CHAPTER IV
IV. THE PRESENT STUDY

4.0. Research Procedure

The success of any programme of education depends upon systematic research which could generate statistical, descriptive and analytical information for effective implementation for and continuous assessment. In the case of innovative programmes, the need for a series of research studies to build up an empirical basis cannot be over emphasized. CALL may have the potential to revolutionaryise teaching-learning process.

The researcher wanted to find out the efficacy of a CALL programme with particular reference to the students of IX Standard in Tamilnadu.

Studies reviewed in the previous chapter do not inclusively point to the superiority and utility of CALL programme to rural students.

4.1 The Experimental Design

The research was designed and carried out during the academic year 1994-95. The steps involved in the experiment are illustrated with a flow chart and the steps were explained below.
RESEARCH PARADIGM FOR CALL TECHNIQUE OF TEACHING PROGRAMME

PHASE I
- Design
  - Formulation of Hypotheses
  - Selection of appropriate Subject
  - Analysis of Topics
  - Selection of Instructional setting
  - Securing admn. Support

PHASE II
- Organisation
  - Selection of sample
  - Formation of groups
  - Allocation of Treatment
  - Collection of Source Material

PHASE III
- Development
  - Lesson Planning
  - Preparation of Software
  - Training in using the Software
  - Ppn. of Ach. tests and psycho. tests

PHASE IV
- Implementation
  - Rapport with Students
  - Application of treatment variables
  - Admn. of post-tests

PHASE V
- Evaluation
  - Calculation of gain scores
  - Comparison of group gains
  - Testing of hypotheses
  - Arriving at research findings
Flow Chart for the conduct of Experiments:

Pre Test
  ▼
  Intelligence Test
  ▼
  Experimental Group
    ▼
    Attitude toward computers
    ▼
    Attitude towards the study of English
    ▼
    CALL Technique
  ▼
  Control Group
    ▼
    Attitude towards the study of English
    ▼
    Conventional Method of Teaching
  ▼
  Attitude towards the study of English
    ▼
    Study Habits
    ▼
    Parental Encouragement
    ▼
    Interest in Foreign Languages
    ▼
    Post - Test
    ▼
    Delayed Post - Test
The following experimental design was followed for the study.

\[ 01 \ X_1 \ 02 \ 03 \]
\[ 04 \ X_2 \ 05 \ 06 \]

where

01, 04 stand for observation on pre-test of two groups,

X1, X2 stand for treatment to two groups,

02, 05 stand for the observation immediately after the treatment and

03, 06 stand for the observation after a period of one month.

**Selection of the Subject:**

The teaching-learning grammar both in mother tongue and foreign language depends upon the technique adopted to attain the instructional objectives. The researcher selected CALL as the technique for his study and the area selected was teaching English grammar. Grammar if taught properly like Mathematics would enable the learner to fetch good achievement scores in the final examination.

**4.1.2. Analysis of Topics:**

The course book prescribed for Standard IX was studied thoroughly. The researcher's experience in teaching grammar to the IX students, and that of the experience of his colleagues in teaching grammar helped the researcher to select 'Affixation'. In the tenth standard public question papers also, this grammatical unit has been included. Hence this unit was selected for the research work.
4.1.3. Selection of Instructional Setting:

As the researcher has been working in rural atmosphere for more than 15 years he proposed to conduct the study there itself. Out of personal experience, it was found that the students belonging to rural area were ignorant of many educational developments and innovations that are being enjoyed by their urban counterparts. They lack the self-confidence of getting good scores in the public examination in English like their urban counterparts. So the researcher took two rural schools one from Orathanad taluk where the researcher has been working as a Post Graduate Teacher and the other from Pattukkottai taluk. The schools selected for the study were Government Higher Secondary School, Orathanadu and Government Higher Secondary School, Karambayam. The distance between the schools is 20kms. The two schools selected for the study were similar in the following aspects:

1. Both the schools were in rural area.
2. Both the schools were controlled by the Department of Education, Tamilnadu.
3. Both the schools had Tamil (mother tongue) as the medium of instruction.
4. Both the schools followed the same syllabus, text books and common examinations.

4.1.4. Permission and Support from the Administration:

The headmasters of both institutions were approached for permission to conduct the educational experiment in their institutions. The objectives and the nature of the experiment were explained to them. They gave their kind permission and moral support for the study.
Likewise, the teachers in both the schools were helpful and co-operative during the conduct of the experiment.

4.1.5. Selection of Participants:

One government school from Orathanad taluk and another government school from Pattukkottai taluk were selected for the study. The general performance of the students in standard VIII common examination was taken as the base. The participants selected for the study were studying Standard IX during the time of research. The performance of those students in common examination of Std. VIII was analysed. In Government Higher Secondary School, Orathanad, there were five sections. All the five sections were almost equal in their achievement. Then in a random manner one of the five sections was selected. It consisted of 45 students. In Government Higher Secondary School, Karambayam there were two sections. The analysis of their previous class's terminal examination showed that they secured an average of 38% which was nearly equal to 40% of the first school. One section by random selection was taken for the study. These two section of pupils from two schools were selected as participants for the study.

It was also to be pointed out that all the pupils were residing in rural area of the same age group, around 14 years. The study was conducted among equal number of students whose parents were uneducated and whose main occupation was cultivation.

4.1.6. Formation of Groups:

Based on the general performance at the eighth standard common examination of the the total sample for this study was divided into two groups with equal size, each with 45 students.
Also in order to assess their academic performance, a pre

test to decide their entry behaviour was also conducted. In order to
measure their intelligence, Culture Fair Intelligence Test-Scale,
Form B was administered to all the pupils belonging to both the groups.

By applying 't' test, it was found that there was no
significant difference between the means of both groups in their
academic achievement, and in their inelegance. Thus two groups were
equally matched. Students of Government Higher Secondary School,
Karambayam formed the Control group whereas the students of Government
Higher Secondary School, Orathanad formed the Experimental Group.

4.1.7. Allocation of Treatment:

The Control group of students were exposed to the conventional
method of teaching. The Experimental group was exposed to CALL
technique. The same topics were taught to both the groups by the
researcher. A conducive atmosphere was maintained for both the groups.
As the researcher himself—an English language teacher—he himself taught
the unit to the control group. The researcher held classes for one
period of forty five minutes everyday for five days in a week before
commencement of the regular school time. The students willingly
attended the classes. Similarly the CALL treatment was given to the
Experimental group before the commencement of the regular school
session.

4.1.8. Collection of Source Material:

The researcher went through the course book, grammar books, books
dealing with English Language Teaching, reports, pamphlets, booklets
about software programmes and screened some of the available Computer
Assisted Instruction softwares. With the help of the knowledge gained from the above, the researcher made a thorough analysis of the contents allotted from sixth to tenth standard which helped him to develop a software keeping in mind the students' general ability. The teachers of English handling standard IX were also consulted and the efforts taken by them while teaching the unit were also taken into consideration.

4.1.9. Lesson Planning:

The researcher selected 'Affixation', a grammatical item prescribed in the syllabus of standard IX. A number of grammar books, linguistics books, dictionaries and softwares developed in other disciplines were referred to. The researcher met many teachers handling this process in English for ninth standard students, observed their classes and noted the problems faced by them while teaching this item. Bearing all these in mind, a suitable software was developed. While developing the software, the researcher took three roles as that of an expert in the subject matter, an educational psychologist and a programmer as the researcher holds degrees and diplomas in the above three areas.

While developing the software, the following instructions suggested by Lysaught and Williams (1968:24) were taken into account. The development of CALL Software has to cross through the following nine stages, as shown in the flowchart given in the next page.
The researcher's role in CALL is that of an assistant who helps the participants in booting computers, inserting the floppy and switching off the computers when the learner has completed his learning on a particular day. If the student himself is well versed in booting the computer, inserting the floppy, going to the correct unit and closing the system, then the researcher has to supervise the activities of to the leaner without intrusion.

4.1.10. Development of Software for CALL:

The development of a software is not an overnight job. It has to cross many stages to make it effective. The stages involved for developing programmed learning material suggested by Lysaught and
Williams (1968) were taken into consideration and due modifications were made to get a basis for the development of the software in question.

4.1.10.1. Selection of the Topics

Though, in principle, all behaviours can be programmed, the devices to produce different kinds of stimulation and to record the different responses of the learner may not be available to all programmes in a particular situation. Keeping this in mind as the basis for the selection of topic, a particular unit in grammar was taken depending upon the task analysis in terms of the stimuli required to be presented and flexibility of the available devices in the rural area where the research was conducted.

As the researcher was interested in studying the effectiveness of CALL over conventional method of teaching grammar to the secondary level students, ninth standard students were taken for the study. As only PC/XT computer was available in the area, the researcher wanted to make the best use of the potentialities of the computer. Keeping the advantages and limitations of the system while running an educational software in mind, the grammar units was taken after consultation with language experts, educational scholars, programmers and senior teachers of English with rich experience at the secondary level. The topic selected is introduced as 'Affixation' in standard nine and the following two parts with ten and eight units respectively were selected for the experiment.
PART - I

1. Negative prefixes
2. Reversative prefixes
3. Pejorative prefixes
4. Prefixes of Degree/Size
5. Prefixes of attitude
6. Locative prefixes
7. Prefixes of Time/Order
8. Number prefixes
9. Others
10. Conversion prefixes

PART - II

1. Noun ---&gt; Noun Suffixes
2. Noun/Adjective ---&gt; Noun/Adjective Suffixes
3. Verb ---&gt; Noun Suffixes
4. Adjective ---&gt; Noun Suffixes
5. Verb Suffixes
6. Noun ---&gt; Adjective Suffixes
7. Adjective Suffixes
8. Adverb Suffixes

4.1.10.2. Defining Entry Behaviour:

The next important stage while developing an educational software is to fix the entry behaviour of the learners. This fixation of the entry behaviour of the learners would help the researcher to begin his research work at the right direction. The importance of
previous learning is highly essential as "previous knowledge influences learning, even though the previous knowledge is only vague related to the new knowledge being required" (Fry, 1963).

The following were the behavioural objectives of the entry behaviour of the learners. The student before coming to learn the grammatical form in ninth standard should

- know the different parts of speech
- differentiate the various parts of speech
- know the spelling rules while forming new words

4.1.10.3. Defining Terminal Behaviour:

Fixing the Terminal Behaviour is the most pivotal step in the construction of an educational software. It suggests where the learner will be at the end of the learning process and it is the task of the software to take the learners to the 'Terminal' behaviour from the 'Entry' behaviour. The success of any educational program depends upon the attainability of the 'Terminal' behaviours. In consultation with the language teachers and education experts the researcher arrived at the following specific behavioural objectives that the learners are expected to attain at the end the educational software. They are:

At the end of Part I (Prefixation), the learner will be able

- to identify a base,
- to identify a prefix,
- to differentiate between prefix and base,
- to list various types of prefixes,
- to give examples to each type,
- to identify the type of prefix asked for and
- to use the correct prefix for a given base.
At the end of Part II (Suffixation), the learner will be able to identify a base, to identify a suffix, to define a suffix to differentiate between a suffix and a base, to give examples of the suffixation, to give examples of the various types of suffixes and to use the correct suffix in a given context.

4.1.10.4. Selecting a Model:

The next stage is the choice of the model, for that a paradigm to be drawn. The paradigm supplies the basic conceptual framework through which individual items are connected. Though researches have proved the supremacy of both linear and branching approaches with reference to learning and retention to different levels of students, the researcher modified the linear approach according to the level of the learners taken for study. So the model selected is an extension of linear programme. When a learner goes wrong, immediately the screen will be changed, reason for his incorrect answer will be displayed and he will be instructed to find out the correct answer by displaying the question once again. Unless he hits the correct key, the next frame will not be visible to him.

The flowchart that follows shows the scheme of arrangements of frames.
CONCEPT TO BE PRESENTED FOR LEARNING

DISPLAY QUESTION TO CHECK LEARNING

ACCEPT RESPONSE

RESPONSE AND ANSWER MATCH

YES

DISPLAY CONGRATULATION

NEXT CONCEPT

NO

REMEDIAL INSTRUCTION

DISPLAY COMMISSION
4.1.10.5. Sequencing:

As only the logically sequenced can produce the expected learner response to realise the objectives, the units dealing with the ideas were presented in a logical order according to the order prescribed in the standard grammar books consulted. The books by Quirk and Greenbaum (1972, 1973) were mostly depended as far as the subject matter is concerned.

4.1.10.6. Frame Construction:

A frame in the computer software employed in the research is a screen which represents a single idea. Each grammatical sub category was resolved into the three main cut stages namely Introductory, Teaching and Testing. Within each cut stage, a number of small steps were taken with suitable examples, keeping in mind the vocabulary level of a Tamil medium student in a rural area. The frames were constructed bearing in mind the maximum number of characters per line (80) and the maximum number of lines per screen (24). To make the frames readable, wherever possible, double line spacing was given and a screen full of text was avoided.

The package was developed in dBase III Plus, a package mainly designed for data collection. As the commands in that package all like the simple commands in English much difficulty was not experienced by the researcher while developing the software. He learnt the commands of dBase III Plus namely how to present the matter, develop loops to provide reinforcement, present question, items, incorporate, scoring system, and finally display the final score after the at end of a test.
The language employed in the software was within the vocabulary level of the participants. The options open to the participant were presented in the form of a menu. The choice could be made by pressing the appropriate code number.

The questions were of the multiple choice type. The maximum number of alternatives is 4 and the minimum is 3. The learner was to select one of the alternatives. As the learners find it difficult to locate the alphabetical keys, the idea of giving numbers for the alternatives as (1), (2), (3) or (4) was taken as the student can use the 'Numlock' key pad very easily. In the tests, if the learner entered the correct answer then the score was one else zero, and it was displayed immediately on the screen. The cumulative score was also displayed at the end as a message. If one scored less than 60% then the learner was instructed to start from the beginning. As a compromise, if a learner gets greater than 60% and lesser than 80%, the items where he went wrong would be displayed and he had to successfully do those items to get above 80%. If he got more than 80% he was asked to go to the next item. This arrangement helped the learner for self evaluation, and motivated him properly. While redoing the test, proper concentration was ensured.

4.1.10.7. Editing:

'Editing' is an important stage during the development of an educational software. Chauhan (1978) lists out the main objectives of editing a program as follows:
1. To eliminate the ambiguities and other inadequacies in it.
2. To improve the logical sequence of the frames.
3. To sharpen and to smooth the program.
4. To improve the technical aspect (content) of the program and
5. To improve the appropriate use of maps, charts and illustrations in the program.

Three types of editing - Technical accuracy edit, Programming technique edit and Composition edit were carried out before the program was ready for a try out.

Technical accuracy edit was done based on the suggestions and comments received from the English language teachers with rich experience in teaching the language, specially to the students in rural areas. One of the important suggestions they provided was the use of language employed in the software. Also the entire subject matter of the concerned units was shown to English Language Teaching specialists to find out the errors while presenting the matter to be taught.

In the second type of editing, with help of educationalists the program as a whole was first edited and followed by the edition in frame. The following were the points kept in mind while editing the whole program.

1. Program is to flow from item to item.
2. Different parts of the program are to be inter related.
3. Ideas are to be logically developed and
4. Apt examples and illustrations are to be given.
The third type of editing, composition edit, referring to the checking of the programme in respect of the vocabulary, spelling, grammar and punctuation, and mechanical aspects such as the uniformity of the numbering system, the length of blanks and placement of illustrations were done with the help of the ELT specialists, taking the following aspects into consideration.

1. The method of answering should be uniform in the same type of frames.
2. Blanks should be placed at or near the end of the frame and
3. There should be consistency in the style of language used throughout the program.

4.1.10.8. Debugging:

Debugging is a terminology found in the computer 'register'. It means the method of error detection and correction. At this stage the help of the programmer was received. The major errors found by the following error messages such as Data type mismatch, File is already open, Unterminated string, Variables not found, Mismatched DO WHILE and ENDDO, Position is off the screen and Unrecognized command verb.

4.1.10.9. Initial Testing & Revision:

It is done in the following ways.

4.1.10.9.1. Individual Try-Out:

This was done informally. A ninth standard student was told that he was not being tested but only helping the researcher to revise the program he had constructed. Each frame was presented separately, and when the student experienced difficulties, his difficulties were discussed with him by the researcher. This helped the researcher to
find whether the difficulty experienced by the student was due to the improper or inadequate presentation of the frame or due to the poor comprehension of the learner. The frame was suitably altered, rejected or made smaller still by adding some more frames previous to that particular frame.

4.1.10.9.2. Small Group Try-Out:

A small group of five students, a fair representative of those for whom the programme is finally intended was asked to take the software revised on the basis of the 'Individual try-out '. Their immediate achievement was assessed. It was found that 75% of the students scored 80% average.

The try-outs helped the researcher to concentrate more on the following items:

1. Illogical sequence of frames.
2. Difficult language used in the Program.
3. Large Steps.
4. Inadequate clues at the introductory stage.

Accordingly, more frames were introduced to have a better logical sequence; language used is simplified; large steps were broken down into smaller and simpler ones; and clues were included which made the students think before choosing the correct alternative.

4.1.10.10. Validation:

After the final revision, another set of ten students was exposed to the final revision of the software. The criterion level of the learner's achievement for validating the software was fixed as 75%
of the sample scoring above 85% average. The achievement of the pupils was found satisfactory with reference to the criterion level. The validated software has the following features.

It is IBM PC/XT/AT compatible. No additional equipment like mouse, lightpen, or printer is needed. The only additional equipment needed is the keyboard. The software is easy to use. The software can be begun with the student to type in his or her name and storing the same in a storing variable. This variable is printed out again on the screen at appropriate points. Concrete examples are provided wherever necessary. The boxing of the text is available. The arrangement of the screen is attractive and unconfusing for naive students. The error messages and feedback are incorporated in the program. In the testing part, the student can receive the marks he has scored in the tests. A student with little knowledge or experience can operate the system.

4.1.11. Hardware and Software Specifications: (Minimum Requirement)

| CPU Type    | : 80286 |
| Speed       | : 20 Mhz |
| Disk Drive  | : ONE |
| Floppy Type | : Double Sided Double Density (5.25") |
| Operating System | : DOS version-5 |
| VDU         | : CGA/Monochrome |
The format of the main menu that appears on the screen was displayed below:

<table>
<thead>
<tr>
<th>MAIN MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION 100</td>
</tr>
<tr>
<td>UNIT 1 101</td>
</tr>
<tr>
<td>UNIT 2 102</td>
</tr>
<tr>
<td>UNIT 3 103</td>
</tr>
<tr>
<td>UNIT 4 104</td>
</tr>
<tr>
<td>UNIT 5 105</td>
</tr>
<tr>
<td>SUMMARY 111</td>
</tr>
<tr>
<td>TEST 1 112</td>
</tr>
<tr>
<td>GUIT 150</td>
</tr>
</tbody>
</table>

Enter your choice : 0

The program developed for presenting the introductory chapter and its output was given below:

```
set talk off
set safe off
set menu off
set date brit
set devi to sere
set status off
PUBLI NAME
clea
VALID = "N"
CH = 0
*STORE SPACE(15) TO NAME,MNAME
SET COLO TO ,,W/GR+
do welcome
a 4,15 to 19,61 double
a 6,16 to 6,60
a 8,25 say " Developed by "
a 10,25 say " M. TAJUDEEN "
a 11,16 to 11,60
a 12,25 say " Guided by "
```
At the end of PART I, you will be able to identify a base, to identify a prefix, to differentiate between prefix and base, to list various types of prefixes, to give examples to each type, to identify the type of prefix asked for and to use the correct prefix for a given base.

We shall see here what is meant by prefix. Look at the following words.

un + happy = unhappy
im + possible = impossible
ir + regular = irregular

Here, un_, im_, ir_ are prefixes. Happy, possible, regular are called bases.
In this unit, we've learnt about 'prefix' and 'base'.

Example:

```
\* 1. LINK, STOP, ORAL
\* 2. LINK, TOP, MORAL
\* 3. INK, STOP, MORAL
\* 4. LINK, STOP, MORAL
```

Enter your option and proceed.
In 'unhappy',

'un_' is the prefix and 'happy' is the base.

This is the end of the Introductory part.

The entire output of the software developed was given in the floppy enclosed.

4.1.12. Conduct of Experiment:

Duration of the Experiment:


The researcher alone taught or guided the learners in learning the chosen topics through conventional method and through CALL.

Physical and mental comfort of the learner were taken care of when he worked before the computer. The computers were placed in a room where there was no noise. The connections were checked before the actual use. The keyboard was fairly large which helped the students press the buttons easily. The screen was conducive to the eyes and it was placed at a distance safe from the user's eyes.
To the Experimental group of learners training relating to basic operating instructions like starting, running and leaving the program were made clear before the actual treatment. They were given training in groups for a week. The reason(s) for the delay while running the program was also informed to the student. As a safety measure, the instructions about the getting the system, inserting the floppy and switching off the system were permanently displayed near the visual display unit. The different units in the software can be accessed by the learner by typing the relevant code number given in the opening menu. For the Control group the researcher took 25 working days during the above period.

4.1.13. Preparation of Achievement Test:

The researcher wanted to study the effectiveness of CALL on scholastic achievement. For this the researcher taught 'Affixation' through CALL. Discussions with the professors of English, well experienced teachers of English and specialists in English Language Teaching, and grammar books were consulted. The researcher wanted to conduct an achievement test on the following objectives at the end of the experiment. The content validity of the achievement test was reviewed by a panel of three members, consisting of a professor of English, a well-experienced teacher of English and a specialist in English Language Teaching.

4.1.13.1. Objectives:

1. To acquire 'knowledge' about the grammatical terms - affixation, base, prefix, suffix and word formation.
2. To develop an 'understanding' of the grammatical terms - affixation, base, prefix, suffix and word formation.
3. To practice the 'Application' of the above grammatical terms.

4.1.13.2. Development of the Achievement Test:

Keeping in mind the objectives specified, the test items were prepared in the prescribed unit included in the ninth standard. Before constructing the test items, the relevant books on 'Testing English' were consulted. Suggestions from Professors of English and experienced teachers of English were sought in connection with the test items in terms of content coverage. Weightage in terms of marks included the degree to which the selected unit relate to future learning. So, proper weightage was given to the three instructional objectives—Knowledge, Understanding and Application in consultation with the experts in the field.

4.1.13.3. Validity and Reliability of the Test:

Before constructing the test items, the researcher went through the important source materials, obtained opinions from experienced professors and teachers regarding the adequacy of test items with reference to content and major objectives of teaching the unit.

The reliability of the achievement test for the standard IX in grammar was determined by Split Half technique. The reliability coefficient was found to be 0.69 and the reliability of the whole test was calculated using Spearman-Brown Prophecy formula and was found to be 0.76 significant at 0.01 level.
4.1.13.4. Blue Print of the Achievement Test:

The test paper, thus prepared, consisted of 50 items. The items found in the paper were of multiple choice type. The blue print of the question paper marks given below:

TABLE #1
BLUE PRINT

<table>
<thead>
<tr>
<th>UNIT</th>
<th>KNOWLEDGE</th>
<th>UNDERSTANDING</th>
<th>APPLICATION</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefix</td>
<td>12(1)</td>
<td>10(1)</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Prefix/Suffix</td>
<td></td>
<td></td>
<td>10(1)</td>
<td>10</td>
</tr>
<tr>
<td>Suffix</td>
<td>8(1)</td>
<td>10(1)</td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

|       | 20 | 20 | 10 | 50 |

TABLE #2

Weightage to Objectives:

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>Understanding</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>Application</td>
<td>10</td>
<td>20%</td>
</tr>
</tbody>
</table>

|       | 50 |
|       | 100% |

4.1.14. Administration of the Achievement Test:

The researcher proposed to study the progress of the pupils' academic achievement. The researcher-made achievement test was already validated. Following the research design, the researcher conducted the achievement test after the treatment. The students were informed
earlier about the date on which the test would be conducted. The question paper and answer sheet were distributed to them. The school teachers assisted the researcher for the successful conduct of the post-test.

4.1.15. Conduct of Delayed Post-test:

After the conduct of the achievement test, a delayed Post-test was also conducted after an interval of one month. The same achievement test prepared for conducting the Post-test was used as the delayed Post-test. The marks secured by the learners in the Post-test were not revealed to them, as the researcher believed that the marks would affect the achievement of the learners in the delayed Post-test. Only after conducting the delayed Post-test, the marks scored by individuals in both the tests were announced.

4.1.16. Conduct of Psychological Tests:

The researcher used only the standardised psychological tools for the study. The researcher translated the instruction part of the Test into Tamil.

4.1.17. Measurement of Intelligence:

4.1.17.1. Tool Used:

Culture Fair Intelligence Test-Scale 2-Form B designed by R.B. Cattell and A.K.S. Cattell was used to measure the intelligence of the samples. This test is suitable for students belonging to age group 13-14, an age group relating to students of standard IX.
4.1.17.2. Description of the tool:

There are four subtests in the tool. Details of the subtests are given below:

Data on Scale 2 - Form B

<table>
<thead>
<tr>
<th>Sub-Test</th>
<th>Number of Items</th>
<th>Time Allotted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1: Series</td>
<td>12</td>
<td>3 minutes</td>
</tr>
<tr>
<td>Test 2: Classification</td>
<td>14</td>
<td>4 minutes</td>
</tr>
<tr>
<td>Test 3: Matrices</td>
<td>12</td>
<td>3 minutes</td>
</tr>
<tr>
<td>Test 4: Conditions</td>
<td>08</td>
<td>2½ minutes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46</strong></td>
<td><strong>12½ minutes</strong></td>
</tr>
</tbody>
</table>

The reliability has been estimated to range from 0.70 to 0.92 on different samples.

4.1.18. Measurement of Attitude towards the Study of English:

4.1.18.1. Tool Used:

The scale for the measurement of Attitude towards the Study of English constructed and standardised by Sundararajan and Balakrishnan was used.

4.1.18.2. Description of the tool:

This tool is of the Likert type and it has statements of which 25 are favourable and 25 are unfavourable towards the study of English. The usual scores are provided for the five alternatives against each statement depending on the nature of the statement favourable or unfavourable. The score ranges from 0 to 200 in terms of unfavourableness to favourableness. The sum of scores for all the statements is the individual's score. A student with a favourable
attitude can get a maximum of 200. Therefore any student who gets a score of 100 and above can be said to have a favourable attitude and any one who gets a scoring less than 100 may be said to have an unfavourable attitude towards the study of English.

4.1.19. Measurement of Attitude toward Computers:

4.1.19.1. Tool used:

A Computer Attitude Scale for Secondary Students (CASS) developed and standardised by Trudi Jones and Valerie A. Clarke was used.

4.1.19.2. Description of the scale:

The 40 item scale is composed of 15 items assessing the cognitive component, 15 items assessing the affective component and 10 items assessing the behavioural component. Each item is presented as a statement to which students respond using a five-point Lickert response scale labeled strongly agree; agree; neither agree nor disagree; disagree; and strongly disagree. Some of the items are worded so that the response of strongly agree indicates a positive attitude and some indicate a negative attitude.

The scale can be administered in 10 minutes. To obtain a score the responses are allocated numerical values, such that strongly agree is scored 5, agree is scored 4, neither agree nor disagree is scored 3, disagree is scored 2 and strongly disagree is scored 1. For the negatively worded items the scoring is reversed so that strongly agree is scored 1, agree is scored 2, neither agree nor disagree is scored 3, disagree is scored 4, and strongly disagree is scored 5. These 40 individual scores are summed to yield the total score.
4.1.19.3. Reliability of the scale:

A Chronbach's Alpha calculated for each of the components and the total scale indicated a high level of internal consistency for each of the affective and cognitive components and the total scale, where in each of the attitude items strongly relate to each other. The correlations between the scores on the three components of the scale are significantly correlated with each other. A test-retest design was used to measure the degree to which the CASS could reliably measure attitudes towards computer over time. The correlation coefficient of 0.84, P < 0.001 indicates that CASS has adequate test-retest reliability. The researcher translated the items into Tamil which was shown to a panel of experts in Psychology, Education and Tamil. Following their approval, the tool was validated.

4.1.20. Measurement of Study Habits:

4.1.20.1. Tool used:

The Study Habits Inventory constructed and standardised by Dr. B.V. Patel was used to find out the Study Habit of the Students.

4.1.20.2. Description of the tool:

There are 45 statements in the inventory which fall into the following seven areas:

1. Home environment and planning of work.
2. Reading and note taking.
3. Planning of subject.
4. Habits of concentration.
5. Preparation for examination.
6. General habits and attitudes.
7. School environment.
Each Statement can be marked on a five point scale. They are Always, Often, Sometimes, Hardly, Never. In case of the item indicating good study habit the student is to be given five marks if he puts a tick mark in the first column. Five, Four, three, two and one marks are to be given if he puts the tick mark in the column of Always, Often, Sometimes, Hardly and Never respectively. In the case of the statement indicating bad study habit, the score is to be assigned in the reverse order. Thus the high score will indicate good study habit and the low score will point poor study habit. The maximum possible score is 225 and the least possible is 45.

4.1.20.3. Reliability and Validity of the tool:

The reliability and validity of the inventory have been established by the author. The reliability established by test-result method and split-half method were found to be 0.79 and 0.82 respectively.

4.1.21. Measurement of Parental Encouragement: (Indian Adaptation)

4.1.21.1. Tool Used:

This test was designed by Prof. R.C. Gardner of University of Western Ontario. This tool uses Likert seven alternative response format labeled strongly disagree, moderately disagree, neutral, slightly agree, moderately agree and strongly agree. There are 10 positively worded items in the scale that assess the extent to which students feel their English study. A high score (maximum = 70) indicates a high level of perceived parental encouragement.
4.1.21.2. Reliability of the scale:

The correlation coefficient of the scale obtained from the test-retest method is 0.79. The researcher selected the pupils of ninth standard as the subjects of the study. The researcher translated all the items of the scale into Tamil. He set a panel of experts in Education, Psychology and Tamil. They scrutinised the main scale and the scale translated into Tamil. They expressed their satisfaction over the construction and translation of the scale. By using the test-retest technique the Reliability Co-efficient was calculated between the two tests and found to be 0.77. A high reliability was observed for the test in Tamil version. Thus the scale was modified and validated.

4.1.22. Measurement of Interest in Foreign Language: (Indian Adaptation)

4.1.22.1. Tool Used:

A scale for measuring the interest on Foreign Language constructed and standardised by Prof. R. C. Gardener was used.

4.1.22.2. Description of the tool:

This tool uses Likert seven alternative response format labeled strongly disagree, moderately disagree, slightly disagree, slightly disagree, neutral, slightly agree, moderately agree and strongly agree. This measure consists of ten positively worded items (maximum = 70) designed to assess subjects' general interest in studying foreign languages.

4.1.22.3. Reliability of the tool:

The correlation coefficient of the scale obtained from the test-retest method is 0.85. The researcher selected the pupils of ninth standard as the subjects of the study. The researcher translated all
the items of the scale into Tamil. He set a panel of experts in Education, Psychology and Tamil. They scrutinised the main scale and the scale translated into Tamil. They expressed their satisfaction over the construction and translation of the scale. By using the test-retest technique the Reliability Co-efficient was calculated between the two tests and found to be 0.79. A high reliability was observed for the test in Tamil version. Thus the scale was modify and validated.

The tools "Culture Fair Intelligence Test-Scale- Form B", "Attitude towards the Study of English", "A Computer Attitude Scale for Secondary Students", "Study Habits Inventory", "Parental Encouragement Scale" and "Interest in Foreign Language Scale" are extensively used to measure the variables selected for this study to find out the relationship/effect of CALL as a teaching technique and the above tools have been to possess the characteristics of a research tool by the previous researchers. Based on this as a reliability of the tool, the researcher has taken up the tools in this work.

4.2. Conclusion:

The present study has been carried out in five phases, namely

1. Design
2. Organisation
3. Development
4. Implementation
5. Evaluation.
Each phase has various stages within it. In this chapter a detailed discussion on the various stages the first four phases has been presented. The students in both the groups were properly tested before and after the teaching of the Grammar Unit. This ensured the validity and reliability of the tools and finding. To carry out phase 5, data was collected on the variables selected for the study either at the entry level or at both levels. The data thus collected were analysed using suitable statistical techniques and based on the analysis, interpretations were drawn and generalisations arrived at. A detailed discussion on the various statistical techniques applied and inferences drawn which come under phase 5 are presented in the following chapter.