any problem in computer operation. The students chosen were allowed to use the computer during their lunch break, 12.30 to 1.30 P.M. and 3.30 to 4.30 P.M. During the time of their learning, the students pointed out their suggestions on location of content, colour contrast etc. Immediately all the suggestions were carried out. Soon after each individual completed the CAL on the selected topics, criterion tests were administered. Ten students out of 15 have scored around 90 percent. The remaining of 5 have scored around 80 percent. From the analysis of the result, it was assumed that this developed CAL software was valid for external use.

The Research Design of the study is presented in the following chapter IV.