### CHAPTER III

**METHODOLOGY**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>3.2</td>
<td>Method adopted</td>
</tr>
<tr>
<td></td>
<td>3.2.1 Research design</td>
</tr>
<tr>
<td></td>
<td>3.2.2 Variables of the study</td>
</tr>
<tr>
<td>3.3</td>
<td>Development of tools</td>
</tr>
<tr>
<td></td>
<td>3.3.1 Formation of item pool</td>
</tr>
<tr>
<td></td>
<td>3.3.2 Standardization of tool</td>
</tr>
<tr>
<td></td>
<td>3.3.3 Preparation of final test</td>
</tr>
<tr>
<td></td>
<td>3.3.4 Description of tools</td>
</tr>
<tr>
<td></td>
<td>3.3.5 Evaluation of the tests</td>
</tr>
<tr>
<td></td>
<td>3.3.6 Tools used for parallel test</td>
</tr>
<tr>
<td>3.4</td>
<td>Population</td>
</tr>
<tr>
<td>3.5</td>
<td>Sample and sampling techniques</td>
</tr>
<tr>
<td>3.6</td>
<td>Data collection procedure</td>
</tr>
<tr>
<td>3.7</td>
<td>Experiment conducted</td>
</tr>
<tr>
<td>3.8</td>
<td>Teacher and teacher training</td>
</tr>
<tr>
<td>3.9</td>
<td>Research setting</td>
</tr>
<tr>
<td>3.10</td>
<td>Scoring and processing of data</td>
</tr>
<tr>
<td>3.11</td>
<td>Statistical techniques used</td>
</tr>
<tr>
<td>3.12</td>
<td>Summary</td>
</tr>
</tbody>
</table>
3.1 Introduction

This chapter deals with the methodology of the study. Methodology includes method adopted, research design, development of tools, standardization of tools, description of tools, population, sample and sampling techniques, data collection procedure, intervention, development of reading-writing package, research setting, scoring and processing of data and plan for data analysis.

3.2 Method adopted

In order to accomplish the objectives of the study, the investigator selected experimental research. As Gay (1996) stated experimental research is the only type of research that can truly test hypothesis concerning cause and effect relationships. In an experimental study the researcher manipulates independent variable, controls relevant extraneous variables and observes the effect of dependent variable. Manipulation of independent variable is the one characteristic that differentiate all experimental research from other types of research (Gay, 1996).

3.2.1 Research design

Among the various experimental designs, the pre test-post test-control group design was selected for the present study.
3.2.1.1 Pretest-post test-control design

As Gay (1996) states this is a true experimental design which involves at least two randomly formed groups, both groups are pre tested, one group receives a new or unusual treatment and both groups post tested.

3.2.1.2 Stages of the study.

There were three stages for this study. The first stage was the pre test stage in which students were tested on language development.

Second stage was the conduct of the experiment (intervention). During this stage instruction through conventional approach was given to experimental and control groups and then experimental group was given additional intervention using Literacy Rich Approach (LRA).

The third stage was the post intervention test stage. In this students were tested on their performance on language development using three tests. They are 1) parallel test (to measure acquisition level of language development), 2) post test (to measure generalization level of language development) and 3) retention test (to measure maintenance level of language development). The retention test was administered after six months of intervention.
3.2.2. Variables of the study

Variables are the conditions or characteristics that the experimenter manipulates or controls. The present study involves the following independent and dependent variables.

3.2.2.1. Independent variable

In experimentation the manipulated variable is called independent variable. It is under the direct control of the experimenter who may vary it in any direction (Sax, 1980).

In this study the independent variable (experimental variable) is instruction through Literacy Rich Approach (LRA).

3.2.2.2. Dependent variables

Dependent variables are conditions or characteristics that appear, disappear or change as the experimenter introduces, removes or changes independent variable (Best & Kahn, 1999). Here the language development of students in vocabulary, reading comprehension, phonological awareness, reading fluency and writing skills are the dependent variables.

The detailed design of the study is presented in the following flow chart.
Variable

Independent

Literacy – Rich Approach

Dependent

Language Development in
1. Vocabulary
2. Reading Comprehension
3. Phonological Awareness
4. Reading Fluency
5. Writing Skills

Tools

Population

Children with Mild Mental Retardation

Sample (60)

Experimental Group (30)

Standard I Higher(10) Standard I Lower (10) Standard III (10)

Instruction through conventional approach
Instruction through Literacy Rich Approach (LRA)

Control Group (30)

Standard I Higher(10) Standard I Lower (10) Standard III (10)

Administration of Tests and Data Collection

Pretest  Parallel Test  Post Test  Retention Test

Scoring and Consolidation

Data Analysis

ANCOVA  ANOVA  LSD  t test
3.3 Development of tools

For the collection of relevant data the investigator developed the following tools:

(1) Functional Reading Assessment Test (FRAT) for standard I
(2) Functional Writing Assessment Test (FWAT) for standard I
(3) Functional Reading Assessment Test (FRAT) for standard III
(4) Functional Writing Assessment Test (FWAT) for standard III
(5) Parallel Functional Reading Assessment Test (PFRAT) for standard I
(6) Parallel Functional Writing Assessment Test (PFWAT) for standard I
(7) Parallel Functional Reading Assessment Test (PFRAT) for standard III
(8) Parallel Functional Writing Assessment Test (PFWAT) for standard III

The investigator reviewed the following assessment tools that are presently used in India for functional assessment of children with mental retardation.


b. Grade Level Assessment Device (GLAD) (Narayan, 1997).


Of these, MDPS, FACP and BASIC-MR are prepared for assessing functional skills of children with mental retardation. Since these tests include all adaptive behavior areas, the coverage for literacy (reading and writing) is inadequate. The GORT –D is intended to measure oral reading fluency and diagnose oral reading problems.

The scale GLAD covers many items of reading and writing under English section. Therefore this test was a major reference material for the preparation of present tests. The tools for the present study has to measure the reading and writing skill development in Malayalam language, the investigator used the above scales as reference materials and developed new reading and writing tools in Malayalam language. To do this investigator also thoroughly reviewed the Malayalam textbooks from Standard I-IV prepared by Government of Kerala. Another reason for reviewing these texts is that the tool has to be standardized and the standardization sample is composed of children studying in regular schools. These textbooks are in vernacular language and are presently followed in government and government-aided schools in the state.
3.3.1 Formation of item pool

After undertaking an extensive review of the above mentioned scales, and Malayalam textbooks and observing classroom teaching being conducted in special schools for children with mental retardation, items were formulated for standard I-IV. These items were shown to a person who is an expert in Malayalam language as well as Malayalam subject teacher. After this, initial try out of the draft test was done with two students each from standard I-IV at regular school and eight children belong to mild category of mental retardation studying in special school. After the initial try out and comments and corrections secured from regular class teachers and special education teachers, test items were modified. Copies of draft test standard I and standard III are given in appendix A, B, C, and D respectively (tests of STD II and IV are not enclosed as they were not included in the study).

3.3.2 Standardization of Tool.

For standardization, item analysis has to be done. Item analysis is the process of establishing the suitability of an item for inclusion in the final test. In order to do the item analysis a pilot study was conducted on a random sample of 20 students each from Standard II, III, IV and V in two regular schools (Little Flower L.P.School and St.Augustin’s U.P School at Muvattupuzha). Since this study was done in the month of
July (second month of the academic year in Kerala) each class’s test was given to the immediate high class. For example, standard I test covers the format of standard I Malayalam text at regular school and therefore the standard I test was given to standard II students, who have completed the content during previous year. Likewise standard II, III, and IV tests were given to students in standard III, IV, and V respectively.

After completing the tests results were tabulated. As a first step in doing item analysis the 20 subjects in each class (II-V) were rank ordered on the basis of total score acquired in the draft scale. The upper and lower one third of the subjects were selected as the high and low scoring groups respectively. The t values for the items of the high scoring and low scoring groups were computed. Those items showed significant difference between high and low scoring groups were retained in the final form of reading and writing test in each standard.

3.3.3. Preparation of final test

It was observed that the items found insignificant in the reading and writing test cannot be simply deleted because the children with mental retardation in special schools still have to learn them. Many of the items have not yet introduced. Therefore, in order to choose needed items a trial test was given to few students in special school.
10, standard II-6, standard III-10, standard IV-6). The results of the tests were tabulated. It was decided to delete the items which got the score 80% and above.

Thus the final selection was as follows: (1) All significant items from the pilot study were retained. (2) Items got below 80% score in the trial test given to children with mental retardation were also retained. Again a few modifications were made to make even number of items in a given test.

Considering the performance of the students with mental retardation in the trial test, it was decided to choose only standard I (reading and writing) and standard III (reading and writing) tests.

Standard 2 and 4 tests were not selected.

3.3.4 Description of tools

I. Tools used for pre test, post test, and retention test:

(1) Functional Reading Assessment Test (FRAT) for standard I
(2) Functional Writing Assessment Test (FWAT) for standard I
(3) Functional Reading Assessment Test (FRAT) for standard III.
(4) Functional Writing Assessment Test (FWAT) for standard III.
II. Tools used for parallel test:

(1) Parallel Functional Reading Assessment Test (PFRAT) for standard I
(2) Parallel Functional Writing Assessment Test (PFWAT) for standard I
(3) Parallel Functional Reading Assessment Test (PFRAT) for standard III
(4) Parallel Functional Writing Assessment Test (PFWAT) for standard III.

The functional reading and writing tests were prepared by giving due importance to the functional needs of children with mental retardation. It is a well known fact that these children have limitations in learning academic skills due to their intellectual deficiency. Whatever they learn should enable them to become independent in daily activities. Therefore the content of the test (vocabulary, reading comprehension, phonological awareness, reading fluency and writing skills) were planned in such a way that mastery of these skills will allow them to function properly in home, school and community.

The description of tools is given below:
3.3.4.1 Functional Reading Assessment Test (FRAT) for Standard 1

The test contains following subtests: (a) alphabet test, (b) vocabulary test (c) reading comprehension test (d) phonological awareness test and (e) fluency test.

a. Alphabet test

This test measures student’s knowledge about Malayalam alphabets. Distinguishing letters is important in reading readiness programme. This test includes (i) identification of alphabets, (ii) reading alphabets (consonants) and (iii) reading alphabets (letters having symbols and hard letters).

b. Vocabulary test

Here student’s general level of word knowledge is assessed. Maria (1990) stated "reader's level of vocabulary is the best predictor of his/her ability to understand the text. This test includes (i) identification of words (simple words and words with hard letters, (ii) reading of words (simple words and words with hard letters), (iii) fill in the blanks with suitable word and (iv) matching of words. First two tests measure students’ ability to look at a word and identify/name it and third and fourth tests need comprehension at word level.
c. Reading comprehension

This test measures whether the student has the ability to understand what is read. There are four sections in this test: (i) two word sentences with questions, (ii) long sentences with questions, (iii) short paragraph with questions, and (iv) long paragraph with questions. All questions in this subtest requires the student to read the sentences / paragraph independently and then answer to the questions that the examiner asks.

d. Phonological awareness test

Studies show that tests of phonological awareness are better indicators of students who are at risk of reading performance than any other commonly assessed factors such as oral language processes (Uhry, 1993). There are five sections in this test. The first three phonological awareness tasks are identified by Yopp (1988) and fourth test is based on the sound categorization tasks used by Bradley and Bryant (1985). Details of the tests are given below.

(i) Phonemic isolation - say the first sound in a word after hearing the word pronounced.

(ii) Phonemic segmentation - say the sounds heard in a word.
(iii) Phonemic deletion - isolate a sound in a word and blend the remaining sounds. Isolation of sounds is given at initial, middle and end levels.

(iv) Sound categorization - name same first sound words, same end sound words and same middle sound words.

(v) Word segmentation - isolate the words in a sentence.

e. Reading fluency

This test measures the student’s ability to read easily, smoothly and correctly. A fluent reader smoothes letter into words and words into meaningful phrases and reads with appropriate expression (Gunnning, 1998).

There are six subsections in this test, three at word level and 3 at sentence level. They are: (i) two letter words, (ii) three letter words, (iii) long words, (iv) two word sentences, (v) three word sentences, and (vi) paragraph.

Here the student is asked to read each unit for one minute continuously in which the examiner records the reading sample in a tape recorder.
3.3.4.2 Functional Writing Assessment Test (FWAT) for Standard I

Writing is a tool for communication. It is both a skill as well as means of self expression. Written language involves a very intricate integration and coordination of memory, vision and motor skills to produce and record written symbols for later decoding by a reader.

This test contains the following subtests: (i) pre writing skill-copy shapes, (ii) write letters, (iii) write words, and (iv) write sentences.

i. Pre writing skill - copy shapes

This includes coping of three basic shapes triangle, square, and rectangle.

ii. Write letters

This test measures student’s ability to print letters when dictated by tester. This includes: (i) writing vowels and consonants and (ii) write letters with symbols and hard letters.

iii. Write words

This test measures student’s ability to hear a word as a complete unit and print it. This test includes four sub sections: (i) write
simple words, (ii) write long words, (iii) write words using given letters, and (iv) fill blanks with given letters to make words.

**iv. Write sentences**

This test measures student’s ability to combine word and make sentences. Writing comprehension is also measured. This test has four subsections: (i) copy sentences, (ii) write sentences independently when dictated by tester, (iii) write suitable word and complete sentence, and (iv) read small paragraph and write answers to questions.

3.3.4.3 **Functional Reading Assessment Test (FRAT) for Standard III**

This test contains four subtests: (i) vocabulary, (ii) reading comprehension, (iii) phonological awareness and (iv) reading fluency.

**i. Vocabulary**

All sections of this subtest measures students’ level of word knowledge. This test has 6 subsections: (i) read given words, (ii) fill up blanks with suitable word, (iii) find synonyms, (iv) make word with given letters, (v) find single word for given phrase and (vi) find odd word from a group of words.
ii. Reading comprehension

This test measures the students’ ability to make meaningful sentences with given words, oral reading with comprehension, recall sequences of events or idea, locate and/or recall answer to questions, follow simple cause and effect relationships, make questions and follow written directions.

This test has following subsections: (i) make sentences using the words given in rows and columns, (ii) read given paragraph, (iii) read story and choose correct answer for the questions, (iv) read paragraph and make questions from it, and (v) read paragraph silently and find answer to the questions.

iii. Phonological Awareness

This includes sound categorization tasks, that is, find the same first sound words, same middle sound words and same end sound words.

iv. Reading Fluency

It has 6 subsections. The first 5 tests are the same ones used in standard I and the last one is to read a passage from standard III text book.
3.3.4.4 Functional Writing Assessment Test (FWAT) for Standard III

This test is divided into two main sections: (a) writing words, and (b) writing sentences.

a. Write words

This test measures the students’ ability to write words using correct spelling and use words according to context. Writing comprehensions at word level is also measured.

This subtest has 6 subsections: (i) write dictated words, (ii) write singular / plural of given words, (iii) write related words, (iv) choose correct gender pair of given words, (v) write past form of given word, and (vi) write opposites of given words.

b. Write sentences

This test measures students’ ability to write sentences for functional usage. Writing comprehension at sentence level is the main area of measurement.

This test has 5 subsections: (i) use given word in a sentence, (ii) write positive sentences, (iii) write negative sentences, (iv) arrange given words and make meaningful sentences, (v) write on a given topic, and (vi) read given paragraph and write answer to questions.
3.3.5 Tools used for parallel test

The purpose of the study is to find out the effect of LRA in the language development of children with mental retardation with special reference to generalization and maintenance. The standardized tools measured these aspects. To meet this goal an alternative content was necessary. The investigator prepared an alternative content called parallel content for standard I and standard 3 and taught this using conventional approach. The investigator also prepared tools to test this parallel content. These tests have the same characteristics as the standardized tests, that is, same number of subtests in each tool, same number of items in each sub test, and equal difficulty level for all items as the standardized tests. Name of the tests are: (1) Parallel Functional Reading Assessment Test (PFRAT) for standard I, (2) Parallel Functional Writing Assessment Test (PFWAT) for standard I, (3) Parallel Functional Reading Assessment Test (PFRAT) for standard III, and (4) Parallel Functional Writing Assessment Test (PFWAT) for standard III.

3.3.6. Evaluation of the tests

a. Reliability of the tests

Reliability coefficients of the above tests were calculated using split half method. The pretest scores of the sample in each standard (that
is, standard I higher, std I lower and std III) were used for this. Each subtest was grouped separately into even and odd items. The reliability of the tool was established by using Guttman’s split–half method followed by Spearman Brown prophecy formula. The reliability coefficients obtained for all tests were 0.99

**b. Validity of the tests**

A test is valid if it measures what it purports to measure. Content validity of the test is usually determined by examining the appropriateness of the types of items included, the completeness of items, the way in which the items assess the content (McLoughlin & Lewis, 1981). Content validity is often assessed by experts in the field. This was done in preparation stage of the test. After preparing the test it was shown to a person who is expert in Malayalam language as well as Malayalam subject teacher. When the initial try out is over, the researcher got comments and corrections from regular class teachers of respective classes (standard I and standard III) as well as special education teachers. Required modifications in the test items were made according to their comments. Hence the test has content validity.

**3.4 Population**

Population selected for this study was children with mild mental retardation.
3.5 Sample and sampling techniques

The selected sample included 60 children belong to the category of mild mental retardation. Random sampling was used in the selection of sample. Investigator collected a list of students studying in Nirmala Sadan special school. After consulting the school psychologist and class teachers, investigator randomly selected 60 children who belong to mild mental retardation (IQ between 50 and 69). The criteria for inclusion in sample were: (I) mild mental retardation, (2) age between 8-20 and (3) ability to communicate verbally. Those who were having additional handicaps such as cerebral palsy, hearing impairment, visual impairment, and autism were excluded.

The investigator administered pretest to all 60 children. The higher functioning 20 students were received std III test and they were in standard III level. Out of 40 children who have taken standard I test, the 20 top scorers were in standard I higher level and the rest were in std I lower level. Thus there were 20 students in each level.

Each level subjects were randomly assigned to experimental or control groups. The procedure explained by Gay (1996) was adopted for random assignment. The procedure was as follows: investigator ranked all subjects from highest to lowest based on their scores in the pretest. The first two subjects (the subjects with the highest and the next highest
scores) were the first pair. No matter how far apart their scores were, one member was randomly assigned to one group and one member to the other. The next two subjects (subjects with third and fourth highest scores) were the next pair and so on. Thus after selection there were three experimental groups and three control groups and each group contain 10 children. To determine whether there were any significant difference between the experimental and control groups on pretest, the independent ‘t test’ was employed. Result indicated that both experimental and control groups in three levels do not differ significantly in the pretest mean scores. Table 3.1 shows the mean, standard deviation and t value of the pretest scores.

Table 3.1
Mean, SD and t value of the pretest scores of the experimental and control groups at various levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard I</td>
<td>Experimental</td>
<td>10</td>
<td>303.90</td>
<td>185.72</td>
<td>0.83</td>
</tr>
<tr>
<td>Higher</td>
<td>Control</td>
<td>10</td>
<td>277.58</td>
<td>167.21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not significant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard I</td>
<td>Experimental</td>
<td>10</td>
<td>58.33</td>
<td>26.54</td>
<td>0.48</td>
</tr>
<tr>
<td>lower</td>
<td>control</td>
<td>10</td>
<td>52.43</td>
<td>28.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not significant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard III</td>
<td>Experimental</td>
<td>10</td>
<td>940.08</td>
<td>459.67</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>10</td>
<td>867.93</td>
<td>385.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not significant</td>
<td></td>
<td></td>
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</tbody>
</table>
The investigator also used ‘t test’ to check whether there is any significant difference between experimental and control groups regarding their IQ scores. This is shown in table 3.2. This test also shows there is no significant difference between the two groups in three levels. Later two students, one from standard I lower experimental group and one from standard III control group were excluded from the study due to continuous absence.

Table 3.2
Mean, SD and t value of the IQ scores of the experimental and control groups at various levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Group</th>
<th>N</th>
<th>Mean IQ</th>
<th>SD</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard I</td>
<td>Experimental</td>
<td>10</td>
<td>60.35</td>
<td>4.99</td>
<td>-0.32</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>10</td>
<td>61.10</td>
<td>5.55</td>
<td></td>
</tr>
<tr>
<td>Standard I</td>
<td>Experimental</td>
<td>10</td>
<td>58.70</td>
<td>6.15</td>
<td>-0.18</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>10</td>
<td>59.20</td>
<td>6.39</td>
<td></td>
</tr>
<tr>
<td>Standard III</td>
<td>Experimental</td>
<td>10</td>
<td>62.20</td>
<td>4.85</td>
<td>-0.35</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>10</td>
<td>62.80</td>
<td>2.44</td>
<td></td>
</tr>
</tbody>
</table>

3.6 Data collection procedure

The investigator contacted the special school authorities. The scope and details of the study was explained and permission was sought
for collecting data from students. The permission of parents was also sought through letter. After getting permission from school authorities and parents, the investigator went to the special school and assessed each student individually.

The procedure for data collection was as follows: The researcher and the student sat in opposite seats. Printed reading/writing test was handed over to the testee and specific directions were given on how to respond to various items in the test. Specific instructions used for administration of tool at each level are given in appendix M. No time limits were imposed for completing the test items and therefore students were given ample time to respond to the questions. However, the examiner verbally encouraged the students to respond.

The data was collected in four stages: pre test, parallel test, post test, and retention test.

3.6.1 Pretest

The main areas of pretest were alphabet test (only for Std I higher and lower levels), vocabulary, reading comprehension, phonological awareness, reading fluency, and writing skills. The tools prepared and standardized by the investigator were used for pre testing.
3.6.2 Parallel test

Investigator prepared a parallel content of the pretest (in all three levels) and this was taught during intervention programme. Based on this, a test was prepared and administered and this is the parallel test. This parallel test was given after completing the intervention and this assessed student’s acquisition level of language development.

3.6.3 Post test

Post test was done by administering the same tool used for pretesting. It was given the next day after the parallel test. By administering the post test the investigator assessed student’s ability to generalize the learned skills in unfamiliar material (response generalization).

3.6.4 Retention test

Six months after the post test, all the six groups were assessed again using the same tools which were given for pretest and post test. This test is known as retention test. This test was meant to find out student’s ability to maintain the learned skills overtime.

3.7 The experiment conducted (intervention)

This study was intended to find out the effectiveness of Literacy Rich Approach (LRA) in the language development of children with
mental retardation when compared to the conventional approach (existing approach).

3.7.1 Content

The aim of the study was to find out the generalization and maintenance skills of the sample in selected skills when used two different approaches. Therefore the investigator prepared a parallel programme which resembles the content of the pretest. This parallel content was taught to all groups using conventional approach.

3.7.2 Instruction through conventional approach

The existing method was used, that is, specific goals and objectives were selected. These objectives were further divided into sequential steps and these steps were taught using detailed lesson plans and appropriate teaching materials. This is the conventional approach in this study and investigator used this approach to both experimental and control groups. Daily evaluation, weekly evaluation, home work etc. were part of this programme. Instructional time taken for this approach was one hour per day.
3.7.3 Instruction through Literacy Rich Approach (LRA)

For the experimental groups the investigator planned an additional programme which is known as instruction through Literacy Rich Approach (LRA). After each day’s one hour training using conventional approach the investigator provided additional one hour training using the Literacy–Rich Approach for all treatment groups. Each group, one by one came to the literacy rich room and got training.

The components of Literacy Rich Approach were: 1) small group practice, 2) on going monitoring, 3) positive feed back, 4) continuous reinforcement, 5) classroom library, 6) daily story reading and 7) writing centre. Details of each component is given below

3.7.3.1 Small group practice

When the experimental groups of children came to the treatment room (literacy rich room) investigator divided them into small groups. Each group contained three or four students. Depending on the specific activities of the day different types of grouping were followed. That is, either homogeneous grouping (same ability grouping) or heterogeneous grouping (mixed ability grouping).
3.7.3.2 Ongoing monitoring:

When students were in the treatment room investigator monitored them closely and continuously. Through this monitoring they got correction, clarification and explanations.

3.7.3.3 Positive feedback

Mcguire (1986) defined feedback as providing information on how well he/she performed during training. For all treatment groups investigator gave feedback in positive terms. As Alberto and Troutman (1995) explains when feedback is given and it is prefaced with an affirmative and followed by a praise statement that focuses on the accuracy or appropriateness of the behaviour it was very effective. Investigator adopted the three forms of constructive verbal feedback explained by the above authors. Examples are given below.

<table>
<thead>
<tr>
<th>Affirmative</th>
<th>Feedback</th>
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<tbody>
<tr>
<td>“Great”!</td>
<td>(Description of correct response)</td>
</tr>
<tr>
<td></td>
<td>You finished your work on time”</td>
</tr>
<tr>
<td>“Good try !”</td>
<td>(Reinforcement of approximation)</td>
</tr>
<tr>
<td></td>
<td>You almost got finished this time”</td>
</tr>
<tr>
<td>“Much Better”!</td>
<td>(Suggestion for modification)</td>
</tr>
<tr>
<td></td>
<td>If you keep trying not to make careless mistakes, you’ll finish all of them next time”.</td>
</tr>
</tbody>
</table>

3.7.3.4 Continuous reinforcement
Reinforcement is the contingent presentation of a desired stimulus, immediately following the response which increases the rate and/or probability of the response. Delivery of reinforcement on a continuous basis is called continuous reinforcement. In other words, each time the student produces the target response he/she immediately receives reinforcement.

As Alberto and Troutman (1995) stated the continuous schedule of reinforcement is useful in teaching new behaviours (acquisition) especially for young children and children with disabilities. In the present study investigator used this continuous delivery model in the following way. The primary reinforcers (e.g. edible reinforcers) even though it has high motivational value, were rarely used. When used, it was used with low functioning and younger students and paired with secondary reinforcers. Pairing helped to teach the student to be motivated solely by secondary reinforcers. Some of the secondary reinforcers used were social stimuli such as words of praise, opportunity to engage in preferred activities etc. Many times these preferred activities itself were opportunities that involved them in literacy works. For example, when completing a particular day’s worksheet, the student can watch a C.D. Rom which they prefer very much. Here they are getting reinforcement at the same time they get
lot of repeated practice in reading. Secondary reinforcers such as tokens were used regularly in this programme.

3.7.3.5 Classroom library

In the literacy rich classroom there was a special area for classroom library. It was well furnished with books of various kinds (stories, dramas, poems, novels, picture books, story charts etc.). During the treatment session specific time is allotted in which students can select books on their choice and read. They read in small groups or before the whole class. Older students take these books to home and read the assigned portion. Next day they report on their reading content. Investigator kept registers in which the details of student’s library usage were recorded. CD Library was an interesting aspect of the Library which enabled the students to watch CDs having stories. They are read along stories having visuals.

3.7.3.6 Writing centre

Writing centre is also a specially furnished area in the literacy – rich classroom. In this area adequate paper, pen, crayons etc. with low-level black board are neatly kept. Students have the freedom to use the writing centre as they wish. Besides this there are specific times all students practice writing.

3.7.3.7 Daily story reading
Investigator read stories to the treatment groups everyday especially to the lower functioning students. Older students take turn in reading stories. For reading stories CD Rom, story books, story charts, magazines etc. were used.

Details of the conventional approach and Literacy – rich approach can be seen in the Reading – writing package prepared by the investigator which is given in appendix N.

3.8 Teachers and teacher training

To increase the external validity of the study three teachers were selected in each level (Standard I higher, Standard I lower, and Standard III) for teaching using the conventional approach. All of them were trained teachers having Diploma in Special Education (Mental Retardation). The mean age of these teachers was 45 and their average teaching experience was 18 years. These teachers taught the experimental and control groups following the same lesson plan and materials prepared by the investigator. Teachers were never given any information about the outcome of this study. They followed the same set of classroom rules for all groups. The intervention phase of this study took place for 2 months, Monday through Friday for a total of 40 school days.

3.9 Research setting
The study was conducted in Nirmala Sadan School for Mentally Retarded Children at Muvattupuzha, Ernakulam District, Kerala. The instruction using Conventional Approach (CA) was conducted in three classrooms known as conventional classrooms. Each classroom had a seating capacity of 10 students. At a time either one experimental or control group attended the class. When they finished the next group came to the class. Teaching materials were brought to the classroom and were distributed individually.

The instruction using Literacy Rich Approach (LRA) was done by the investigator and it took place in a specially designed classroom which is known as literacy – rich classroom. The investigator designed this room with literacy – specific materials. (The list of materials included in the Literacy – rich classroom is given in appendix O). Every day the three treatment groups came to this classroom for one hour duration. They took turns in coming here.

3.10 Scoring and processing of Data

For standard I reading test a score of 1 mark is given for all correct items of alphabet test, vocabulary test, and comprehension test except comprehension of small paragraph (item 3.3) and long paragraph (item 3.4). For 3.3 and 3.4 the score for correct response is 2 marks. For vocabulary and comprehension partially correct answers were
considered with $\frac{1}{4}$ mark deduction for each letter error and symbol error. In phonological awareness test the score for correct answer is 1 mark and in reading fluency a score of 1 mark is given for each correct sound. In standard I writing test a score of 1 mark is given for correct answers in prewriting, writing letters and writing words. In writing sentence test the score for correct item is 2 marks. As it is done in reading test, partially correct writing answers were considered with $\frac{1}{4}$ mark deduction for each letter error and symbol error.

For standard III reading test a score of 1 mark is given for all correct items except for making meaningful sentences and making questions. A score of 2 marks is given for these items. The subtest oral reading carries the score of 10 marks, out of which 8 marks are given for correct reading and 2 marks for reading fluency. The scoring of phonological awareness and reading fluency tests are done exactly as that of standard I tests. For standard III writing a score of 1 mark is given for all correct items except for using given word in sentence, arrange words to make meaningful sentence, write on topic and write answer to questions. Here each correct item carried 2 marks. Deduction of marks for letter error and symbol error was done as explained in standard I tests.
The Details regarding the scoring (item score, maximum score, criteria for scoring etc.) is given in Appendix P.

The data collected for each group (standard I higher, standard I lower, and standard III) were entered separately in computer. The name of the subjects in each group was arranged alphabetically and their reading writing scores were entered in the following order: pretest, parallel test, post test, and retention test.

3.11 **Statistical techniques used for data analysis**

The data were analyzed based on the objectives and hypotheses by employing appropriate statistical methods using SPSS. The following statistical techniques were used for this purpose.

1. Computation of mean, standard deviation, and percentage.
2. The Student’s ‘t’ test’.
3. Analysis of covariance (ANCOVA)

Analysis of Covariance (ANCOVA) is a form of ANOVA, which is used to determine whether there is significant difference between two or more means at a selected probability level. For a study based on a pretest –post test -control group design Analysis of Covariance (ANCOVA) is a superior method for controlling for pretest differences (Gay, 1996; Shavelson,1988). ANCOVA adjust post test scores for
initial pretest differences. The procedure given by Brace et al., (2003) is used for reporting the result of ANCOVA.

4. Repeated Measures Analysis of Variance (Repeated Measures ANOVA)

5. The test of Least Significant Difference for post hoc comparisons. The critical difference was calculated as per the procedure given by Steel and Torrie (1980).

3.12 Summary

This chapter has dealt with the research methodology, which is experimental method: pre test-post test- control group design. It also describes about the setting and population. Description of the development of tools and details of conventional and Literacy Rich approaches were also presented. It also explains the description of data collection technique, data collection, intervention and data analysis.