CHAPTER 4
RESEARCH METHODOLOGY

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CHAPTER 4
RESEARCH METHODOLOGY

This chapter will bring forward the procedure adopted for this study. Dependent and the independent variables, information about the schools, hospitals and institutes used for data collection, details about the sample and the tools used, and data processing are elaborated.

4.1 Statement of the Research Problem

To find out the correlation of certain intellectual abilities with behavioral problems (ADD/ADHD), and emotional problems of children having Learning Difficulties namely LDL and LDN in three age groups.

4.2 Research Questions

Does there any significant relationship exist between three age groups of children of LDL and LDN with IQ, ADHD and emotional problems?

Are there any particular emotional or ADHD factors predominant in any of these three age groups of the children with LDL and LDN?

Can we use MISIC scores (IQ test) as a diagnostic tool for identifying the students with LD namely LDL and LDN?

4.3 Objectives of the Study

- To study the correlation between behavioral problems, that is, ADHD and ADD, and intellectual abilities of children having LDL and LDN, in three age groups.
- To study the correlation between emotional problems and intellectual abilities of children having LDL and LDN, in three age groups.
4.4 **Variables**

This study proposes to use Malin's Intelligence Scale for Indian Children (MISIC), Attention Deficit Hyperactivity Disorder (ADHD) scale by DuPaul (1991), and Emotional Rating Scale (ERS), with children already identified as having Learning Difficulties.

The independent variables are Learning Difficulty in Languages (LDL), and Learning Difficulty in Learning Numerical Concepts (LDN). The scores on ten sub tests and three kinds of IQ namely Verbal, Performance and Full Scale IQ of MISIC, ADHD ratings given by parents and teachers, and ERS score given by children are the dependent variables. Control Variable of the study is three age groups. Age group of the children with learning difficulties in languages and mathematics is from 6 years to 11 years. These children are divided into three age groups. Age group 1 consists of children between 6 to 7 yrs., age group 2 consists of children between 8 to 9 yrs. and age group 3 consists of children between 10 to 11 yrs. old.

4.5 **Operational Definitions of Variables**

There are following terms related to this study that require further explanation. They will be used throughout the remainder of the study as defined in this section. The operational definitions for the Independent variables are given below-

- **Learning Difficulties (LD)** - For the present study, LD is defined as a specific group of children who have problems in learning. These problems are school-related, in the areas of reading, writing, spelling and mathematics. These problems are not present as the result of visual, hearing or motor handicap, of mental retardation emotional disturbance or of environmental, cultural or economic disadvantage. These children are otherwise bright, fairly articulate in their verbal expression, but severe discrepancy between achievement in school subjects and their intellectual potential is present. In this study LD has been divided into two categories-
• **Learning Difficulty in Languages (LDL)** - In the present study the term Learning Difficulty in Languages (LDL) is described for the group of children who have reading and language difficulties. Child's reading achievement, when measured by individually standardized test of reading accuracy or comprehension, is significantly below than that expected of a child of the same age and intellectual capacity. This difficulty significantly interferes with academic achievement or activities of daily living that require reading and use of language in written manifestation.

• **Learning Difficulty in Numbers (LDN)** - In the present study, this term is used to describe a group of children who have difficulties in numbers, numerical operations and mathematics. The mathematical ability of a child, as measured by individually administered standardized tests, is substantially below than the expected level, given the child's chronological age, measured intelligence, and age appropriate education.

• **Behavioral Problems** – In the present study, behavioral problems were studied by the ADHD and ADD diagnostic criteria, given by *DSM-IV-TR* (2000). This will cover ADD and ADHD problems in detail. The other externalizing disorders like Conduct disorder is excluded from the present study.

### 4.6 Hypotheses

1) There is no significant positive correlation between ADHD and intellectual abilities of LDL in three age groups.

2) There is no significant positive correlation between ADHD and intellectual abilities of LDN in three age groups.

3) There is no significant positive correlation between emotional problems and intellectual abilities of LDL in three age groups.

4) There is no significant positive correlation between emotional problems and intellectual abilities of LDN in three age groups.

5) There is no significant difference between intellectual abilities of LDL and LDN in three age groups.
4.7 **Research Design**

This study utilized co-relational research design.

4.8 **Sample**

The sample for this study is 'purposive sample'. These children have been already identified as having Learning Difficulty in Languages (LDL) and Learning Difficulty in Numbers (LDN).

These LD children were identified as LDL and LDN, by professionals namely psychologists, psychiatrists, remedial teachers, counselors etc. working in the field of Clinical Psychology. These professionals identified LD with some standardized and non-standardized tools. They are:

1) Parent Perception Form (Appendix A)
2) Case History Sheet (Appendix B)
3) The child's previous school record or report card.
4) Language Evaluation (Appendix C)
5) Mathematics Evaluation (Appendix D)

The first step in data collection included distribution of permission letters to various institutes working with children diagnosed with LD, school principals, hospital management, and special educators (Appendix E).

For the present study 162 children with LD were listed down from various institutes, hospitals and schools in Maharashtra, India. From these 162 children, only 120 children diagnosed with difficulties in languages and mathematics and aged from 6 years to 11 years were considered for the study, to meet the desired age group criteria. The parents and teachers of selected children also participated in the study.
Remaining 42 children were not considered because of three reasons, (a) For 10 children diagnosis was improper, (b) For 26 children age-criteria did not match and there were multiple diagnosis issues and (c) For six children contact was not possible.

Percentage of Socio-economic status of the participants showed, 30% from upper middle class, 50% from middle class and 20% from lower class. Participants in the study were bilingual. Languages spoken were mainly Hindi or Marathi and English.

The sample included 72% boys and 28% girls who ranged in age from 6 years to 11 years. (M= 8.65; SD = 1.54). Refer table 4.1, 4.2 and 4.3 for the details of the sample.

Table 4.1: Percentage of Boys and Girls Participated in the Study (N=120)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>85</td>
<td>70.8%</td>
</tr>
<tr>
<td>Female</td>
<td>35</td>
<td>29.2%</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.2: Chronological Ages and Number of Children Participated in the Study according to the age-groups.

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Chronological Age</th>
<th>No. of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>*1</td>
<td>6 to 7 yrs.</td>
<td>40</td>
</tr>
<tr>
<td>*2</td>
<td>8 to 9 yrs.</td>
<td>40</td>
</tr>
<tr>
<td>*3</td>
<td>10 to 11 yrs.</td>
<td>40</td>
</tr>
</tbody>
</table>

*1 Age group comprising children between 5 yrs. 6 months to 7 yrs. 5 months.
*2 Age group comprising children between 7 yrs. 6 months to 9 yrs. 5 months.
*3 Age group comprising children between 9 yrs. 6 months to 11 yrs. 5 months.
Table 4.3: Percentage of Children attending Remedial Education and not attending Remedial Education (N=120)

<table>
<thead>
<tr>
<th>Attending Remedial Education</th>
<th>41%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not attending Remedial Education</td>
<td>59%</td>
</tr>
</tbody>
</table>

From the table 4.3, it is clear that remedial education was not possible for 59% of participants because of various reasons like unavailability of remediation in the schools, expensive sessions, and lack of awareness.

4.9 Tools

Tools are classified as Independent and Dependent variables.

**Tools for Independent Variables**

The professionals used different tools to identify LD. These tools are used in the special schools by remedial teachers, in hospitals and institutes by concerned psychologists and psychiatrists whereby the students are further classified as LDL and LDN. These consist of objective and non-standardized methods, differing in their degree of objectivity, like detailed case history, previous school records, parent's interview, individual files in the school that consist of scores on teacher-made tests, classroom observations, teacher's feedback and *DSM-IV-TR*, (2000) criterion.

1. **Parent's Perception Form** - At first the parents are required to fill a form with details about their child. This is mostly related to a parent's perception of child's performance in school, attitude towards school, homework, etc. (Appendix A)

2. **Case History Sheet** - The parents are interviewed in detail about the child's birth history, developmental history, family history, health and medical history and educational history. (Appendix B)
3. The child's previous school records or report cards are scrutinized and noted down in the child's individual file in the schools, institutes and hospitals by the teachers or psychologists.

4. **Language Evaluation** - The child is assessed on various aspects of language like expressive language, written as well as oral, handwriting etc. (Appendix C)

5. **Mathematics Evaluation** - The child is assessed on the level of basic mathematics like counting, shape discrimination, place value, simple additions, subtractions, multiplications etc. (Appendix D)

Other essential materials like a special stopwatch that can be stopped and restarted from the same point, instruction manual, pencils, erasers, etc. were used.

**Tools for Dependent Variables**

4.9.1 **Malin's Intelligence Scale for Indian Children (MISIC)**

Malin's Intelligence Scale for Indian Children (MISIC) is standardized by Malin, (1969) for Indian children. MISIC is an adaptation of Weschler's Intelligence Scale for Children (WISC). The age group for standardization was of children from 6 years to 15 years. This is an individual test. MISIC Record sheet is attached. (Appendix F).

The MISIC established test-retest reliability and yielded a Pearson's Product moment correlation for full scale IQ is 0.91. Indian adaptation has established concurrent as well as congruent validity. Concurrent validity was obtained from school ranking and found to be to 0.61, whereas congruent validity was obtained from adapted version of the California short form test of Mental Maturity for the upper age levels and from the Goodenough's Draw-a-man test for the lower age levels. Both yielded a coefficient of 0.63. The validity coefficients of correlation are satisfactory.

The MISIC consists of 11 sub-tests, divided into Six Verbal and five Performance tests. Any five sub tests from verbal and all sub tests from performance are essential for calculating the score of Full Scale IQ.
For the present study, vocabulary test from Verbal test was not considered in the Full scale IQ. All other tests are included in the study. The languages of instruction are English, Hindi, Gujarati and Marathi. Sub tests of MISIC and their description are presented in the table 4.4.

Table 4.4: Number of Test Items Presented in each sub test of the MISIC.

<table>
<thead>
<tr>
<th>Verbal Tests</th>
<th>No. of items</th>
<th>Performance Test</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information: Range of knowledge</td>
<td>30</td>
<td>Picture Completion: Attention to detail</td>
<td>20</td>
</tr>
<tr>
<td>Comprehension: Judgment</td>
<td>14</td>
<td>Block Design: Nonverbal reasoning</td>
<td>7</td>
</tr>
<tr>
<td>Arithmetic: Concentration</td>
<td>16</td>
<td>Object Assembly: Analysis of part-whole relations</td>
<td>4</td>
</tr>
<tr>
<td>Similarities: Abstract thinking</td>
<td>16</td>
<td>Coding : visual-motor functioning</td>
<td>A and B</td>
</tr>
<tr>
<td>Digit Span: Memory, anxiety</td>
<td>8</td>
<td>Mazes: Coordination, logical thinking</td>
<td>6</td>
</tr>
<tr>
<td>Vocabulary: Vocabulary level</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4 indicates the sub test, the abilities measured by the sub test and number of items presenting in each sub test.

This test can be completed in 1 ½ hours. The test provides three IQs – Verbal IQ, Performance IQ and Full Scale IQ.

Computation of test score includes few steps:

1) Having totaled the respective subtest raw scores, these can be easily converted into the Thet Quotients (TQs) by means of t table in the manual.

2) After the conversion of raw scores into TQs, add and find the average of each group (Verbal and Performance) separately.

3) Finally, to obtain the Full Scale IQ, add both the Verbal and Performance test totals and divide for the average.

4) If only the verbal group of TQs are obtained, they can be balanced for a Full Scale IQ by adding about 6% to supply for the missing performance scores.
4.9.2 The ADHD Rating Scale

The ADHD rating scale, (Appendix G), was developed by DuPaul (1991) for evaluating the occurrence of ADHD symptoms in children. The scale consists of 14 items directly adapted from the ADHD symptom list according to DSM-III-R criteria (American Psychiatric Association, 1987).

Parents and teachers have to select a response that best describes the target child and indicate the frequency of each symptom on a Likert Scale ranging from not at all (0) to very much (3), with higher scores indicative of greater ADHD-related behavior. The same scale has to be completed by parents and teachers separately.

The test has good reliability and validity and is sensitive to treatment effects. Because it has a small normative sample, it is suggested that it should be used as a screening or treatment outcome (DuPaul, 1991). Coefficient alpha were calculated to determine the internal consistency of the ADHD Rating Scale and its sub scales. For parent ratings, Cronbach's alpha coefficients were obtained as follows: ADHD total score, .94; inattention-hyperactivity, .93; and impulsivity-hyperactivity, .90. For teacher ratings, similar coefficients were obtained: ADHD total score, .96; inattention-hyperactivity, .95; and impulsivity-hyperactivity = .94. The coefficient values of parent ratings and of teacher ratings are similar.

Pearson Product-moment correlation coefficients for parent ratings were as follows: ADHD Total Score, .94; inattention-hyperactivity, .90. Similar levels of stability were found for teacher ratings: ADHD Total Score, .94; Inattention-hyperactivity, .95 and impulsivity-hyperactivity, .95.

Test scores can be calculated by following steps. They include –

**Number of Symptoms Present** - Simply add the number of items rated as 2 or higher. A score of 8 or more exceeds the DSM-III-R cutoff for a diagnosis of ADHD.

**Total Score** - Sum the Total number of points for all 14 items. If the score exceeds 1.5 SD above the mean for age and sex, it is clinically significant score.

**Factor I: Inattention-Hyperactivity** - Sum the items for this factor and compare the score to the table of norms for the child's age and sex. Again a score higher than 1.5 SD above the mean indicates clinically significant problem in the area of attention.
Factor II: Impulsive-Hyperactive - Sum the items for the factor and compare the score to the table of norms for the child's age and sex. Again a score, higher than 1.5 SD above the mean indicates a clinically significant problem in the area of impulsivity.

For this study, parent and teacher ADHD rating scores were added together to get the single composite score. Therefore, the cut off of 16 points and above, was considered for the presence of ADHD (Parents ratings of minimum 8 points + Teachers ratings of minimum 8 points= 16 points).

Table 4.5: Scoring Instructions for ADHD Rating Scale.

<table>
<thead>
<tr>
<th>Parent Rating</th>
<th>Teacher Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score: Sum the items 1 to 14.</td>
<td>Total Score: Sum the items 1 to 14.</td>
</tr>
<tr>
<td>Inattention-hyperactivity: Sum items nos. 1, 2, 3, 6, 7, 8, 12, 13, 14.</td>
<td>Inattention-hyperactivity: Sum item nos. 1, 2, 3, 6, 7, 8, 12, 13.</td>
</tr>
<tr>
<td>Impulsivity-hyperactivity: Sum item nos. 1, 2, 4, 5, 9, 11, 14</td>
<td>Impulsivity-hyperactivity: sum item nos. 1, 2, 4, 5, 9, 11, 14</td>
</tr>
</tbody>
</table>

4.9.3 Emotional Rating Scale (ERS)

The test was developed by the researcher to study the emotional problems of children having LD (Appendix H). Emotional Rating Scale (ERS) was developed to assess the emotions of children with Learning Difficulties (LD). This is an individual test. Test completion takes around 30 minutes. This scale consists of 14 statements. Scale was designed in very simple language; because the population for which it has been designed is of special children. This test is made available in two languages, namely English and Marathi.

Children have to read the test items carefully and then have to rate the most appropriate statement regarding how they feel. For children who have severe reading difficulties, researcher has to read the statements, without any emotional expressions on the face/ neutral facial expressions and tone. Child has to listen to it carefully and then has to select the appropriate statement. Test can be completed in ½ hour.
Before actual administration, the rapport has to be established. The room in which it is going to be administered should be with minimum distractions.

**Scoring and Interpretation**

This scale consists of 14 items. Each item has 3 options that is Never, Sometimes and Always feel. Likert scale was developed. In the scale each item ranges from 0 to 2.

Maximum Possible Score =28.

Scoring for Item No: 1,2,3,5,6,7,8,9,10,11 = (0,1,2) respectively.

Some item numbers of the scale are negatively scored. Negative items are included to check the monotony in responses. Reverse score item numbers are 4, 12, 13 and 14. Scores for these reverse item numbers are 2, 1, 0 respectively. Scoring for ERS interpretation is depicted in Table 4.6. As the scale was developed for children with special needs, it was designed in very simple language.

**Table 4.6: Interpretation of Emotional Rating Scale (ERS).**

<table>
<thead>
<tr>
<th>Total of Scores</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>Normal Emotions</td>
</tr>
<tr>
<td>5-9</td>
<td>Mild Emotional problems</td>
</tr>
<tr>
<td>10-14</td>
<td>Moderate Emotional problems</td>
</tr>
<tr>
<td>15-19</td>
<td>Severe Emotional problems</td>
</tr>
<tr>
<td>20 &amp; above</td>
<td>Profound Emotional problems</td>
</tr>
</tbody>
</table>

For test retest reliability study, data were obtained from 121 children with LD at 1 month interval. Cronbach's alpha reliability coefficients of initial test for ERS score were r .84, and for retest were 0.80.

Pearson product-moment correlation coefficient for ERS score was r 0.87, which is significant at the .01 level.
4.10 Data Collection Procedure

Standard Procedure of test administration was followed in collecting the data.

For data collection, contact was established with various institutes, schools and remedial teachers, psychologists and hospitals, psychiatrists for the names of children having LDL and LDN. Permission letters (Appendix E) were distributed to them.

Names, age and sex, type of LD list were made for the initial contact with children's parents.

Appointment date was given to the parents. Appointment diary was maintained for the visit of the children. Case history was taken from the parents. Each child, in the study was tested with the three measures namely, MISIC, ADHD scale for parents and for teachers, and ERS. Re-appointments were scheduled for the children who missed their appointment.

Data from parents were collected through personal visits. For teachers, the ADHD rating scale was circulated with the help of children. Teachers' contact was established in the schools and from the phone calls.

Administration of MISIC test took average around 1 and ½ hour approximately per participant. Instructions for each sub test were given according to the manual. Children enjoyed the performance sub tests of the test. Administrations of the tests were completed in institute’s testing room and hospital Child Guidance Center (CGC) testing room.

After the completion of MISIC, half an hour break was given to the children for relaxation. Then ERS was given to the children with its instructions. For younger children and the children with severe difficulties in reading, test items were read aloud by researcher and then responses were noted down. Scale items were read aloud by researcher, without any emotional expression on the face/ neutral facial expressions and tone. Children had to listen it carefully and then had to select the appropriate statement. Test was completed in thirty
minutes with the help of researcher. Otherwise participant took around 20 minutes to complete the ERS on their own.

ADHD rating scale was administered on 120 children's parents and teachers. Parents and teachers completed their ADHD rating scale in around 15 to 20 minutes. In some cases, teachers' ADHD rating scale was given to the child for their teacher. For majority of the cases the researcher personally administered ADHD rating scale on the child's teacher in school.

All three test measures were then computed according to their scoring procedure in the manual. Approximately scoring of three tests took around 40 to 45 minutes per child.

All the test result reports were given to the parents. Counseling was done on the remediation factor. Services, available sources related to remediation were provided to them.

**Difficulties Encountered:**

While administering MISIC (an intelligence test meant for normal children) to the special, exceptional child in the present study, some difficulties were encountered.

The time limit set for each test item in each sub test of performance scale had to be relaxed, that is, more time had to be given to do the given task.

Instructions had to be repeated frequently, even in-between the test items and when the test was in progress.

In the test of Digit Span, some children were unable to work as per the instructions.

In a nutshell, procedure incorporated in data collection includes, rapport building, administration of the tests and individual guidance for the parents. Data was further analyzed for the descriptive and inferential statistics.
**4.11 Data Analysis**

The main objective of analysis is to see the significant correlation of intellectual abilities, behavioral problems and emotional problems of LDL and LDN in three age groups.

Responses by 120 children with LD for MISIC and ERS and responses on ADHD rating scale were noted down from the children's parents and teachers independently. All these responses were entered in the Excel data sheet. The analysis was performed by using SPSS version 16.0 for windows. Administration of MISIC, ADHD rating scale and ERS was done for each child and their parents and teacher. Data was further analyzed for MISIC, ADHD Rating Scale and ERS.

**Analysis of MISIC**

Analysis of MISIC for each child was computed for 13 sub tests. All the scores of the sub tests and IQs were recorded and entered in the MISIC data sheet. From MISIC score, Full scale Intelligence Quotient (FSIQ), Verbal Intelligence Quotient (VIQ) and Performance Intelligence Quotient (PIQ) was gained for 120 students. The Verbal scale sub tests scores of Information, Comprehension, Arithmetic and Digit Span were calculated for VIQ. The performance scale sub tests scores of Picture Completion, Block Design, Object Assembly, Coding and Mazes were considered for PIQ. For each sub test, score were recorded for each child independently.

This data was further analyzed for descriptive statistics, to calculate the Means, Standard Deviations (SD) and Medians. Two Way ANOVA was calculated to see the significant difference and interaction effect between the variables, namely type of LD and Age groups with intellectual abilities on MISIC. To find out the significance level of differences in intellectual abilities of LDL and of LDN along age, t test was implemented.
Analysis of ADHD-
ADHD scale was administered on 120 children's parents and teachers separately. Thus, Parent ratings of ADHD and teacher ratings of ADHD were scored according to manual. For the scale analysis, parent and teacher ratings were added together, to get the composite score of ADHD. From the scale, Factor I, that is Inattention-Hyperactivity, commonly known as ADD and Factor II, Impulsivity-Hyperactivity, commonly known as ADHD were computed. Thus, these factors were calculated separately for parent ratings and teacher ratings. Descriptive statistics is calculated for each ADHD factor given by parents and teachers of 120 children.

This analyzed rating scale means scores were further correlated with mean FSIQ of LD. Pearson Product Moment Correlation was calculated between Intellectual abilities and ADHD scale factors given by parents and teachers along age.

Analysis of ERS-
ERS test was administered on each child, and ERS scale score was calculated. This score was entered in the data sheet along with the ratings of ADHD and MISIC of each child. Descriptive statistics ERS was calculated. ERS score was further correlated with FSIQ and ERS. Pearson Product Moment Correlation was calculated between Intellectual abilities and ERS along age.