METHODOLOGY
CHAPTER - III

METHODOLOGY

3.1. Overview
3.2. Statement of the Problem
3.3. Objectives of the study
3.4. Hypotheses of the study
3.5. Identification of children with learning difficulties
3.6. Functional Assessment by Teachers and Parents
3.7. Diagnosing the children’s difficulties in Reading, writing and spelling. (English Language)
3.8. Experimental Design
3.9. Variables
3.10. Procedure adopted for equating the groups
3.11. Sample for the study
3.12. Tools used for the study
3.13. Reliability of the Tools used in the study
3.14. Validity of the Tools used in the study
3.15. Multi-sensory Remedial Instructional Strategy for reading, writing and spelling (English language)
3.16. Pre - try out of Instructional Aids
3.17. Lesson Plans and Conventional teaching
3.18. Data Gathering Process
3.19. Administration of the Pre-Test
3.20. Treatment of MSTL group regarding reading concept
3.21. Treatment of MSTL group regarding writing concept
3.22. Treatment of MSTL group regarding spelling concept

3.23. Treatment of CT groups regarding reading, writing and spelling concepts

3.24. Administration of Post-tests to test the Reading, Writing and Spelling concepts of English language

3.25. Administration of Retention tests to test the Reading, Writing and Spelling concepts of English language

3.26. Statistical Analysis used in the study
CHAPTER-III
METHODOLOGY

3.1 Overview

This chapter deals with the description of the Methodology followed by the investigator to study the effectiveness of multi-sensory instructional strategy on the Reading, Writing and Spelling (English language) abilities of Children with learning difficulties at Primary level. The methodology used in the present study is discussed under the following heads namely, Statement of the problem, objectives of the study, hypotheses of the study, technique of identification of children with learning difficulties, sample selected for the study, reliability and validity of the tools used in the study and statistical treatment.

3.2 Statement of the Problem

To study the effectiveness of instructional strategies for children with learning difficulties in reading, writing, and spelling (English language) abilities of children, the investigator has taken up the problem "EFFECTIVENESS OF MULTI-SENSORY INSTRUCTIONAL STRATEGY ON THE READING, WRITING AND SPELLING (ENGLISH LANGUAGE) ABILITIES OF CHILDREN WITH LEARNING DIFFICULTIES AT PRIMARY LEVEL". This study attempts to find out the effectiveness of multi-sensory instructional strategy on reading, writing and spelling abilities of children with learning difficulties in English language by comparing the achievement of students who learned through multi-sensory instructional strategy and those who learned through conventional teaching strategy.
3.3 **Objectives of the Study:**

1. To develop tests to identify reading difficulties, writing difficulties and spelling difficulties of children in English at primary level.

2. To identify the children with reading, writing and spelling difficulties in English at primary level.

3. To develop multi-sensory instructional strategy to overcome reading difficulties, writing difficulties and spelling difficulties in English language among children with learning difficulties at Primary level.

4. To find out the effectiveness of multi-sensory instructional strategy to overcome the reading, writing and spelling difficulties in English of children with learning difficulties.

5. To find out the significant difference if any, in the reading abilities of children with learning difficulties who learned English language through multi-sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

6. To find out the significant difference if any in writing abilities of children with learning difficulties who learned English language through multi-sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

7. To find out the significant difference if any in Spelling abilities of children with learning difficulties who learned English language through multi-sensory instructional strategy due to variations in
the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

3.4 Hypotheses of the Study

1. There will not be significant impact on post test reading ability scores of children who learned English language through multi-sensory instructional strategy and conventional strategy.

2. There will not be significant impact on post test writing ability scores of children who learned English language through multi-sensory instructional strategy and conventional strategy.

3. There will not be significant impact on post test spelling ability scores of children who learned English language through multi-sensory instructional strategy and conventional strategy.

4. There will not be significant impact on retention test reading ability scores of children who learned English language through multi-sensory instructional strategy and conventional teaching strategy.

5. There will not be significant impact on retention test writing ability scores of children who learned English language through multi-sensory instructional strategy and conventional teaching strategy.

6. There will not be significant impact on retention test spelling ability scores of children who learned English language through multi-sensory instructional strategy and conventional teaching strategy.

7. There will not be significant difference in Post test reading ability scores of children who learned English language through multi-
sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

8. There will not be significant difference in retention test reading ability scores of children who learned English language through multi-sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

9. There will not be significant difference in Post test writing ability scores of children who learned English language through multi-sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

10. There will not be significant difference in retention test writing ability scores of children who learned English language through multi-sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

11. There will not be significant difference in Post test spelling ability scores of children who learned English language through multi-sensory instructional strategy due to variations in the Sex, Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

12. There will not be significant difference in retention test spelling ability scores of children who learned English language through multi-sensory instructional strategy due to variations in the Sex,
Community, Locality, Family size, Family type, Parent’s educational qualification and Family income.

3.5 Identification of the Children with learning Difficulties

Five important steps were followed by the investigator for identifying the children with learning difficulties. They are:

a. Observation of academic achievement score
b. Intelligence assessment
c. Sensory screening
d. Observation of socio- economical status
e. Functional Assessment

(a) Observation of Academic Achievement Score:

Out of 370 matriculation schools in Coimbatore district, the investigator selected 15 Schools. A total of five achievement test scores of IV and V standard students were collected from the school record. Among them Children who got 3 success and 2 failures (35 marks is considered as success) were selected for further screening related to learning difficulties. In addition, the investigator calculated mean and standard deviation values for entire class of children in English language examination. From the calculations, the children whose scores was below two standard deviation from the group mean score were to be considered as children with learning difficulties and planned for further diagnosis. On the other hand children whose scores was above two standard deviation from the group mean score were considered as high achievers and not considered for this study. The specimen copy of the school progress card, which was designed for this study, is given in the appendix II.
b. Intelligence Assessment:

The Raven's Coloured Progressive Matrices (RPM) was administered to assess the intelligence of the children. Those who got normal level of percentile point score in R.P.M test, the continuous failure in English academic achievement test, observation comment, given by the teacher are taken into consideration to label the students with learning difficulties. The specimen copies of RPM are included in the Appendix V, VI and VII.

Pencil and R.P.M Response Sheets were distributed to the children. The children were asked to fill the particulars about themselves on the record forms. The investigator helped the children to fill the response sheet. Their particulars were checked with school records. A sample item of response sheet is included in the Appendix VIII. They were asked not to open books until every one was ready. The investigator opened a book for the group to see and explained the first question item in the R.P.M. The explanation was given until doubts were cleared. The instruction given in the manual was strictly followed by the investigator. The comfortable seating arrangement and lighting arrangement were made while conducting the test. The pupils were asked to take their own time for completing the test items.

C. Sensory Screening:

1. Visual Screening

To assess visual acuity of children, the Snellen's chart was used. The Snellen's chart consists of rows of letters. In this test the English alphabet Es are arranged in various positions and
children’s task is to indicate what direction the legs of Es are facing. Each row corresponds at which persons with normal visual function can discriminate the direction of Es. Pupils are normally tested at the 20 feet row, they are said to have 20/20 central visual acuity for far distances. The specimen copy of Snellen’s chart in reduced size is given in the appendix III.

2. Auditory Screening (Audio Meter)

To assess hearing ability of children selected for the study, they were subjected to undergo audio logical testing. Automatic Audio meter was used for assessing hearing ability. The pure tone test was conducted for both ears and their hearing ability was ascertained. The children whose hearing ability was found at or below 20 dB were considered as normal hearing individuals. Assistance from E.N.T specialist for using the Audio meter was obtained for knowing the hearing ability of children. It is a reliable and standard instrument used in the medical field. The specimen copy of the audiogram recording sheet is given in the appendix IV.

For practical purpose the child whose intellectual capacity was average or above average and their academic achievement below the average of the class achievement score was considered as CLD and considered for further diagnosis. In the further diagnosis, the above said children were subjected to undergo sensory screening (Visual Acuity Test, Hearing Ability Test). To understand their socio- economical status and cultural aspects, their background information was referred to for confirming them as CLD.

While identifying the CLD in a class, children’s mental ability, their continuous academic achievement marks for five occasion
and deviation of academic achievement from group mean score were analyzed. For screening their sensory ability, appropriate apparatus and scientific procedure was followed. Further, the information regarding background variables were studied carefully for confirming a child as having learning difficulty.

3.6 *Functional Assessment by Teachers and Parents:*

After identifying the CLD as a further confirmation task, the investigator took efforts to study the characteristics of children. For this purpose, the investigator prepared two questionnaires, one for the teacher and the other for the parents to assess the character of CLD. The investigator referred to Clement’s (1966) “Minimal Brain Dysfunction in Children” which mention list of characteristics prevalent in individual with learning disability, for developing Functional Assessment Test (FAT) for this study. The following are the characteristics frequently associated with learning difficulties. They are as follows

1. Hyperactivity
2. Perceptual impairment
3. Emotional Liability
4. General Co-ordination deficits
5. Disorders of attention
6. Impulsivity
7. Disorders of memory and thinking
8. Specific learning disabilities in the areas of reading, writing, spelling and arithmetic.
9. Disorders of speech and hearing

10. Equivocal neurological signs and electroencephalographic irregularities.

The investigator prepared Functional Assessment Test (FAT) based on the above mentioned characteristics. Each FAT contains 50 statements. The investigator constituted a four member panel to validate the tool prepared by the investigator. The panel consisted of 4 faculty members associated with education of children with learning difficulties. After a thorough analysis of the tool some modifications were done for each statement. Their valuable suggestions have been incorporated. Finally, 45 statements were retained for each Functional Assessment Test.

The investigator issued the functional assessment test to parents and teachers and then gave clear instruction to respond to the questionnaires. Both negative and positive statements were in the functional assessment test. It is prepared with five options for each statement. The response of FAT collected from parents and teachers were used to confirm the child as learning difficulties. The maximum score possible for tool is 120. All the children identified as children with learning difficulties for this study obtained more than 92 marks in both the assessments (Parents and Teachers). It indicates that the children considered for this study have similar characteristics of learning difficulties. A specimen copy of the questionnaire for the parent is given in Appendix IX and a specimen copy of the questionnaire for the teacher is given in Appendix X.
3.7 Diagnosing the Children’s Difficulties in Reading, Writing and Spelling. (English Language)

After the functional assessment process was over, the investigator started to implement diagnostic process. With the help of diagnostic test in reading, writing and spelling concept, the investigator categorized children into Reading, Writing and Spelling difficulties.

To diagnose the learning difficulties, the investigator developed the following tests.

1. Reading Disabilities Diagnostic Test (RDDT)
2. Writing Disabilities Diagnostic Test (WDDT)
3. Spelling Disabilities Diagnostic Test (SDDT)

On the basis of the two routes namely phonological and visual, the investigator developed the Reading Disabilities Diagnostic Test. It covers the following components.

1. Letter identification
2. Word attack
3. Analogues
4. Sound Identification
5. Word recognition
6. Oral reading
7. Complete the missing words
8. Word Analysis and Synthesis
9. Auditory Segmentation
10. Cloze Test

The writing Disabilities Diagnostic Test was developed on the basis to assess the difficulties in motor skills such as fine motor skills, gross motor skills, laterality and directionality. The test items were developed in keeping the below mentioned writing components.

1. Letter formation
2. Letter Slope
3. Letter Size
4. Letter Spacing
5. Word Spacing
6. Letter Word Alignment
7. Letter joining

The spelling disabilities diagnostic test was mainly based to assess the difficulties in visual memory, visual discrimination, Visual Sequence, Visual Verbal association, visual perception, auditory memory, auditory discrimination and auditory perception. The following components were included in the Spelling diagnostic test.

1. Circle the correct spelling
2. Word Recognition
3. Plurals and Syllabication
4. Track the following
5. Add prefix and suffix to the roots
6. Spell and match the syllables

7. Finding words by using the clues given

8. Dictation regarding spelling rules.

These tests helped to categorize the children into three different types of learning difficulties. After the construction, the diagnostic tests items were checked by the investigator and subject specialists. Based on the observation made by the investigator and specialists, certain modifications were made. Specialist’s valuable suggestions have been incorporated to finalize the diagnostic tests. In each test, the test score is 50 and each question carries one mark, for every correct answer, one mark was given and zero was given for every wrong answer. The duration of each test was one hour. The specimen copies of the test papers are enclosed in Appendix XI, XIII and XV and the scoring key in Appendix- XII, XIV and XVI.

3.8 Experimental Design

Pre test- Post test- Retention test, experimental design was used in the study to know the relative effectiveness of multi-sensory instructional strategy used in this study. The dependent variable of this experiment is retention of information gained by children with English reading, writing and Spelling difficulties learned through multi-sensory instructional strategy.

80 children with learning difficulties (CLD) (41 boys and 39 girls) of standard IV and V were identified and administered a pre-test to know the previous knowledge about the language aspects, which were selected for treatment. The pre-test scores and other information like Sex, Community, locality family size,
family type, parent’s educational qualification and family income of CLD were referred for splitting the 80 Children into two equated groups. Before finalizing the two groups, their pre-test scores obtained in reading, writing and spelling aspects regarding two groups were subjected to ‘t’ test. The investigator found that ‘t’ value obtained for reading, writing and spelling were (1.25, 1.58, and 1.641) respectively which were not significant at 0.05 level. This process proves that the two groups were equally divided with same entry behavior. The treatment groups consisted of 19 boys and 21 girls, and the conventional teaching groups consisted of 22 boys and 18 girls. Achievement tests regarding reading, Writing and spelling concepts in English language were conducted for both groups, immediately after the treatment (multi-sensory instructional strategy and conventional teaching strategy). These tests are termed as Post tests. The same achievement tests were administered after one month as the retention tests.

3.9 Variables:

i) Independent Variables:

Independent variables are those, which determine the effects in which the investigator is interested. There are two types of independent variables. One type consists of experimental variables, which are controlled by the investigator. The other type consists of variables not controlled by the investigator.

In this study the experimental variable is the multi-sensory instructional strategy. The other types of variables termed as organism or attribute variables are such as sex, community; locality, family size, family type, Parent’s educational
qualification and family income also determine the effects of the experiment. For better understanding of the sample the separate form was used to gather bio-data.

**ii) Dependent Variable**

Dependent variables were the retention of information gained by children with learning difficulties on the achievement tests designed to measure the effectiveness of multi-sensory instructional strategy used in teaching of reading, writing and spelling tasks. Thus the dependent variable is measured changes in pupils' performance attributable to the influence of experimental and independent variables.

**3.10 Procedure adopted for equating the groups**

In order to understand the organism variables of the sample, it was decided to make use of a personal data sheet. The personal data sheet includes the information regarding sex, community, locality, family size, family type, parents' educational qualification and family income. The specimen copy of bio-data form is given in Appendix I. The information obtained through this data was made use of for making certain data analysis. The following procedure was adopted to equate the two groups namely multi-sensory instructional strategy groups and conventional teaching strategy groups.
1. **Sex:**

   The number of boys and girls in experimental group were 19 and 21 and in control group were 22 and 18. They were categorized as follows

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Boys</td>
</tr>
<tr>
<td>B</td>
<td>Girls</td>
</tr>
</tbody>
</table>

2. **Community**

   Community of students of two groups was matched with the help of information received from the data sheet. There were three categories of communities

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BC</td>
</tr>
<tr>
<td>B</td>
<td>SC</td>
</tr>
<tr>
<td>C</td>
<td>OC</td>
</tr>
</tbody>
</table>

3. **Locality of Residence**

   Locality of residence of two groups was matched with the help of information gathered from the data sheet. There were two categories of locality.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Rural</td>
</tr>
<tr>
<td>B</td>
<td>Urban</td>
</tr>
</tbody>
</table>
4. **Family Size:**

The family size of two groups were collected and matched with the help of information from the data sheet. There were two categories as follows.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Small</td>
</tr>
<tr>
<td>B</td>
<td>Large</td>
</tr>
</tbody>
</table>

5. **Family Type:**

The family type of two groups were collected and matched with the help of information from the data sheet. There were two categories as follows.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>A</td>
</tr>
<tr>
<td>Joint</td>
<td>B</td>
</tr>
</tbody>
</table>

6. **Parent’s Educational qualification:**

Parent’s educational qualifications were matched with the help of information, from the data sheet. There were four categories as follows.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Illiterate</td>
</tr>
<tr>
<td>B</td>
<td>Up to Hr. Sec</td>
</tr>
<tr>
<td>C</td>
<td>Graduate</td>
</tr>
<tr>
<td>D</td>
<td>Post Graduate</td>
</tr>
</tbody>
</table>
7. **Family Income**

Family income was matched for two groups with the help of information from the data sheet. There were four categories as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Below 1 lakh</td>
</tr>
<tr>
<td>B</td>
<td>Rs 1-2 Lakhs</td>
</tr>
<tr>
<td>C</td>
<td>Rs 2 -3 lakhs</td>
</tr>
<tr>
<td>D</td>
<td>Above Rs 3 lakhs</td>
</tr>
</tbody>
</table>

**Entry behavior and Pre-test**

To know the previous knowledge about the content, the investigator prepared pre test question papers regarding reading, Writing and Spelling ability of students in English language. Each question paper is with 50 marks. For reading 10 components were tested, for writing 7 components were tested, and for spelling 8 components were tested. The marks obtained through pre-tests help the investigator to divide the learning difficulty children into two groups. Before finalizing two groups, the pre-test scores in
both control and experimental groups were subjected to 't' test and it was found that there is no significant difference between the two groups regarding pre-test scores in reading, writing and spelling concepts.

The following table shows the pre-test score of distribution of two groups (multi-sensory instructional strategy group and conventional teaching strategy group)

Table- 3.1: Comparison between control and experimental groups in reading pre-test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>No</th>
<th>SE</th>
<th>tvalue</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>2.17</td>
<td>1.38</td>
<td>40</td>
<td>0.3</td>
<td>1.25</td>
<td>Not Significant at 0.05 level</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>2.60</td>
<td>1.53</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table-3.2.: Comparison between Control and experimental groups in writing Pre-Test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>No</th>
<th>SE</th>
<th>tvalue</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>2.30</td>
<td>0.97</td>
<td>40</td>
<td>0.291</td>
<td>1.548</td>
<td>Not Significant at 0.05 level</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>2.75</td>
<td>1.56</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table-3.3: Comparison between Control and experimental groups in spelling Pre-Test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>No</th>
<th>SE</th>
<th>t value</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>2.05</td>
<td>1.36</td>
<td>40</td>
<td>0.320</td>
<td>1.641</td>
<td>Not Significant at 0.05 level</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>2.58</td>
<td>1.50</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.11 Sample for the Study

Out of 370 Matriculation schools of Coimbatore District, the investigator selected 15 schools. There were about 1523 Primary level students studied in 4th and 5th standard in the 15 Schools. Among them 180 children were identified as having learning difficulties, Among 180 Children with learning difficulties, 80 children were randomly selected for this study.

Therefore 80 Children were then selected for the study. They studied in 4th and 5th standards in Matriculation schools in Coimbatore district. The sample consists of 39 girls and 41 boys.
Table-3.4: Class wise Distribution of sample for the study

<table>
<thead>
<tr>
<th>Standard</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>20</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>V</td>
<td>21</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>39</td>
<td>80</td>
</tr>
</tbody>
</table>

Table – No.3.5: Distribution of Sample in terms of Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Control group</th>
<th>Experimental group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of students</td>
<td>%</td>
<td>No. of students</td>
</tr>
<tr>
<td>Sex</td>
<td>Boys</td>
<td>22</td>
<td>55.5</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>18</td>
<td>45.0</td>
</tr>
<tr>
<td>Community</td>
<td>BC</td>
<td>16</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>14</td>
<td>35.0</td>
</tr>
<tr>
<td></td>
<td>OC</td>
<td>10</td>
<td>25.0</td>
</tr>
<tr>
<td>Locality</td>
<td>Rural</td>
<td>20</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>20</td>
<td>50.0</td>
</tr>
<tr>
<td>Family size</td>
<td>Small</td>
<td>18</td>
<td>45.0</td>
</tr>
<tr>
<td></td>
<td>Large</td>
<td>22</td>
<td>55.0</td>
</tr>
<tr>
<td>Family type</td>
<td>Joint</td>
<td>17</td>
<td>42.5</td>
</tr>
<tr>
<td></td>
<td>Nuclear</td>
<td>23</td>
<td>57.5</td>
</tr>
<tr>
<td>Parents educational</td>
<td>Illiterate</td>
<td>2</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Up to Hr. Sec.</td>
<td>12</td>
<td>30.5</td>
</tr>
</tbody>
</table>
3.12 Tools used for the study:

For Collecting new, unknown data required for the study of any problem, one might use various devices. These devices or instruments employed in the collection of data are called tools. Each tool is particularly appropriate for certain sources of data, yielding information of the kind and in the form that would be most effectively used. A large number and variety of tests have been standardized and are available for a relatively small cost. The following tools are used for the present study. The tools used for this study are as follows.

i. Mental Ability Test (Raven’s Coloured Progressive Standard Matrices (RCPSM))

ii. Questionnaire for functional Assessment
   a. Functional Assessment Test - Teachers (FATT)
   b. Functional Assessment Test - Parents (FATP)

iii. Diagnostic Test in English
a) Reading
b) Writing and
c) Spelling

iv. Achievement Test in English
a) Reading
b) Writing and
c) Spelling

In addition to these tools the following instruments were also used for the study

v. Snellen’s Chart (Visual Screening)

VI. Audio Meter (Auditory Screening).

Proforma

For knowing about the background variables of children a proforma was prepared by investigator to collect data regarding sex, Community, locality of residence, family size, family type, Parent’s educational qualification and family income. The students are asked to fill up the form.

Name : 
STD : 
Sex : Male/ Female
Community : B.C/ S.C/ OC
Locality : Rural / Urban
Family size : Small/ Large
Family type : Joint/ Nuclear

Parent’s educational Qualification : illiterate/ Up to Hr.Sec / Graduate/ Post Graduate

Income of family : < 1 lakh / < 1-2 lakhs/ 2-3 lakhs/ > 3 lakhs

A specimen copy of proforma is enclosed in the appendix-I

**iv) Achievement Test:**

The investigator developed the achievement tests for English language Reading, Writing and spelling. Each question paper is meant for 50 marks. For reading 10 components (Letter identification, Word attack, Analogues, Sound identification, Word recognition, Oral reading, Complete the missing words, Word analysis and Synthesis, Segregate the sounds, Cloze test) were tested. For writing 7 Components (Letter Formation, Letter Slope, letter Size, Letter Spacing, Word Spacing, Letter word alignment and Letter joining) were tested, For spelling 8 components (Circle the correct spelling, word Recognition, and Syllabication, Track the following, Add prefix and suffix to the roots, spell and match the syllables, Finding words by using the clues given and Dictation on spelling rules) were tested. The investigator used the item analysis and established reliability and validity for the achievement tests. Further the investigator also prepared the scoring key for these tests.

**Item Analysis**

To prepare Achievement tests in reading, writing and spelling concepts in English language, the investigator prepared test papers termed as pilot study test papers for English reading, writing and
spelling. The question papers for reading writing and spelling concepts consisted of 62, 58 and 61 questions respectively. Each question carries one mark for the correct answer. The questions were prepared and issued to children. The duration of each test was 60 minutes. A specimen copy of pilot study question papers and the scoring key for each one is enclosed in the Appendix XVII, XIX, XXI, XVIII, XX and XXII respectively. A total of 30 children in 4th standard were taught to understand the content selected for the study. The investigator calculated the difficulty index and discrimination index for all questions in each question paper. The investigator selected the questions which has discrimination index 0.6 and above and difficulty index 55% and above. Based on this analysis the investigator selected 55 questions each for reading, writing and spelling concepts of English language. Before giving final shape to the pre-test question papers, the investigator consulted with senior subject specialists and experts. Incorporating their valuable suggestions 3 questions were removed from each question papers and keeping the statistical calculations in mind, the investigator removed 2 more questions from each question paper. Hence the 5 questions from each were discarded and only 50 questions were kept for final study. Therefore each final Pre-test question paper consists of 50 questions. The specimen copy of each achievement test question paper and the scoring key for each test paper is enclosed in Appendix XXIII, XXV, XXVII, XXIV, XXVI and XXVIII respectively.

i) Mental Ability Test

British Psychologist Charles Spearman argued that all activities share a common factor called general intelligence;
assessment requires the construction of general intelligence without becoming clouded by the various specific abilities. Ideally, such a test should be highly abstract and free from cultural biases. The most successful such test of intelligence is Raven’s Coloured Progressive Matrices (1984). Hence Raven’s colored Progressive Matrices (RPM) was administered to assess the intelligence of pupils. As a non-verbal test, it provides useful information on a person’s ability to think clearly and logically. The problems become progressively simple to complex. The order of the tests provides the standard training in the method of working. The 3 sets provide opportunity for grasping the method of person’s capacity for intellectual activity.

RPM coloured version consisted of three sets as A, Ab, B and each set having 12 items. Totally 36 items are there in the RPM test. A sample item is included in Appendix V, VI and VII.

The scoring key and norm table for different age group, which was given in the manual, was referred to for classification of the children’s mental ability. The norms for Raven’s coloured matrices scale are given in five grades as follows

1. ‘Intellectually Superior’.
2. ‘Definitely above the average in intellectual Capacity’.
3. ‘Intellectually average’.
4. ‘Definitely below average in intellectual Capacity’.
5. ‘Intellectually defective’.

According to the norms given in the test manual, the school children were classified. The children whose score were
average (or) above average in mental ability were taken for further screening. It is a standardized test followed by educationists and Psychologists.

**ii) Snellen’s Chart (Visual Screening)**

To assess the visual activity of children, the Snellen’s chart was used. The Snellen’s chart consists of rows of letters. In this test Es are arranged in various Positions and the person’s talk is to indicate what direction the legs of the Es are Facing. Each row corresponds to the distance at which person with normal visual function can discriminate the direction of Es. Pupils are normally tested at the 20 feet distance. If they can distinguish the direction of letters in the 20 feet row, they are said to have 20/20 Central Visual acuity for far distances. (The specimen copy of Snellen’s chart in reduced size is given in the appendix (III) this is an effective device used in the clinic to assess the visual acuity of the individuals.

**Audio Meter (Auditory Screening)**

To assess Learning ability of Children selected as CLD, they were subjected to undergo audio logical testing. For assessing hearing ability, automatic audiometer was used. The pure tone test was conducted for both ears and their hearing ability was ascertained. For this study, the children whose hearing ability was found at or below 20 dB were considered as normal hearing individuals. The investigator was assisted by an ENT Specialist in using the Audiometer to know the hearing ability of the children. (The specimen copy of audiogram is given in the appendix IV) It is a reliable and standard instrument used in the medical field.
iii) Diagnostic Tests

After the completion of the different process and screening for identifying CLD, the investigator prepared diagnostic tests regarding reading, writing and spelling aspects of English language.

a. Reading Difficulties Diagnostic Test: (RDDT)

Researchers have found out that there are three stages of reading called logographic stage, where words are identified by distinguishing visual features, the alphabetic stage based on phoneme awareness where the letter- sound system is mastered, and the orthographic stage which is based on visual analysis and is independent of sound Snowling, (1985) These three stages come under two routes of reading namely phonological and visual. The Phonological route corresponds to Frith’s alphabetic stage and the visual route corresponds to the orthographic stage. Based on these two routes, the investigator constructed the Diagnostic test in reading.

The Reading Difficulties Diagnostic Test covers the following components.

In order to obtain specific information about the learner’s current status in reading, aspects such as phonic knowledge, word recognition, comprehension, Phonic awareness, Visual discrimination and short term auditory memory are assessed. The test items have been developed in keeping the components of reading difficulties namely, Letter identification, Word attack, Analogues, Sound identification, Word recognition, Oral Reading, Complete the missing words, Word Analysis and Synthesis- Comprehension, Segregate the sounds and cloze test. Test items have
been given to subject specialists and experts with a request to review the items about their suitability to identify the particular aspect of reading difficulty. Based on their comments, certain items have been retained and certain items have been deleted. At this stage the test comprises 50 objective type questions, each question carries one mark. For each correct answer ‘one’ mark is awarded and for each wrong answer ‘Zero’ is given. The reading difficulties diagnostic Test and its scoring key are given in Appendix XI and XII.

b) Writing Difficulties Diagnostic Test (WDDT)

Luria refers to kinetic melody of handwriting as the functional integration of hand, the sensory and motor parts of the brain controlling movements, the eye and visual cortex, language area and association areas and frontal cortex, the thinking part. Though hand writing needs all the senses as mentioned above, writing is chiefly based on motor skills such as fine motor skill, gross motor skill, laterality, directionality etc. The test has been developed in keeping view of the components of writing difficulties namely Letter formation, Letter slope, Letter Size, Letter spacing, Word Spacing, Letter Word alignment and letter joining. The developed writing Difficulty Diagnostic test items have been given to subject specialists and exports working at school and collegiate level, with a request to review the items about their suitability to identify the particular aspect of writing difficulty. Based on their comments certain items have been retained and certain items have been deleted or incorporated. At this stage, the test comprises 50 objective type questions. Each question carries one mark. For each correct answer ‘one’ mark is awarded and for each wrong answer ‘zero’ is given.
The writing difficulties diagnostic test and its scoring key are given in Appendix XIII and XIV.

c) **Spelling difficulties Diagnostic Test:**

Spelling error analysis is a way of analyzing student’s spelling in order to identify the student’s strength and weakness which is the process of diagnostic test.

Spelling errors are classified as logical phonetic alternatives, which follow English spelling convention, visual sequential errors which are usually two letters out of order. These errors are to do with visual rather than auditory memory. Rule base errors show lack of awareness of spelling rules or phonetic alternatives, sounds missing, misheard of mis-sequenced can be very disordered and motor errors, may take the form of handwriting errors, repetition or omission of letters. Based on this analysis the diagnostic test in spelling is constructed. It includes the components of spelling difficulties such as circle the correct spelling, Word Recognition, Plurals and syllabication, track the following words, Add prefix and suffix to the roots, spell and match the syllables from words by using the clues given, and dictation based on the spelling rules. Developed test items have been given to subject specialists and experts in school and collegiate level with a request to review the items about their suitability to identify the particular aspects of difficulty in spelling. Based on their comments, some test items were modified, deleted or in corporate. At this stage the test comprises 50 objective type questions and each question carries one mark. For each correct answer ‘one’ mark is awarded and for each wrong answer ‘zero’ is given. The spelling difficulties diagnostic test and its scoring key are given in Appendix XV and XVI.
All the diagnostic tests helped to understand the nature of errors committed by CLD regarding the reading, writing and spelling aspects of English language. Therefore the diagnostic test results gave more insight to the investigator and helped to select the appropriate instructional strategies for children with language difficulties.

3.13 Reliability of the tools used in the study

In this study, test-retest method was used to establish the reliability of the achievement tests. The achievement test for reading, writing and spelling were prepared by the investigator and were conducted for 30 children of IV standard. Each test contains 50 questions, for each question paper the co-efficient of correlation was calculated by test retest method. The co-efficient of correlation obtained for Reading, Writing and Spelling were 0.77, 0.69, and 0.77 respectively.

3.14 Validity of the Tools used in the study

The investigator used concurrent validity to validate the test papers. The marks of the tests were correlated with Quarterly examination English language marks of children with language difficulties and the correlation coefficient obtained each for Reading, Writing and Spelling were 0.69, 0.68,0.70 respectively. In this context, the investigator consulted subject specialists and experts and lecturers in the field of psychology and education. The valuable suggestions provided by them were incorporated. It was concluded that the tools selected for the study was a valid one.
Hence the investigator established both the judgment validity and the concurrent validity for the achievement test.

3.15 Multi Sensory Remedial Instructional Strategy for reading, writing and spelling (English Language)

Generally, children with reading, writing and spelling difficulties have problems in different areas like auditory perception, auditory sequence, auditory discrimination, auditory memory, visual perception, visual sequence, visual discrimination, visual memory and motor skills. Keeping the nature and extent of the disability one should select appropriate remedial strategies to overcome that particular disability in reading, writing and spelling. Developing a remedial programme to overcome the specific type of disability may not be possible. Keeping the number of children involved in different kinds of learning difficulties, the only practical and feasible approach is the development of comprehensive remedial instructional strategies incorporating all the salient features of overcoming all the specific learning difficulties.

After equating the two groups, the next essential task was selection of appropriate instructional strategies and content material for treatment. To develop multi-sensory remedial instructional package the investigator previewed number of instructional aids keeping all the information gained from diagnosing the children with specific learning difficulties. The multi-sensory remedial instructional strategy used in the study to overcome Reading, Writing and Spelling difficulties is a logical blend of appropriate technology to overcome the specific learning difficulties of children and the learning difficulties as a whole. The investigator included some of the teaching aids such as Charts, Hooked on phonics, Audiocassettes, Multimedia, word webs,
cards, Word wheels, variety of handwriting passages. Handwriting books, jig jaw puzzles, OHP materials in the Multi-sensory instructional kit. The investigator used some of the software on English reading, writing and spelling concepts available in the market. The developed instructional remedial strategy kit had been shown to experts in this area, and based on their comments; the components of the strategies had been enriched. Thus their valuable suggestions were incorporated.

3.16 Pre-Tryout of Instructional Aids

A group of 20 children from 4th and 5th standards were taught with the instructional aids prepared by the investigator. The children were enquired by the investigator about the clarity of different teaching aids used for teaching English language reading, writing and spelling concepts. Almost all children were satisfied with the instructional materials. So the instructional aids were validated with the help of views collected from the children. The English teachers and experts in English language validated the instructional aids. They provided some valuable suggestions about the instructional aids and they are incorporated.

3.17 Lesson Plans and Conventional teaching

The same objectives already fixed for other instructional approaches were framed for conventional methods of teaching also. For English reading, Writing and Spelling concepts, separate lesson plans for conventional teaching were prepared by the investigator. Each lesson plan for 45 minutes duration was prepared which covered all the aspects in the content matter selected for treatment. The lesson plans were shown to a panel of judges consisting of experts in teaching.
English language from near by middle school, secondary school, matriculation school and the teacher training college. The valuable suggestions pointed out by them were taken into consideration for finalizing the lesson plans. The lesson plans consist of all important aspects, such as general and specific objectives, Motivation, Presentation, Consolidation, recapitulation and assignment. The specimen copies of the lesson plans are enclosed in the appendix XXIX, XXX and XXXI.

3.18 Data Gathering Process

The investigator involved herself in data collection and collected data from children with language difficulties in IV and V standards. A group of 80 children were selected. Then the whole group was divided into 2 groups with the following number of children in each group. The experimental group consisted of 40 children and the control group consisted of another 40 children. While classifying the two groups the pre- test - Post test- retention test equated group design was followed. Their background variables and previous knowledge about the content matter had been taken into consideration and two groups were equated accordingly.

3.19 Administration of the Pre- Test

The test paper consists of two parts. The details regarding the bio-data of the children like Sex, Community, locality, Size of the family, type of the family, Parent’s educational qualification and income of parents were included in the part I. In the second part a total of 50 questions each regarding reading, writing and spelling concepts of English language was framed to assess the previous knowledge about
the content matter which had been selected for treatment. Each question in each question paper carries one mark for correct answer. The duration of each test was 60 minutes. After correcting the pre-test answer sheets, a careful analysis was made and the marks obtained by the children with language difficulties were subjected to ‘t’ test, the investigator found that the ‘t’ value obtained for reading, writing and spelling were (1.25), (1.548), (1.641) respectively which were not significant at 0.05 level regarding experimental and conventional groups. On the basis of analysis 80 children were divided into two equated groups, Experimental groups and Conventional groups.

In this study, the investigator trained the teachers of 15 different English medium schools which were selected for the study, 2 teachers were selected from each school and each teacher was trained to teach reading, writing and spelling concepts in English language by using multi-sensory instructional remedial strategy and conventional teaching method. Altogether 30 teachers were trained to use the instructional aids such as multi-sensory instructional materials related to reading, writing and spelling which were collected by the investigator.

They were given training for a period of 10 days by the investigator.

3.20 Treatment of MSTL group regarding reading concept

All children were assembled in a convenient hall where computer and multi-sensory remedial instructional materials were set ready. Soon after their assembly the concerned English language teacher who was trained by the investigator for MSTL in reading programme started to give instruction. They also gave a short introduction about the content matter learnt through reading programme. The areas in which one can
find difficulties in reading are Letter identification (Visual auditory perception), Word attack (Auditory visual association), Analogues (Auditory sequential memory), Sound identification (Auditory discrimination), Word recognition (Visual motor difficulties), Oral reading, complete the missing words by following the picture (Visual verbal association), Comprehension (Word analysis and synthesis), Auditory Segmentation, cloze test (Perceptual sensory information). The children were taught English language reading programme related to the above mentioned components of reading difficulties by using multi-sensory remedial instructional strategy.

Therefore, the investigator used a comprehensive remedial instructional strategy which incorporated all aspects of visual, Auditory, Kinesthetic and Tactile method. To overcome the deficiency in visual area, picture - matching, shape matching, letter like shape matching, letter and word matching, word to colourful picture matching activities were provided to the children. Word attack, Analogues, Oral reading and Auditory segmentation are based on the auditory areas. Building up a basic sight vocabulary using whole word recognition, developing basic phonic knowledge by teaching speech sounds, rhymes, alliteration, listening games and puzzles are much helpful.

The investigator asked the teacher to use an inexpensive alphabet kit with plastic and wooden letters, charts with diagraphs, flash cards with corresponding sounds, computer programmes, Word game such as scrabble’s etc. to overcome reading disabilities. Visual verbal association was stimulated by overhead projector which presented the word families and picture cards corresponding to the word.

Each child of the group was given chances to work with the instructional materials and they were encouraged to interact with
teacher. The teacher cleared the questions and doubt raised by children before, after and in between the instructional period.

The seating arrangement was made in such a way to see the activity of teacher and use the instructional materials more effectively by each child. The same activity was continued for a period of 2 months and all the children were happy to attend the programme of reading concept in English language

3.21 Treatment of MSTL group regarding writing concept

All children were assembled in a convenient hall where computer and multi-sensory remedial instructional materials were set ready. Soon after their assembly the concerned English language teacher who was trained by the investigator for MSTL in reading programme started to give instruction. She also gave a short introduction about the content matter learnt through writing programme. The areas in which one can find difficulties in writing are letter formation, letter slope, letter size, letter space, word space, letter word alignments and letter joins. The children were taught English language writing programme related to the above mentioned components of reading difficulties by using multi-sensory remedial instructional materials.

The investigator asked the teacher to use a multi-sensory remedial instructional strategy which incorporated all aspects of Visual Auditory Kinesthetic and Tactile method

Motor skill is the key element which takes a great part in one’s handwriting. The blending of visual, auditory, kinesthetic and tactile channels in writing needs the low cost devices rather than high level technology. Strips of the charts in which four lines are drawn, individual letter cards of different sizes, the three letter joining of alphabet cards
('jkl, mno, pqr etc"), individual letter cards with joining strokes, variety of handwriting displayed by over head projector and different kinds of charts were used for multi-sensory instructional strategy. The learners attention were caught by the large arm movements in blackboard and the large size letters in charts by using felt pen and crayons. Further flannel Boards, Magnetic Board, Individual letter cards incursive strokes to form a word charts, flash cards, Hand writing books etc. were also used to overcome writing difficulties. In writing children mostly commit error in letter formation. Building, cutting, sticking, threading, tracing, jigsaw – making, using big movements in large blackboard, simple mazes and dot – to – dot patterns are vital ways to promote hand – eye co-ordination and motor control. This acquisition of handwriting should not be left to incidental learning. If the child’s balance and general co-ordination are very poor, teachers need to plan specific activities like hopping, beam walking, small ball catching etc.

Each child of the group was given chances to work with the instructional materials and they were encouraged to interact with teacher. The teacher cleared the questions and doubt raised by children before, after and in between the instructional period.

The seating arrangement was made in such a way to see the activity of English teacher and use the instructional materials more effectively by each child. The same activity was continued for a period of 2 months and all the children were happy to attend the programme of writing concept in English language.
3.22 Treatment of MSTL group regarding spelling concept

All Children with spelling difficulties were assembled a convenient hall where computer and multi-sensory instructional kit were set ready. Soon after their assembly the concerned English language teacher, who was trained by the investigator for MSTL in spelling programme started to give instruction. She also gave a short introduction about the content matter learnt in spelling programme. The areas in which one can difficulties in spelling are circle the correct spelling (Visual verbal association), Word recognition (Visual discrimination), Plurals and syllabication (Visual memory motor- Co- ordination), Track the following words (Visual sequence), Prefix and suffix to the roots (Perceptual discrimination), Spell match the words (Auditory Perception), Give the rhyming words, Finding the words by clues (Visual perception) and Dictation (Auditory visual memory). The children were taught English spelling programme related to the above mentioned components of spelling difficulties by using multi- sensory remedial instructional kit.

The investigator asked the teacher to use a multi-sensory remedial instructional strategy which incorporated all aspects of Visual Auditory Kinesthetic and Tactile method

Spelling actually involves the Coordinated use of several different complementary process and strategies, including listening carefully to the component sounds and syllables within the word and by developing kinesthetic images of most commonly written words (Weckert, 1989) and Brien 1992) Hence, teaching should be on strength to remediate the auditory, visual and motor areas of weakness. The child who lacks the auditory perception skill can be trained letter-sound correspondence by VAKT (Visual Auditory Kinesthetic Tactile)
approach. Phonic awareness is very important regarding spelling. Visual verbal association skill is very important regarding correct spelling. The investigator included varieties of word and picture cards, Word family charts, Flash cards with correct spelling and wrong spelling, spelling rules by using hooked on phonics kit practice in the multi-sensory remedial instructional strategy.

Plural rules were exhibited very effectively by using Co­centre double cards and Over head Projector. For facilitating the visual sequence of the children the investigator used cards with disjoined pictures and also word puzzle box. So for performing the teaching learning process effectively, The investigator further asked the teachers to use the varieties of teaching programmes with the help of different teaching aids namely jig jaw puzzles, Word play, Co- centre triple cards, Word wheels, TV, Tape recorder, VCR, Language laboratory equipment, Alphabet cassettes, Hooked on Phonics cassettes, Charts with spelling rules, computer, Spell checkers etc. Each child of the group was given equal opportunities to work with the instructional materials, and they were encouraged to interact with the teacher who supervised the students well. The teacher cleared the questions and doubts raised by children before, after and in between the instructional period.

The seating arrangement was specially looked after, so that each child could see the activity of English teacher clearly and use the variety of instructional materials effectively. The same activity was continued for a period of 2 months and all the children were happy to attend the programme regarding teaching of spelling related to English language.
3.23 Treatment of CT groups regarding reading, writing and spelling concepts

The conventional teaching group was asked to sit comfortably in a classroom. The light and ventilation arrangements in that classroom were made perfect. Soon after their assembly the concerned English teacher who was trained by the investigator in CT programme started to give instruction about CT programme. She taught separately about the English reading concepts (Letter identification, Word attack, Analogues, Sound identification, Word recognition, Oral reading, Complete the missing words, word analysis and synthesis, segregate the sounds and cloze test) English writing concepts (Letter formation, Letter Slope, Letter size, Letter spacing, Word spacing, Letter word alignment and Letter joining and English spelling concepts (Circle the correct spelling, Word recognition, Plurals and syllabication, Track the following, Add prefix and suffix to the roots, Spell and match the syllables, Finding words by using the clues given, and Dictation based on spelling rules) to the children with language difficulties of CT groups without using any instructional aids. Only black board was used wherever necessary. The lesson plans for teaching of reading, writing and spelling concepts prepared by the investigator were used. All doubts were cleared by the teacher whenever necessary. Soon after teaching, the revision was done with the help of thought provoking questions regarding learning of English reading, Writing and Spelling concepts.

3.24 Administration of Post tests to test Reading, Writing, and Spelling concepts of English language

Immediately after completing the multi-sensory instructional remedial strategy and conventional teaching strategy regarding the
English language reading, writing and Spelling concepts, the post tests were administered for each. The children were not allowed to consult each other. Special attention was given to supervise the tests. The same pre-test question papers (Achievement tests) were used as post-test question papers. The duration of time for each question paper was one hour. After completing the tests, all the papers were corrected and scored against the criteria laid earlier. No penalty was made for wrong answers. These scores were combined along with the information gathered through the personal datasets.

3.25 Administration of Retention tests to test the Reading, Writing, and Spelling concepts of English language

The same children were again asked to answer the same test papers in English reading, writing and spelling concepts which were used for pretests and post tests after one-month period.

The two types of treatment on English reading, writing and spelling concepts were scored objectively and the scores were transferred to the data sheets. These were combined along with the information gathered through the personal data sheets. All the scores were sorted to yield various tables for statistical analysis.

Thus the research design had covered the phases namely identification of CLD functional Assessment of CLD, Diagnosis of children with language difficulties, developing test items, preparation of multi-sensory instructional materials, matching the two groups (regarding reading, writing and spelling) administering Pre-test, Post-test and retention test and collecting data. The scores obtained were subjected to statistical analysis.
3.26 Statistical Analysis used in the study:

Statistical treatment is an important aspect in a research. The investigator employed the parametric statistics to process the data collected from the sample. The “Student t-test” was used to find out the difference between the treatment groups and controlled groups. Data collected for this study were subjected to statistical analysis. The investigator employed the descriptive analysis and differential analysis to process the data collected from the sample. A detailed analysis of data is presented in Chapter IV.