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CHAPTER III

METHODOLOGY

Method means an orderly procedure of processes or a set form of procedure adapted in an investigation where as methodology is defined as the science of method of arrangement. Some refer to it as the logic of procedure (Best and Kahn, 1993). This chapter deals with detailed description of the design, tools and techniques, sample selection, data collection, procedure and statistical considerations.

3.1 DESIGN

A research design is a plan according to which observations are made and data assembled. It provides the empirical and logical basis for drawing conclusions and gaining knowledge. According to Ravichandra (1983), research design is a plan, structure and strategy of investigation conceived so as to obtain answers to research questions and control variance.

According to Best (1981), an experimental design is the blueprint of the procedures that enable the researcher to test hypotheses by reaching valid conclusions about relations between independent and dependent variables.

The present study is experimental in nature. A pre test post test experimental design has been used. The effect of three remedial treatments on spelling performance has been studied. These are:

1. TAK/v
2. Visual orthographic method.
3. Listen, Speak, Read & Write (LSRW)

There were three experimental group namely: Dyseidetic spellers, (Phonetic group) Dysphonetic spellers (Visual group) and Mixed group, each having 13 children in it.
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Dyseidetic group (Phonetic group) comprised of children who were phonetic spellers (e.g. Rite for write, lisen for listen). Dysphonetic group (Visual group) included those children who were phonetically inaccurate in spellings. Their spellings had all the required letters but the letters are placed in bizarre positions such as waht for what, wihte for white. Mixed group comprised of children who made both kind of errors.

The dependent variable in this study is achievement in spellings and independent variable is remedial measure. All the three groups served as comparison groups for each other. As the no. of subjects available was small, researcher could not afford a control group. All the groups had boys and girls mixed in them. A pretest was administered before the onset of experiment and post test at the end of treatment period. Two more sets of observations were made called delayed post test one and delayed post test two, 21 days after the post test and 46 days after the post test respectively.

3.2 TOOLS AND TECHNIQUES

Reliability of any piece of research is based on the tools/tests/scales and techniques used in it. If the tools are not dependable the findings of research also can't be relied upon. The following tools were employed in the present study.

3.2.1 Coloured Progressive Matrices (CPM) (Raven et al., 1977) This tool was used for measuring intelligence. The coloured progressive matrices are designed for use with young children and people for anthropological studies, and for clinical work. It can be used satisfactorily with people who for any reason can not understand or speak in the English Language, aphasias, children with cerebral palsy or deafness, as well as with people who are intellectually subnormal. The CPM is well known for assessing the degree to which people can think clearly, or the level to which their intellectual functions have deteriorated. It has reliability varying with age from .50
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to .80. It correlates (r = .50) with both the Crichton vocabulary scale and Terman Merril scale. Over the entire range of operational utility, the test retest reliability of the CPM was close to 90.

3:2.2. Diagnostic Test for learning Disability (DTLD, Mehta and Swarup, 1993)

The DTLD is a tool constructed to identify those children, who experience learning problems, because of learning disability. Since learning disability span over a variety of abilities, ten areas, each representing a basic psychological process, have been selected in this test. A deficit in any of the area or areas or a combination of any, would lead to a learning problem. The first six areas represent the processes involved in visual and auditory perception viz.

1. Eye – hand coordination (EHC)
2. Figure ground perception (FG)
3. Figure constancy (FC)
4. Position in space (PS)
5. Spatial relation (SR)
6. Auditory Perception (AP)

Four areas from subtest no. 7 to 10 represent the aspects of cognitive functioning viz.

7. Memory (M)
8. Cognitive abilities (CA)
9. Receptive language (RL)
10. Expressive Language (EL)

In DTLD, a subject, therefore, moves from a perceptual to a cognitive domain incorporating thinking, memory, receptive and expressive language to get an insight into the subject's overall cognitive structure. The purpose of this diagnostic tool is to find the locus of the problem and to provide a sound basis for a structural and an effective remedial programme. The DTLD can be administered
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individually as well as in a group. Diagnosis would be based on the analysis of the subject's test performance, which would become the basis for effective remediation strategies in 10 areas. The test indicates the strengths and weaknesses of the subject in ten areas. A total score of 50 or below implies severe learning disability. Only those who scored either 50 or below were taken. A sample of profile of a child on this test is presented in appendix X.

3.2.3 Identifying tool of word spellings

This test was constructed by investigator to identify children from 4th standard who have problem in spellings performance in English though the test has been developed for 3rd & 4th standard both. The raw form of this test is presented in Appendix I. A 100 word items were written from English text books of 2nd, 3rd, 4th standard (CBSE and NCERT syllabi). The proportion of the words selected from 2nd, 3rd & 4th was 2:2:1. Care was taken to select words which have various combination of vowels and consonants. Majority of words contained more than three alphabets. Each word was used in a sentence. Each item was allotted one mark. This raw form of test was administered on 180 students of 3rd standard children of various schools of Chandigarh at the end of academic year. The tests were then scored and were analyzed for item difficulty and item discrimination.

3.2.3.1 Item analysis

After administration of pilot form of the test and scoring of test, the test papers were arranged in ascending order of merit for calculating discrimination index.

Discrimination Index:

The discrimination index was calculated by 27% rule. The group was divided into 3 parts. The best 27% is named as the upper group and 27% from the last end is termed as the lower group. The
remaining student constitutes the middle group. Middle group was kept aside. Discrimination index was calculated by following formula:

\[
D.I. = \frac{U-L}{N/2}
\]

Each item was subjected to this formula. U comprises of number of students who correctly attempted a particular item from upper group and L correspondingly from the lower group. Each item which had discrimination index of more than .18 was retained (Garrett, 1981).

**Item difficulty**

Item difficulty was calculated by \( I.D = \frac{\text{total no of children who correctly attempted the item}}{N} \). Items with difficulty level between 35% to 65% were retained.

Any item which had a difficulty value lying beyond range of 35% to 65% and or had a discrimination index of less than .18 was rejected. Thus, a set of 35 items were retained from a total of 100, as final form of the test. The appendix II presents all retained (thirty five) items with item difficulty and discrimination index values.

Final form of the test comprised of spellings involving double vowel (similar / different vowels), double consonant (happy), combined CH (which) & SH (Sheep), WH words (White, what,) CK combinations (Stick) besides others. Words beginning with H, with and without sound of H e.g. hut, honest. Words beginning with S, having a sound of SH & S (story and sugar) (Appendix III).

### 2.3.2. Reliability

Reliability is one of the most important characteristic of a measuring tool. Reliability refers to the degree to which a measuring
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tool gives consistent results. If it gives the same result on successive measurement either by same or different persons it is termed reliable.

Reliability was established by test-retest method (n=121). It was found to be 0.90 (P < .01).

3.2.3.3. Validity

In determining the appropriateness of a measure for a proposed research study, the researcher needs to be concerned with not only reliability but also validity. The conventional definition of the validity of a test is the extent to which it measures what it was constructed to measure. Criterion referenced validity was established (r = .827, p < .01). The criterion being classroom performance in English in spellings. Content validity was established, with help of opinion of experienced school teachers, teacher educators and university teachers.

3.2.3.4 Norms

Finally, to obtain norms, test was administered on 122 3rd standard and 561 4th standard children. Appendix IV presents the norms obtained.

3.2.4 Tailor made Individual test on spellings

Investigator prepared a test of 40 items from the books of identified students and administered to them. The purpose of this test was to obtain a list of 30 misspelt words to be used for remediation. Hence the tailor made test was different for different students. It was administered to the students before commencing remedial sessions. If student does not commit these many errors on tailor made spelling test, home work and class work of students were scrutinized to find errors to be included in test to complete a list of 30 words. This list was used during remedial sessions. One sample test of tailor made individual test is presented in appendix V. A sample list of 30 words for remediation is presented in an appendix later (XIV).
3.2.5 Teacher’s Referral form

There are three main areas which were identified for observation namely reading, writing and behaviour. An observation of these contributed towards identification of learning disabled children. Teacher’s referral form was prepared by investigator. This was used to know teacher’s rating about the identified learning disabled children. There were 11 (eleven) items in total choosen carefully covering all the areas of learning disability. This form is presented in appendix VI. The data from this form was used to ratify the identification results. Response was to be obtained on a five point rating scale. Both -ve and +ve items were included in the scale. Highest obtainable score was 57 on this test lowest possible score was 0.

3.2.6 Remedial Techniques

There are three techniques

1. TAK/v method.
2. Visual orthographic method.
3. Listen ,Speak, Read and Write method

These were used to remediate spellings among identified children. These techniques required some materials which are mentioned below.

- Flash cards bearing words
- Flashcards showing words with tactile surface.
- Cards bearing alphabets with tactile surface.

(Samples shown in Appendix VII)

3.2.7 Analysis of Errors to classify children

Analysis of errors were based on the following kinds (1) Dyseidetic (2) Dysphonetic (3) Mixed type. Classifications were based on the majority of errors, for example if the child made 14 errors of one kind and 1 error of the other kind, he was classified on the bases of 14 errors of one kind.1 error could have occured randomly.
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Analysis of errors in spellings revealed that children’s spellings were either at phonetic (dyseidetic groups) or transitional (dyshphonetic groups) level (Lydiatt, 1984). Appendix VIII presents sample of errors in two groups.

3.2.8 Observations

Researchers observed the subjects on the basis of characteristics of L.D. given by Traver & Hallahan (1976) throughout the sampling for clues before remediation and during remediation.

3.3. SAMPLE OF THE STUDY

A sample is a subset of population to generalize the test results. The sample should be representative of large population of which results would apply.

The sample size depends upon the subjects availability, economic selection both in terms of time and money and complexity of data analysis involved. The sample should be large enough to serve as an adequate representative of the population (Best and Kahn, 1993).

3.3.1 Size and Nature

The sample size depends upon the subject’s availability, economic selection both in terms of time and money, complexity of data analysis involved. Above all the ideal sample should be large enough to serve as an adequate representation of the population (Best and Kahn, 1993).

The total sample of the study comprised of 39 learning disabled children selected from regular school going children of 4th standard having average or above average intelligence, manifesting traits of learning disabled children and significant deficits in their spelling skills as compared to their classmates. In this study, the initial sample drawn was four hundred and twenty. These children
belonged to eight schools of Chandigarh. 39 identified learning disabled children belonged to seven schools.

The age of the children to be selected as sample was decided to be above 8 years, since by the age of 7-8 years the visual and phonological elements become fixed and child uses both processes and hence manifests spelling difficulties (Bradley and Bryant, 1985)

The group wise and gender wise composition of sample is given as under. In fact, identified children were 41, one of them dropped out due to medical reasons, one got transferred.

<table>
<thead>
<tr>
<th>Gender / Group ↓</th>
<th>Girls</th>
<th>Boys</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonetic</td>
<td>6</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Visual</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Mixed</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>

In this study purposive sampling was used.

3.3.2 Criteria for sample selection

The study required a sample of spelling disabled children. Since the spelling disability is a type of learning disability, it was necessary that the sample be subjected to the criteria of learning disability. The following criteria were used for the identification of sample from regular school:

(i) Average or above average intelligence. (Tested by CPM)
(ii) Exclusion of sensorial handicaps, No subject manifested any sensorial handicaps. Subjects were tested informally. Subject was made to read from writing board from a distance and from text book. It
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was seen that they followed all routine instructions issued at a reasonably loud level e.g. “Please open your book” “Close the door.”

iii) Performance equal to or below a score of 50 on DTLD.

iv) Performance on spelling test below P20 level.

v) Discrepancy in performance in Moths (nonverbal) and English (verbal) (Higher than .64Z).

vi) A score equivalent to 60% or more on Teacher’s Referral Form.

3.3.3. Procedure of Sample Selection The sample was selected using the following procedure.

(i) Identification tool for spellings: Initially, no. of children selected were five hundred and sixty one from eight schools of Chandigarh. On the basis of performance on the spelling test, those children who fell below P20 were selected. 99 children’s were retained here (Appendix IX). Further, they were subjected to following criteria. (Stage I)

(ii) DTLD was used to screen learning disabled children from among 99 selected children. Those who scored 50 or lower were retained. Appendix X presents score of identified children on identifying tool and on DTLD. There were 53 children who scored 50 or below 50 on DTLD. (Stage II)

(iii) Intelligence Test: Raven’s coloured progressive matrices (CPM) were used to exclude children with low intellectual functioning from among the selected children. Appendix XI shows CPM scores of all of so far identified children. 48 children were retained here. This covered stage III.

(iv) Teacher’s referral form: The teacher observed identified learning disabled children for the problems encountered by them in the area of reading writing and spellings and other behaviours in scale. The researcher was to select only those
children who scored at least 60% on this referral form. All identified children scored above 60%. (Stage IV). Appendix XII presents scores of all 48 children.

(v) Classroom observations: The general classroom behaviour of the student was carefully observed by the investigator to identify behavioural problems. Investigator also observed the children during remediation session. These observation were used only to ratify selection process and to confirm responses in teacher's referral form.

(vi) Children who had discrepancy in Mathematics and English. Marks of 5 unit tests of Mathematics and English were taken, averages, S.D,Z scores worked out and compared.

Discrepancies in Z scores of Class test of English and Math's were taken as criterion for identifying spelling disabled children (Refer Appendix XIII). The students with discrepancy of .64Z or above formed the remedial group. Highest discrepancy included in subjects was 2.98Z. By using these criteria, a total of 41 students were identified as spelling disabled children in 7 of a total of 8 schools. This was final and fifth stage of sample selection. Out of these, 41 selected children, one dropped out due to medical reasons and one got transferred. Thus the sample comprised of 39 subjects.

It may be noted that discrepancy in potential and performance in spellings was automatically ensured when subjects below P20 in spellings were retained and those above average intelligence were retained.

3.4 PROCEDURE FOR DATA COLLECTION

The present study was conducted in six phases: pre test, classification of subjects compiling word list for administration of remedial techniques, remediation, post test, delayed post tests.
3.4.1 Pre test stage

Performance on identifying tool of word spellings served as a pre test, also. Marks of all the subjects in English were collected.

3.4.2 Classification into groups

The performance on identifying tool helped the investigator to know the types of mistakes the students make. On the basis of their mistakes, subject were classified to 3 groups namely Dyseidetic (phonetic group), Dysphonetic (visual group) and mixed group.

3.4.3 Preparation of word lists for remedial work:

In total, 30 errors have been selected for remediation from tailor made Individual test, class work, home work and from their exercise note books. This was a list unique to every child and was prepared according to requirements of classification. Refer Appendix XIV for a sample of errors for remediation.

3.4.4. Experimental treatment

Experimental treatment started at the starting session of school in the May and continued till October. Before treatment commenced subjects were requested to abstain from absenting themselves, otherwise they will miss some new and interesting activities. Each child was taken individually for treatment. For each child, before starting remedial work, the researcher entered into an informal conversation about their interests, home work, games they play, routine work etc. just to establish rapport. From the compiled list of words prepared in 3.4.3 each word was taken one by one. On an average three words per day were taken for remediation (Bryant et. al, 1981 and Gorden et. al 1993).

Each child in all seven schools was taken daily for fifteen to twenty five minutes (McNaughton et. al 1994). A word was considered

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learnt, when a child produced it correctly three times in a sequence. With some children, words had to be repeated next day.

Treatments given for 3 groups are as follows:

3.4.4.1 TAK/v for Dyseidetic spellers (Phonetic group)

Students with this problem read and spell-primarily through phonetic analysis. They have strength in phonetic analysis (highly phonetic). The detail of procedure is as follows.

(i) Researcher cut out the selected word alphabets from a strip of sand paper and pasted them on a piece of chart paper.

(ii) Made subject’s finger, trace it while researcher said each part of the word as loud as naturally possible at the same time, with subject’s eyes closed.

(iii) Subjects traced each part of the word on his/her own with same finger, with eyes closed, saying it loudly.

(iv) Experimenter removed piece of chart paper. Subjects wrote the word on a new piece of paper with eyes open.

(v) Attempt was compared with original if incorrect, steps (ii) to (iv) were repeated.

This method was used for smaller words. For larger words following was done.

(vi) Larger words were broken into syllables.

(vii) Those syllables were read out to the subject and subject repeated those syllables.

(viii) The process from (i) to (v) for different syllables were repeated.

(ix) Then whole word was attempted by the child.

Modalities used were auditory, tactual and kinesthethic. The method was phonology based.
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3.4.4.2. Visual orthographic method for Dysphonetic speller
(Visual group)

This method is evolved by avoiding phonic based instruction and emphasizing orthographic (visual) learning strategies (Recht et al., 1990). Self correction through modeling is an orthographic strategy. (Ganchow, 1983). Students with this problem read & spell primarily through visualization and have difficulty in phonic analysis.

(i) Researcher prepared three sets of each alphabet in sand paper of 1" size.
(ii) Researcher made flashcards of these words.
(iii) Researcher showed the word on flashcard and subject visually noted the pattern of spelling of that word for approximately 25 sec.
(iv) Researcher asked the subject to locate the alphabets which were required to make the word from a pile of alphabets.
(v) After locating, the subjects arranged alphabets to make the word shown in flash card.
(vi) The alphabets thus arranged were compared by the student with the word on flash card shown once again.
(vii) Subject was allowed to reattempt, when error existed, steps from (iii) to (vi) were repeated.
(viii) This process was repeated for all the words

Modalities used were visual and motor. The method was morphology based.

3.4.4.3 Listen, speak, read & write method (LSRW) for Mixed group.

(i) Researcher called a word and subject carefully listened to word.
(ii) Subject repeated the word, orally.
(iii) Researcher showed card bearing the word.
(iv) Subject read the word silently.
(v) Subject wrote the word spelling saying each letters of the word loudly.

(vi) The written word was compared with the card bearing the word.

(vii) When error existed steps from (ii) to (vii) were repeated.

Modalities used were auditory, visual, vocal and motor. The method utilized both morphological and phonological bases of spellings.

3.4.5. Post Test

Identifying spelling test was given at the end of treatment after a gap of one day. At this time, tailor made spelling test was also administrated again. The posttests were given to examine whether or not the remedial activities were beneficial in ameliorating the spelling problems among children.

3.4.6. Delayed Post Test (DPT$_1$)

Delayed posttest one after a gap of 3 weeks was given to subjects to test the retention/ stability of effects of treatment.

Both the tests individual and identifying were again used.

3.4.7 Delayed Post Test (DPT$_2$)

DPT$_2$ was given after 46 days of post test to check the long term effect (memory) of the treatment.

At this time, achievement scores of all 39 children in English were also collected to assess the changes in their performance and transfer effects of the remedial measures.

3.5 Statistical Techniques

In the present study, different statistical techniques were employed to analyze the data keeping in view the objectives and hypotheses.
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For item analysis, discrimination index and item difficulty were calculated for each item. For reliability and validity of the test, product moment method of correlation was used.

Descriptive statistics like mean, standard deviation, quartile deviation, skewness and kurtosis, percentiles; quartiles were computed for norms of the spelling test.

In order to study the effect of remedial techniques the analysis of variance was employed at various stages of the study: pretest, post test, delayed post tests for identifying tool of spelling.

Students t-test: t-test for independent and correlated means t-test was employed to test the hypotheses and to find out the significance of difference between means of different groups and different variables if ANOVA indicated significant variations. (Garrett, 1981)