Chapter - IV

Plan and Procedure
CHAPTER IV
PLAN AND PROCEDURE

"Research may be termed as a systematic enquiry for verified knowledge. It is an organized deliberate effort to collect information, to analyse it, to put it together and finally to evaluate it." (Hair, P.A. 1975) Formulation of the suitable and systematic Research design requires a deep knowledge of Research methods. With guidance from experts in the field and with review of related studies along with the better understanding of the teaching learning process, the investigator was able to adopt the Experimental Research procedure which is described in detail in this chapter.

4.1. STATEMENT OF THE PROBLEM

The Government of India has launched Sarva Shiksha Abhiyan for Universalization of Elementary Education. The programme aims at providing useful and relevant elementary education in the age group of 6-14 years by 2010. The 86th Constitutional Amendment, which has made free and compulsory education a right of all children from 6-14 years of age, has given further thrust to the goal of UEE. The objective of UEE cannot be achieved without including children with special needs under the ambit of elementary education.

One of the focus areas of SSA is to increase access, enrolment, retention of all children and to reduce school drop outs. The emphasis of SSA is also on providing quality education to all children. Rarely has it been considered that the special educational needs of these children could be met by providing adequate resource support to them in regular schools and giving them an opportunity to receive education in the most appropriate environment. Hence, education of children with special needs is considered an important area in SSA. Children with Learning Disability come under the umbrella of the children with special needs (CWSN). The challenges that we face with respect to remediation and management of Children with Learning Disability are daunting. Our educational system with its overwhelming emphasis on knowing rather than learning, theory
rather than application, is ill-suited for the child with LD. Many researchers have noted the need for instruction in specific strategies to help children who are both gifted and Children with Learning Disability to compensate for their disability in order to become more independent learners (Baum et al., 2001; Coleman, 2001; Dole, 2000; Ferri & Gregg, 1997; Fetzer, 2000; McEachern & Bornot, 2001; Robinson, 1999; Weinfeld et al., 2002).

There are number of Methods and Techniques to teach science concepts. Teachers make use of these in their instruction depending upon the nature of concepts, children and their level of understanding. The Children with Learning Disability have difficulty to comprehend the concept due to poor listening and reading skills. Children with Learning Disabilities (LDs) face enormous challenges learning to read. Many never reach a level of reading proficiency that allows them to build knowledge, acquire information, feed their interests, or enrich their lives. In some cases, their attempts to read result in such a degree of discouragement and frustration that reading subtract rather than add to their lives. For children with LDs, their early struggles in learning to read are a harbinger of dismal educational outcomes. Overall, children with learning disabilities leave elementary school with severely deficient reading and writing skills (deBettencourt, Zigmond, & Thornton, 1989; Deshler, Schumaker, Alley, Warner, & Clark, 1982) and leave secondary school with little or no improvement in these areas (Zigmond, 1990).

Comprehension is the immediate goal of reading. The most salient characteristic of these children is difficulty in acquiring efficient word-level reading skill. Accurate word reading is critical to reading comprehension because the meanings that readers construct from text come via the words. No words, no meaning. If individuals cannot read words accurately, their comprehension suffers. Children with this disability have trouble remembering things they have heard and find it difficult to express themselves verbally. Hence the teacher is hard pressed to use visuals and visualization for better understanding. This may influence Achievement in science.
As the District Institute of Education and Training (DIET) is a Government institute providing academic and resource support at the grass root level for the success of various programmes being undertaken in the area of Elementary Education. (DIET Guidelines 1989) and as the investigator happens to be the senior lecturer of Inservice branch (DIET Trichy) he has been motivated to take up the study titled: “EFFECTIVENESS OF THE SELECT TECHNIQUES IN ENHANCING THE ACHIEVEMENT IN SCIENCE AMONG THE CHILDREN WITH LEARNING DISABILITY”

4.2. DEFINITION OF THE KEY TERMS

The important terms in the study are Select Techniques, Achievement in Science, and Children with Learning Disability, definitions of which are given below:

a. Select Techniques:

In the Oxford advance learners dictionary the word select when used as an adjective (only before a noun) means carefully chosen as the best out of a larger group of people or things. In the present study Select Techniques mean the following techniques which the investigator considers to be beneficial in enhancing the achievement of the Children with Learning Disability in Science:

a. Visualization
b. Chunking
c. Webbing
d. Idea Map
e. Concept Map
f. Story Telling
g. Puppetry (finger Puppets)

b. Achievement in Science.

Achievement in Science refers to the achievement of the children in the IV std. Science text book prescribed by the Government of TamilNadu.
c. Children with Learning Disability.

Webster's Dictionary (1979) states learning as ‘an acquired knowledge or skill, especially, much knowledge in a special subject; erudition’.

‘Learning Disability’ is the common usage in American and “Learning Difficulty” is the normal usage in European culture. Both the terms refer to the difficulties in learning. In Indian context, Learning Disabilities and Learning difficulties are synonymously used to express the difficulties that may arise due to significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities.

Krick (1963), who coined the term 'Learning Disabilities', defines Learning disability as retardation, disorder or delayed development in one or more of the processes of speech, language reading, writing, arithmetic or other schools subjects resulting from psychological handicap caused by a possible cerebral dysfunction and / or emotional or behavioural disturbances. It is not the result of mental retardation, sensory deprivation or cultural and instruction factors.

The National joint Committee for Learning Disabilities (1981) defines ‘Learning Disabilities as a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction. Even though a Learning Disability may occur concomitantly with other handicapping conditions (eg., sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g., cultural differences, insufficient / in appropriate instruction, psychogenic factors), it is not the direct result of those conditions or influences (Hammill, Leigh, McNutt & Larson, 1981, p336)’

These definitions of Learning Disabilities explain that Learning Disability is a disorder in the processes of speech, language, reading, writing, spelling,
arithmetic and other school subjects. This disability is a result of Psychological, Neurological, Emotional, Behavioural and Cultural Abnormalities of children.

In the present study the term Learning Disabilities refers to the difficulties experienced by the children in one or more of the basic psychological processes involved in understanding or to read, write and spell or to do mathematical calculations. The present study is concerned it concentrates on the primary school children studying in IV standard with learning disability.

4.3. DESIGN OF THE STUDY

Research design is the blueprint of the procedure that enables the investigator to test the hypothesis for reaching valid conclusion about relationships between independent and dependent variables. Selection of a particular design is based on the purpose of the study the types of the variables to be studied and the controlled variables under which experiment is to be conducted.

The present research was an Experimental Research. The design of the experiment was pre-post tests equivalent groups design. (Best and Kahn 1995). The independent variable was teaching of Science through Select Techniques to the Children with Learning Disability of IV standard children. The dependent variable was the achievement in Science. The Children with Learning Disability were screened with the help of the SSA check list for identification of Children with Learning Disability. If the answer to any of the 3-5 statements is positive, then the child was carefully assessed with the help of Holy cross rating scale for assessing the Children with Learning Disability. With the help of their academic achievement in science in the quarterly examination the sample was selected and divided into control and Experimental Group. The sample selected for the Control and Experimental Groups was 42 children and 35 children from four schools each. The control group consists of 42 Children with Learning Disability from IV standard of PUMS Edamalaipattipur, PUMS Panjappur, Kalaimagal Elementary School, Edamalaipatti and PUMS Panjappur of Trichy District. The
Experimental Group consists of 35 Children with Learning Disability of IV std from PUES Olaiyur, PUMS KK Nagar, Social Aided Elementary School, Trichy and Periyur Elementary school, Sundar Nagar. The duration of the experiment was one month that was January 2007. The teachers of the Experimental Group were given three days training in the awareness on Learning disability, Characteristics of the Children with Learning Disability and the techniques selected by the investigator to enhance the achievement in the subject of Science among the Children with Learning Disability. The teachers of the Experimental Group used the selected techniques in their regular classes and also in remedial teaching after the training. The researcher visited the schools randomly to ensure, the use of the Select Techniques and clarified the doubts of the teachers in using the Select Techniques. After collecting the data analysis was made using ‘t’ test.

The Experimental Research is a Pre test Post test Equivalent groups Design. The Independent Variables are Teaching of Science, Training the teachers and Use of Select Techniques the Dependent variable is Achievement. The tools used in this experiment are the (i) Achievement Test in Science (ATS) for measuring the Achievement of the sample groups, which is constructed and validated by the investigator, (ii) SSA Checklist for Screening the Children with Learning Disabilities and (iii) Holy Cross Service Society Rating Scale Assessment Tool for assessing Children with Learning Disability. Thirty five Children with Learning Disability were selected form the PUES Olaiyur, PUMS KK Nagar, Periyar Elementary School Sundarnagar and Social Aided Elementary School Trichy for the Experimental Group. The Control Group consists of forty two Children with Learning Disability from PUMS Panjappur, PUMS Edamalai patti Pudur, Kalimagal Elementary School Edamalaipatti and Infant Jesus Elementary School Kajamalai colony. The time taken for the experiment was one month Mean, Correlation, and ‘t’ test for independent variables and were used as Statistical Techniques. This is represented below table No. 4.1.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nature of experiment</td>
<td>Pre test Post test Equivalent groups Design.</td>
</tr>
</tbody>
</table>
| 2      | Variables                | I  Independent Variable   
|        |                           | Teaching of Science          
|        |                           | Training                     
|        |                           | Use of Select Techniques    | II  Dependent Variable     
|        |                           | Achievement                  |
| 3      | Tool used                | Achievement Test in Science (ATS) for measuring the Achievement of the sample groups (constructed and validated by the investigator) |
|        |                           | **A standardized tools:**  
|        |                           | SSA Checklist for Screening the Children with Learning Disabilities     |
|        |                           | Holy Cross Service Society Rating Scale Assessment Tool for assessing Children with Learning Disability |
| 4      | Sample Selected for the experiment | Experimental group  
|        |                           | 35 Children with Learning Disability were selected form the following schools:  
|        |                           | 1. PUES Olaiyur             
|        |                           | 2. PUMS KK Nagar            
|        |                           | 3. Periyar Elementary school, Sundarnagar                                |
|        |                           | 4. Social Aided Elementary School, Trichy 8                             |
|        |                           | Control Group              
|        |                           | 42 Children with Learning Disability form the following schools:         
|        |                           | 1. PUMS Panjappur           
|        |                           | 2. PUMS Edamalaipatti Pudur  
|        |                           | 3. Kalimagal Elementary school, Edamalaipatti                            |
|        |                           | 4. Infant Jesus Elementary school, Kajamalai Colony.                    |
| 5      | Duration of experiment   | One month                  |
| 6      | Statistical Techniques   | Mean, Correlation, and ‘t’ test for independent variables               |
4.4. OBJECTIVES OF THE STUDY

The objectives of the study are:

I. To identify the Children with Learning Disability.

II. To construct and validate Achievement test in Science for IV standard Children with Learning Disability.

III. To select the techniques beneficial in enhancing the achievement of the Children with Learning Disability in Science.

IV. To design a training programme in Select Techniques.
V. To find the effectiveness of the Select Techniques in enhancing the academic achievement in science of the Children with Learning Disability.

VI. To find out the significant difference in achievement if any between the Control and the Experimental Groups.

VII. To compare the effectiveness of the Select Techniques in the achievement in Science among Experimental and Control Groups with respect to the learning objectives (such as Knowledge, Understanding, Application and Skill) Sex, Educational Qualification of the Teacher, Experience of the Teacher, Parental Income, Parental Education, Parental Profession, Type of Management and Type of School (primary/middle).

4.5. HYPOTHESES

I. There will be no significant difference with regard to achievement in science between the Control Group and the Experimental Group in the Pre-test.

II. There will be no significant difference with regard to their Achievement in Science between the Control Group and the Experimental Group in the Post test.

III. There exists no significant difference among the Groups taught through Select Techniques and Traditional teaching on Achievement in Learning Objectives in Science among the Children with Learning Disability.

IV. There is no significant difference among the Control and Experimental Groups with respect to the Sex, Educational Qualification of the Teacher, Experience of the teacher, Parental Education, Parental Profession, Parental Income, Type of management and Type of School (primary/middle).

4.6. RESEARCH PROCEDURE

The various stages of the research procedure of the present study are formulation of hypothesis, Selection of schools, Identification of children with LD,
Selection of techniques, Preparation of tool, Validation of selected tool, Selection of sample, Administration of pretest, Training of teachers, Treatment, Administration of post test, Testing of Hypothesis, Applying statistical Techniques and Findings. This flow chart of the research procedure is given in fig 4.2.

**Fig 4.2 Flow Chart of the Research procedure**

1. **Formulation of Hypothesis**
   - Selection of Schools
   - Identification of Children with LD
   - Selection of Techniques
   - Preparation of Tool
   - Validation of Selected Tool
   - Selection of Sample
   - Administration of Pretest
   - Training of Teachers
   - Treatment
   - Administration of Post test
   - Testing of Hypothesis
   - Applying Statistical Techniques
   - Findings
4.7. VARIABLES UNDER THE STUDY

The dependent variable of the study is achievement in Science and the independent variables are training of Teachers and Application of Select Techniques in teaching Science among the IV std. Children with Learning Disability in selected units.

4.8. SELECTION OF TOPICS

The units for the study were selected from the science text book of fourth standard prescribed by the Government of TamilNadu. The units eleven and twelve were selected from the hard spots list identified by the teachers and children. The unit eleven is katrru vanga povoma it is about the land and sea breeze the unit twelve is vindai yendirangal it is about the functions of Heart, Lungs, kidney and digestive system.

4.9. SELECTION OF TECHNIQUES

Children with Learning Disabilities (LDs) face enormous challenges learning to read. Many never reach a level of reading proficiency that allows them to build knowledge, acquire information, feed their interests, or enrich their lives. In some cases, their attempts to read result in such a degree of discouragement and frustration that reading subtract rather than add to their lives. For children with LDs, their early struggles in learning to read are a harbinger of dismal educational outcomes. Overall, children with learning disabilities leave elementary school with severely deficient reading and writing skills (deBettencourt, Zigmund, & Thornton, 1989; Deshler, Schumaker, Alley, Warner, & Clark, 1982) and leave secondary school with little or no improvement in these areas (Zigmond, 1990).

Comprehension is the immediate goal of reading. The most salient characteristic of these children is difficulty in acquiring efficient word-level reading skill. Accurate word reading is critical to reading comprehension because the meanings that readers construct from text come via the words. No words, no meaning. If individuals cannot read words accurately, their comprehension
suffers. Children with this disability have trouble remembering things they have heard and find it difficult to express themselves verbally along with difficulty in organizing information. They also have negative attitude towards learning and haphazard in their approaches to learning. Regarding academic strategies, students with LD devised unusual strategies and preferred additional oral explanations or visual explanations, whereas nondisabled students preferred more written examples (Heiman, Tali; Precel, Karen. 2003). The Institute for the Advancement of Research in Education (IARE) in USA has completed a research study entitled Graphic Organizers: A Review of Scientifically Based Research. In the report, twenty-nine studies were identified and evaluated as scientifically based research (SBR). The studies provided evidence in support of the instructional effectiveness of the use of visual learning techniques. Scientifically based research cited in the literature review demonstrates that a research base exists to support the use of visual learning techniques for improving student learning and performance in the following areas:

Reading comprehension

- Student achievement across grade levels, diverse student populations and content areas
- Thinking and learning skills such as organizing and communicating ideas; seeing patterns and relationships; and categorizing ideas
- Retention

Keeping in mind the above the investigator has selected the following techniques.

I. Chunking
II. Visualization
III. Webbing
IV. Idea Map
V. Concept Map
VI. Story Telling
VII. Puppetry (finger Puppets)
4.10. TRAINING OF TEACHERS

The teachers of the experimental were given training for three days in using Select Techniques to teach science to the Children with Learning Disability in Nagammai teacher training Institute, Trichy. The topics covered include Learning Disability, (concept, Meaning and definition), Type of Learning Disabilities, and Characteristics of Children with Learning Disability, role and importance of teachers in overcoming Learning Disability in children and Select Techniques (Visualization, Chunking, Webbing, Idea Map, Concept Map, Story Telling, Puppetry (finger Puppets)). The teachers were trained to prepare concept maps, Idea maps, and webs for the selected units. Teachers were made to visualize after they have been exposed to visualization, they were also trained in how to make use of visualization in teaching? To make the science learning interesting to the Children with Learning Disability story telling and simple finger puppets were also made use of while training teachers. The teachers were given training in writing small scripts for science concepts, and to make simple finger puppets for their scripts and dramatise the concepts using finger puppets. The training module is enclosed in the annexure.

4.11. ASSESSMENT OF CHILDREN WITH LEARNING DISABILITY

Assessment is the process of collecting information about a child that will be used in forming judgments and making decisions concerning that child. There are two major reasons for conducting an assessment. The first is classification. The more important reason for assessment, however, is planning instruction. Assessment that focuses on curriculum and teaching is needed for guiding instruction. Children are referred for assessment because they are experiencing academic problems. The assessment process helps to identify the nature of the problem and the student’s strengths and weakness (Swanson, 1991). Two general approaches for assessing learning disabilities can be used: (1) traditional assessment and (2) alternative assessment.
4.11.1. Traditional Assessment

Traditional assessment procedures that rely on standardized tests are frequently used. The scores from these tests allow the examiner to compare the student’s performance to the performance of a group of children who are comparable in terms of age (or to a non-referenced group on whom the test was standardized). Many of the commonly used standardized tests are judged by psychologists and educators to statistically adequate in terms of their reliability, validity and standardization.

Standardized testing is criticized for a number of reasons:

I. Many educators are finding that standardized tests do not provide enough information about the children;

II. The tests may not assess what the child is learning in class

III. Standardized tests may be biased against culturally diverse population

IV. The pressure for high test scores may sway teachers to use class time to prepare children to take the tests; and

V. The tests focus instruction on segmented skills instead of higher-order thinking and creativity (Pottect, Choate, & Stewart, 1993).

4.11.2. Alternative Assessment

Disenchantment with traditional testing has led educators to turn to alternative assessment procedures. Interest in alternative assessment is growing because it assesses the child in the natural setting, uses the school curriculum, and capitalizes on what the student actually does in the classroom.

4.12. TOOLS USED IN THE STUDY

Achievement test in science was the tool used for measuring the achievement of the sample groups constructed and validated by the investigator and standardized tools were also used in the present study to identify the Children with Learning Disability. Since there was no suitable test readily available the investigator had to develop an achievement test in science to measure the dependent variable taken up for the study. The units in science
include katru vanga povoma (sea breeze and land breeze) and vindaiyandirangal (various systems of the human body). The standardized tools used were (1) SSA checklist for screening and identifying children with learning disabilities (2) Holy cross service society rating scale for assessing Children with Learning Disability

4.12.1 Construction of Achievement Test in Science (ATS)

To measure the Achievement of the Children with Learning Disability in Science the investigator constructed a test which consisted of four cognition levels namely, Knowledge, Comprehension, Application and skill. (Bloom 1956).

a. Construction of the Preliminary Draft of Achievement Test in Science (ATS)

The investigator decided to have multiple choice items for ATS because they are currently the most highly regarded and widely used form among the other objective type items (Mohideen, 1999) and also it will reduce the strain of the children with dysgraphic type of Learning Disability might be considered an added advantage. More over it also reduces the use of the language which will help the Children with Learning Disability to comprehend better. Suggestions made by Ross (1954) and Dececco and Corwford (1967) for the construction of multiple choice items were followed in developing the test items.

Since the investigator himself a teacher educator in science he is proficient enough to develop suitable items to test each of the units selected for the study. The investigator went through the IV std. Science text book and keeping it as reference constructed the test items on four cognition levels, namely, Knowledge, Comprehension, Application and skill according to Bloom 1956 from the unit selected. In constructing the multiple choice items, the investigator carefully avoided giving unintended clues to the correct answer and repetition of words in the options. Attention was given to have the test item uniformly distributed from the selected units.
A blue print including the components- Knowledge, Comprehension, Application and skill, presented in table 4.2 was prepared to check the items. The investigator then showed the ATS to two experienced teacher educators of Science to verify the suitability of the items to the target children. After additions and deletions of certain items, 50 items were retained. Of them 20 items were of the ‘knowledge’ level, 15 were of the ‘Comprehension’ level 9 were of the ‘Application” level and the remaining 6 items were of ‘skill’ level. The children were instructed to circle of the best answer. The score of ‘1’ was given for the correct and ‘0’ for the wrong / unanswered items. No negative marking was made for the wrong answers as negative marking may increase children’s anxiety and be deleterious to performance (Shreemathi, 1996)

To understand further the nature of the preliminary draft developed, a table containing the units and the test items selected was also prepared and the same is presented in the table 4.2

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Unit</th>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Skill</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>1, 3, 4, 8, 9, 11, 13</td>
<td>2, 6, 12</td>
<td>5, 10, 14</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>II</td>
<td>18, 21, 25, 28, 30, 35, 37, 44, 45, 46, 47, 48, 49, 15, 16, 20, 26, 29, 31, 32, 34, 36, 40, 43, 50, 17, 23, 27, 33, 38, 42</td>
<td>19, 22, 24, 39, 41</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>20</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>50</td>
</tr>
</tbody>
</table>

b. Validation of ATS

The validity of a test refers to the degree to which the test actually measures what it is proposed to measure (Anastasi, 1955). The test items were prepared with reference to the instructional objectives related to the content area.
Thus the content validity of the tool was established with the expert opinion from two teachers handling IV std. science and three elementary school Headmasters who have got rich experience. Where ever it was necessary suitable modifications were made based on the opinion. The draft was also sent to two teacher educators to verify the construction of the items. For validating the preliminary draft of the AST the children studying V Std. were selected because at the time of development of the test IV std. children were not supposed to study the units selected for the test.

The procedure of validating the test is as given below.

I. A score of 1 for each right response and 0 for each wrong response were given.
II. The row and column of the table were assigned for the respondents’ names 1-50 and the questions numbered 1-50 in the preliminary draft of ATS respectively.
III. Scores of each respondent were recorded, question wise in the table.
IV. The sum of the scores obtained by all the respondents was calculated individually.
V. The scores of the respondents were arranged in the descending order.
VI. The highest fifteen scores and the lowest fifteen scores of the respondents were taken into account.
VII. The sum of the scores of each question by the fifteen high scorers (X₁) and the fifteen low scorers (X₂) were calculated column wise and then the mean scores (M₁ and M₂) and Standard deviation were calculated.
VIII. Using the values of M₁, M₂, N₁, N₂, 0⁻¹, o⁻², t value was calculated.
IX. Of the t- value corresponding to the questions in the preliminary draft of ATS was equal or greater than 1.96, those items were selected.

Accordingly, 40 items were selected from the 50 items in the preliminary draft of ATS. The distribution of the same under different learning objective is presented in the table 4.3
4.12.2. TOOL FOR ASSESSING CHILDREN WITH LEARNING DISABILITY

Assessment is the process of collecting information about a child that will be used in forming judgments and making decisions concerning that child. There are two major reasons for conducting assessment in special education. The first is classification. The more important reason for assessment is for planning instruction. The critical assessment information can be used to help the child learn the investigator used a check list and a rating scale to asses the Children with Learning Disability.

a. Check List for Screening Children with Learning Disability

The checklist for identification of children with learning disabilities used by SSA consists of nine items. The first two items deal with attention of the children. The third and fourth items are connected with reading the fifth and sixth are about numbers and calculation. The seventh and eighth are about copying the text and spacing in writing and ninth is about comprehension level of the child. If the answer for three statements in the checklist is positive it is assumed that the Child may have Learning Disability. This tool was used by the investigator and the teacher to screen the children for primary assessment of the children. If the child gets yes for three items then he is assessed for learning disability using Holy cross service society rating scale assessment tool for assessing Children with Learning Disability.

Table 4.3
Blue Print for the final Draft of AST

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Unit</th>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Skill</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>1, 3, 4, 8, 9,</td>
<td>2, 6</td>
<td>5, 10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>II</td>
<td>11, 12, 13, 18, 21, 25, 28, 30, 35, 37</td>
<td>14, 15, 16, 20, 26, 29, 31, 32, 34, 36, 40</td>
<td>17, 23, 27, 33, 38</td>
<td>19, 22, 24, 39</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>15</td>
<td>13</td>
<td>7</td>
<td>5</td>
<td>40</td>
</tr>
</tbody>
</table>
b. **Holy Cross Service Society Rating Scale**

Holy cross service society rating scale assessment tool for assessing Children with Learning Disability consists of 35 point rating scale to help teachers identify children with learning disabilities in their class. Teachers rate the 35 points on a 3-point scale (with 0 for never, 1 for occasionally and 2 for frequently). The highest possible score is 70 (35X2). The score of the children identified as having learning disabilities was 36. Teacher's judgments of children characteristics are useful for identifying children with learning disabilities, and rating scale help in this process.

The Holy cross service society rating scale assessment tool for assessing Children with Learning Disability tool consists of 35 items. The first nine items deal with attention, memory and sequencing ability. Item number 1 and 2 deal with attention problems. Item number 3, 4, 5 and 6 deal with memory while item number 7, 8, and 9 concentrate on sequencing ability. Item number 10 refers to verbal and non verbal comprehension and Item number 11 refers to spatial ability and the ability to follow direction.

Items 12 to 23 deal with the problems of writing. Item 12 refers to the interest in writing, item 13, 14, 15 and 16 refer to coping from blackboard changing the shape of the letters, replacing the letters of the same word and replacing the letters in the words respectively. Item numbers 17 and 18 deal with inversion of letters, item number 18 deals with changing word order.

Item 19 to 25 deal with the way of writing. Item number 19 refers to the inability to write the letters on the line and 20 refers to the grip of the pencil or pen. Item number 21 and 23 deal with illegibility and 22 deal with the shape of the letters and 23 with overwriting while 24 deals with the space between the words respectively. Item number 25 refers to spelling errors occurring while taking notes.
Item number 26 to 30 refers to the attitude towards reading. Item number 26 refers to the attitude towards reading. Item number 27 refers to omission and repeating. Item number 28 and 29 refers to the words to words reading and guessing from the first letter. 31 and 32 deals with home work and answering the questions respectively. 33 to 35 deals with the arithmetic 33 deals solving the problem from left to right instead of right to left. 34 deals with using his fingers for counting and 35 deals with the subtraction.

4.13. SELECTION OF SAMPLE

Samples were selected for two different purposes viz., (i) conducting experiment and (ii) developing criterion tests. The brief discussion of the same is presented in the following paragraphs.

4.13.1 Sample Selected For Conducting the Experiment

The sample selected for this experiment was purposive sampling (Garrett, 1966). The investigator selected 35 Children with Learning Disability from the four schools of Trichy educational district and 42 Children with Learning Disability from another four schools of Trichy educational district.

4.13.2 Sample Selected for Validation of ATS

The criterion referenced test is administered before and after the treatment to measure its effectiveness. For the present study, the investigator had to construct and validate a criterion-referenced test namely AST. The investigator has selected 50, V std. children for the purpose of validating the ATS. The ATS is annexed in the appendix.

4.14. THREATS TO EXPERIMENTAL VALIDITY

The adequacy of Experimental design is judged by the degree to which they eliminate or minimize threats to experimental validity. Experimental validity depends on many factors. If the extraneous variables are carefully controlled then the study will be internally valid. According to Campbel and Standly (1966), there are two types of validity (i) Internal Validity and (ii) External Validity.
4.14.1 Internal Validity

An experiment has internal validity to the extent that the independent variables actually have a genuine effect on the dependent variable in the experimental setting. Campbell and Stanley (1963) have identified various variables that can threaten internal validity.

I. History Threat

Unplanned events may occur during the research over which the experimenter has no control and affect the results. Such events are referred to ‘history threat’. During this experimentation unexpected events did not occur. Hence this threat was eliminated.

II. Maturation

The number of factors associated with the passage of time not envisaged in the investigation might cause clashes in subjects' scores. This is known as ‘maturation threat’. Since the subjects selected were similar in age, and the period of experimentation was for a month only, there was no scope for maturation. Hence this threat was eliminated.

III. Selection bias

Differences between the subjects in the groups may result in outcomes. The random assignment of subjects to experimental and control group ensures according to the laws of probability that the groups compared do not significantly differ from one another in their composition. The subjects should be equal in all respects.

In this study the homogeneity of the control group and experimental group was confirmed as both the groups had no significant difference in the pre test score. So this threat was eliminated.
I. Testing

Effects consist of either reactivity as a result of testing or practice/learning from exposure to repeated testing. i.e. The effect of one test upon the scores of a subsequent test is called testing threat. In experimental studies it is common to test subjects at the beginning and end of the study. If considerable improvement is found in the post-test score, the investigator may conclude that the improvement is due to the experimentation, an alternative explanation is that it may be due to the use of pre test. In this investigation, pretest, and post test were conducted for both Control and Experimental Group children. Hence this threat was eliminated.

II. Statistical regression

An effect may be due to respondents being identified on the basis of extreme high or low scores. The subjects should be selected in equal number from all levels of scoring. In his study, the subjects were equal in their pre-test scores. Hence this threat was eliminated.

III. Instrumentation

Difference in results due to changes in the measuring instrument between the pre-test and post-test may constitute a threat to the internal validity. No instrument was changed in this experiment. Hence this threat was nullified.

IV. Mortality or attrition of subjects

It is common to lose some of the subjects as the study progresses. This is called mortality threat. During the entire course of the study, such subject loss did not occur.

V. Biases in sample selection threats

Differences between the subjects in the groups may result in outcomes. The random assignment of subjects to Experimental And Control Group ensures, according to the laws of probability that the groups compared do not significantly
differ from one another in their composition. The subjects should be equal in all respects. In this study the homogeneity of the control group and Experimental Group was confirmed as both the groups had no significant difference in the Pre test score. So this threat was eliminated.

4.14.2 External Validity

External validity consists of a determination whether the results of the experiment can be generalized to an entire population from which the samples were drawn in the study. The answer to the question of generalization is not mathematically or inductively fully attainable. The methods of subject selection and/or control procedures and type of design strengthen inferences that the findings are representative but the induction remains inconclusive. Therefore, scientists place great emphasis on replication of the results through repeated experimentation to bolster the generalization of the initial findings. Various threats to external validity are discussed below.

I. **Multiple treatment interference**

When the same subjects receive two or more treatments there may be a carry over effect between treatments such that the results cannot be generalized to single treatment. There was no chance of this threat in this study as the two groups were given only one treatment, each.

II. **Interaction Effect of Testing**

Pre testing interacts with the experimental treatment and causes some effect such that the results will not be generalized to the population which has not been Pre tested. All the children were subjected to this type of programme. If at all any interaction effect occurs it would be common to all children.

III. **Interaction Effects of Selection Biases and the Experimental Treatment**

This refers to the effect of some selection factor of intact groups interacting with the experimental treatment that would not be the case of groups which had
been randomly formed. All the available subjects were selected. So this threat was eliminated.

IV. Artificiality of the Experimental Setting

In an effort to control extraneous variables the investigator imposes careful controls which may introduce a sterile or artificial atmosphere that is not at all like the real-life situation about which generalizations are desired. The reactive effect of the experimental process is a constant threat.

Using teaching techniques and strategies are common in the classroom. So the children allotted to the Experimental Group would not feel any artificiality and there was no chance of this threat.

V. Placeba-Hawthorne Effect

Knowledge of participation in an experiment may introduce the extraneous variable of bias in favour of Experimental Group. Since the investigator himself was a science teacher basically and has been training primary teachers in teaching science, this threat was eliminated from the study.

VI. Contamination

Contamination is type of bias introduced when the investigator has some previous knowledge about the subjects involved in an experiment. By employing only objective type questions in the Achievement Test, this threat was eliminated.

Thus the possible threats are controlled in this study to establish experimental validity and hence the experimental design attained maximum internal validity and external validity.

4.15. COLLECTION OF DATA

The investigator collected the data from the eight selected school for his study in the Trichy educational district. The investigator with the help of the teachers identified the IV std. Children with Learning Disabiliy. The children
were screened with the help of the SSA check list for identification of Children with Learning Disability. If the answer to any of the 3 statements is positive, then the child was carefully assessed with the help of Holy cross rating scale for assessing the Children with Learning Disability. The identified Children with Learning Disability were divided into the Control and Experimental group. A Pre-test was conducted using the self made tool, namely ATS.

Since the investigator himself a senior lecturer of the inservice branch of DIET Kumulur he had the opportunity to prepare and field test many modules designed for training teacher by DIET kumulur and DTERT. The investigator prepared a training module which was subjected to the perusal of principals and inservice senior lecturers of the Aduthurai and Keelapalur DIETs for validation. Their suggestions for the betterment of the module were taken into account. Keeping the module as a guideline the investigator trained the teachers of the Experimental Group in the ‘Select Techniques’ to be used in the teaching of science in the inclusive classroom which contains Children with Learning Disability. The teachers used the Select Techniques to teach the selected units in science in their classes. The investigator visited the school during this period to observe and help the teachers. Thus the investigator monitored the effective use of the Select Techniques. At the end of the treatment, a post-test (ATS) was conducted to measure the level of achievement in science among the Children with Learning Disability. Thus the data was collected from both the control group and Experimental Group systematically for the analysis in the present study.

4.16. STATISTICAL TECHNIQUES USED

Different statistical techniques were used in the study for validating the ATS and analyzing the data. The summary of the various statistical techniques used in this study is briefed as follows: (i) descriptive analysis – mean, percentage and standard deviation. (ii) relation analysis – Pearson product-moment coefficient or correlation to find out the relation between the two groups
and (iii) inferential analysis – ‘t’ test, to analyze the differential hypothesis in relation to two different.

4.17. DELIMITATIONS OF THE STUDY

The following are the delimitations of the present study:

i. Since the study focused on academic achievement of the Children with Learning Disability with a limited sample size broad generalization of the finding beyond this population are not claimed.

ii. Since the study focused on limited characteristics of the Learning disability broad generalization of the finding is not claimed.

iii. The focus of the study was limited to achievement in science the other subjects were not assessed.

iv. Because of constraint of time and resources, the experiment covered only two selected units.

Next chapter deals with the Analysis of the Data.