CHAPTER III
THE PRESENT STUDY

3.0 Introduction

The present study has been specifically intended to study the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in Mathematics. The relative contribution of research variables such as (Home Life Experience, Intelligence Quotient (IQ), Mathematics Attitude and Behaviour Problems), personal variables such as (Sex, Community, Father's Education, Father's Occupation and Family Type) and school related variables such as (Management of the School and Board of Affiliation) towards Performance in Mathematics of Learning Disabled and Academically Backward pupils are also investigated in this study.

3.1 Statement of the Problem

The problem is stated as "A Study of the Performance in Mathematics of Learning Disabled and Academically Backward Pupils".

3.2 Operational Definitions of the Key Terms

Performance in Mathematics refers to how the pupils carry out Mathematical tasks.

Learning Disabled pupil is the one who has average or above average intelligence, but there is a marked difference in intelligence and actual achievement in terms of reading, writing, spelling and arithmetic.
Academically Backward pupil is the one who compared with other children of his own age does very poorly in his/her school work

3.3 Need and Significance of the Study

Universalisation of Primary Education has been a partially fulfilled target till date in India. Education has not been able to meet educational needs of several sections of school going population. One such section relates to the children facing various learning problems in the classrooms. If these children are not provided with special help and treatment, they may tend to be the dropouts or the delinquents. Learning problems in primary school children need immediate attention. Identifying children with learning problems leading to under achievement in regular schools and efforts towards making educational provision for them are important.

In a class, at least 20% to 30% of the children get poor marks. Some of these children have emotional problems due to socio-economic conditions, cultural deprivation and environmental disadvantages and some have physical or neurological handicaps. Some children have average or above average intelligence, but they have problems in the areas of reading, writing, spelling and mathematics. These children are referred to as Learning Disabled children.

No substantial/significant research has been done in this area of Learning Disability in India. No database or local specific incidence is available about the children with Learning Disability. A deeper or more
Incisive study and research in great depth is required in this area. Children with Learning Disabilities are neglected and ignored in the school system partly because teachers lack the skills to handle these children and partly because by the time nature of their problem is diagnosed, it becomes too late. The majority of these disabilities can be corrected by using structured remedial principles in a programme that understands the child's needs.

The definition and criteria for determining what constitutes a Learning Disability has been a controversial issue for decades. It is a critical issue for education because students who are Learning Disabled need to be identified in order to receive appropriate special education services. It is of vital importance to the Indian educationists to concentrate on ways and means of identifying, controlling and preventing Learning Disabilities in children. Hence, the investigator selected Learning Disability as one of the areas for the present investigation.

There are many children who have problems in learning. But not all of them are Learning Disabled. The children who get poor marks in school subjects are called Academically Backward. The annual promotions in our schools are decided on the basis of the marks obtained by the pupils in the examinations. In most subjects, 20% to 30% of the pupils fail to get the minimum required for a pass. In a sound system of education, so much failures in examinations should not happen. This is both a waste of national wealth as well as of human resources.
Despite this high prevalence of Academic Backwardness, the problem is under-recognized. Teachers or parents are ill-equipped to understand the issue. Hence, we are left with a significant group of children who have problems with their studies but do not get help for this. The frustration on the part of the child due to failure compels the child to avoid school and finally he/she is dropped out of the school and becomes a defeated, unworthy individual.

Academic Backwardness in primary school children need immediate attention to achieve the goals of Universalisation of Primary Education and to make full use of human resources. The first step to be taken is to create an awareness of this problem among the teachers and parents. Hence, the investigator has selected Academic Backwardness also as one of the areas for the present study.

In this era of science and technology, a strong base of mathematics education for all is considered an absolute necessity. A sound knowledge of basic mathematics is therefore necessary to thrive in the competitive world and carry out even the daily routine. Research in the analysis and remediation of problems related to mathematics has been rather neglected. But large numbers of school children continue to experience failure in this subject. The effects of mathematics failure throughout years of schooling coupled with illiteracy in adult life, can seriously handicap both daily living and vocational prospects. Many children with learning problems in mathematics would be capable of demonstrating proficiency in mathematics if these disabilities/difficulties are
alleviated. Hence the first step to be taken is the identification of the problems faced by Learning Disabled and Academically Backward in mathematics class. The knowledge about this may act as a basic information for developing an appropriate educational programme for the Learning Disabled and Academically Backward pupils in the field of mathematics. Also the investigator being a student of mathematics is interested in this area. Hence Performance in Mathematics was taken as the main variable in this study.

The present study has been designed primarily to explore the extent of different types of mathematical disabilities/difficulties among Learning Disabled and Academically Backward pupils in primary classes. Many researchers have concluded that some of the research variables such as (Home Life Experience, Intelligence Quotient (IQ), Mathematics Attitude, and Behaviour Problems) personal variables such as (Sex, Community, Father’s Education, Father’s Occupation and Family Type) and school related variables such as (Management of the School and Board of Affiliation) have contributed to Performance in Mathematics. Hence the above said variables were also studied with a view to finding out the varying contribution of these variables between Learning Disabled and Academically Backward pupils towards Performance in Mathematics.

Home Life Experience

In economically deprived homes, the child may not be exposed to adequate sensory, linguistic and cognitive activities. Also an emotionally
unstable home life may deprive the child of any motivation to learn. Broken homes or fighting parents, unhygienic conditions, poverty, lack of facilities lead to poor academic performance. Hence to find out Home Life Experience of Learning Disabled and Academically Backward pupils, Home Life Experience was studied as one of the variables in this study.

Intelligence Quotient (IQ)

In the diagnosis of Learning Disabilities, intellectual abilities of the child must be evaluated to ensure that cognitive factors are not the reason for learning problems. But in the case of Academic Backwardness, poor intelligence, may be one of the causes. Hence Intelligence Quotient was studied as a variable to measure the IQ of Learning Disabled and Academically Backward pupils.

Mathematics Attitude

How the children react to mathematics is very important. Because of their repeated failure in this subject may lead to negative attitude towards mathematics that further leads to no motivation to learn this subject. Hence the investigator included Mathematics Attitude as one of the variables in the present study.

Behaviour Problems

It has been established time and again that the Learning Disabled children have Behaviour Problems which differentiate them from other
children. Hence in the present study Behaviour Problems as a variable is included to investigate the degree of presence of these Behaviour Problems in Learning Disabled and Academically Backward pupils.

For many years, educators have generally accepted the findings of a number of research studies which have demonstrated differences between boys and girls in various academic achievements especially in mathematics. The variable Sex was chosen in order to study if there is any sex differences exists in the performance of Learning Disabled and Academically Backward pupils. Therefore knowledge of sex difference if any, will enable teachers to organise varied educational programmes to suit the needs and abilities of both the sexes.

Community system in India has a very long history. The hierarchical stratification of society had by ages made a sort of encrustation on each communal group. This compartmentalisation together with an unequal distribution of privileges gradually leads to disparity in opportunities for the members of the different communities, consequently some of the communities became socially backward. Communal backwardness is often associated with economic backwardness and other unsatisfactory conditions like poor housing conditions, under nourishment etc. Hence Community is also included as a variable in the present study to study its effect on Academic Performance of Learning Disabled and Academically Backward pupils in Mathematics.
Parents play an indispensable role in the learning process and performance of children. Impact of parental literacy and qualification on learning have been confirmed by many studies. Pupils whose parents were educated are exposed to adequate learning materials in terms of books and better schooling etc. The parents give utmost importance to education of their children and help the children at home. Also those belonging to nuclear family get more care at home. It has a positive influence in the academic aspirations and achievement of their children.

On the other hand, the pupils whose parents were illiterates and those belonging to joint family (more number of people in the family) may be deprived of adequate motivation from their parents. These families are exposed to an impoverished environment deprived of learning facilities. Lacking both in facilities and motivation, these children manifest more learning problems. Hence in the present study Father’s Education, Father’s Occupation, Family Type were taken as personal variables in order to study their influence on the Performance in Mathematics of Learning Disabled and Academically Backward pupils.

In India, schooling is done in different types of Management of Schools such as Government, Corporation, Private Aided, and Private Unaided and different Boards of Affiliation like State Board and Matriculation Board following different curricula and providing different learning climate. The infrastructure provided in Government, Corporation, and Private Aided Schools
are minimal compared to those in Private Unaided Schools. Hence it is logical to assume that there may be differences in the performance of Learning Disabled and Academically Backward pupils in mathematics. Hence Management of the School and Board of Affiliation were taken as variables for the present study.

Any problem diagnosed at the earlier stage is simpler to solve. A learning problem is usually diagnosed when a child enters the primary school. As it is not possible to assess disabilities/difficulties before the child acquires the skills, the assessment is required only after the age of 7 to 8 years. Therefore standard V pupils were selected for the study.

Keeping in view of all these matters, the present study is an effort which attempts to find out the different types of mathematical disabilities/difficulties among Learning Disabled pupils and Academically Backward pupils.

3.4 Variables Under Study

3.4.1 Personal Variables

1. **Sex** refers to Boys and Girls of standard V
2. **Community** refers to social class of the pupils such as Backward, Most Backward or Scheduled (Caste & Tribe) Communities
3. **Father's Education** refers to the level of Education of Father such as Elementary, Secondary, Higher Secondary or Graduation
4. **Father's Occupation** refers to the Occupational Type of Father such as Coolie, Employed or Self-employed.
5. **Family Type** refers to Nuclear Family (consists of maximum of 4 persons) and Joint Family (consists of more than 4 persons)
3.4.2 School Related Variables

1. **Management of the School** refers to governing body which includes Government, Corporation, Private Aided and Private Unaided School.

2. **Board of Affiliation** refers to the schools which follow curriculum/syllabi prescribed by different boards namely Matriculation or State.

3.4.3 Research Variables

1. **Performance in Mathematics** refers to how the pupils doing the given task in Mathematics. The task here refers to the problems in Mathematics that are to be solved by the pupils covering the ten areas identified earlier.

2. **Home Life Experience** refers to how the pupils feel about their life in the Home. That is the relationship with members of the family and treatment met with.

3. **Intelligence Quotient (IQ)** refers to the measure of the level of intelligence of pupils.

4. **Mathematics Attitude** refers to the feeling of likes (favourable) and dislikes (unfavourable) towards Mathematics.

3.5 **Objectives of the Study**

1. To study the Performance in Mathematics of Learning Disabled pupils.

2. To study the Home Life Experience of Learning Disabled pupils.

3. To measure the Intelligence Quotient (IQ) of Learning Disabled pupils.

4. To study the Mathematics Attitude of Learning Disabled pupils.

5. To study the Behaviour Problems of Learning Disabled pupils.

6. To study whether the Learning Disabled pupils belonging to different groups based on Sex, Community, Father’s Education, Father’s Occupation and Family Type differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

7. To study whether the Learning Disabled pupils studying in different schools based on Management and Board of Affiliation differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

8. To study the Performance in Mathematics of Academically Backward pupils.
9. To study the Home Life Experience of Academically Backward pupils.

10. To measure the Intelligence Quotient (IQ) of Academically Backward pupils.

11. To study the Mathematics Attitude of Academically Backward pupils.

12. To study the Behaviour Problems of Academically Backward pupils.

13. To study whether the Academically Backward pupils belonging to different groups based on Sex, Community, Father’s Education, Father’s Occupation and Family Type differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

14. To study whether the Academically Backward pupils studying in different schools based on Management and Board of Affiliation differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems
15. To study whether the Learning Disabled pupils and the Academically Backward pupils differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

16. To study the relative contributions of the personal variables (Sex, Community, Father’s Education, Father’s Occupation and Family Type) school related variables (Management and Board of Affiliation) and the research variables (Home Life Experience, IQ, Mathematics Attitude and Behaviour Problems) towards the Performance in Mathematics of Learning Disabled pupils

17 To derive the Regression of Performance in Mathematics of Learning Disabled pupils on the variables in the form of equations (Raw score form and standard score form)

18. To study the relative contributions of the personal variables (Sex, Community, Father’s Education, Father’s Occupation and Family Type) school related variables (Management and Board of Affiliation) and the research variables (Home Life Experience, IQ, Mathematics Attitude and Behaviour Problems) towards the Performance in Mathematics of Academically Backward pupils
19. To derive the Regression of Performance in Mathematics of Academically Backward pupils on the variables in the form of equations (Raw score form and standard score form)

20. To identify the significant discriminating variables of Learning Disabled pupils and Academically Backward pupils

21. To formulate the discriminant equations for the two groups, Learning Disabled pupils and Academically Backward pupils

22. To diagnose the types of errors committed by the Learning Disabled pupils and the Academically Backward pupils in Mathematics.

3.6 Hypotheses of the Study

1. Learning Disabled Boys and Girls differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

2. Learning Disabled pupils belonging to different Communities differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems
3. **The Learning Disabled pupils whose Fathers have different levels of Education differ significantly in their**
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

4. **The Learning Disabled pupils whose Fathers hold different types of Occupation differ significantly in their**
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

5. **The Learning Disabled pupils belonging to Nuclear and Joint Family differ significantly in their**
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

6. **The Learning Disabled pupils studying in different Management of Schools differ significantly in their**
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems
7. The Learning Disabled pupils studying in different Boards of Affiliation differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

8. Academically Backward Boys and Girls differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

9. Academically Backward pupils belonging to different Communities differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

10. Academically Backward pupils whose Fathers have different levels of Education differ significantly in their
    a. Performance in Mathematics
    b. Home Life Experience
    c. IQ
    d. Mathematics Attitude
    e. Behaviour Problems
11. Academically Backward pupils whose Fathers hold different types of Occupation differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

12. Academically Backward pupils belonging to Nuclear and Joint Family differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

13. Academically Backward pupils studying in different Management of Schools differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

14. Academically Backward pupils studying in different Boards of Affiliation differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems
15. Learning Disabled pupils and Academically Backward pupils differ significantly in their
   a. Performance in Mathematics
   b. Home Life Experience
   c. IQ
   d. Mathematics Attitude
   e. Behaviour Problems

3.7 Method of Study

As the study intends to collect data pertaining to the study of Performance in Mathematics of Learning Disabled and Academically Backward, Normative Survey Method is employed to describe and interpret what exists at present. Normative/Descriptive research describes what is, describing, recording, analysing and interpreting conditions that exist. It involves some type of comparison or contrast and attempts to discover relationships between existing non-manipulated variables. The Normative study to educational problems is one of the most commonly used approaches.

3.8 Tools Used

The following tools were used for the study:

1. Personal Data Sheet developed by the Investigator and the Guide.
2. Mathematics Performance Test developed by the Investigator and the Guide.
3. Home Life Experience Questionnaire (Hemalatha and Kumaran, 2000).
4. Intelligence Test—Cattell’s culture fair (scale 2, form A) (Cattell, 1973)

5. Mathematics Attitude Questionnaire developed by the Investigator and the Guide

6. Scale for Screening the Learning Disabled developed by the Investigator and the Guide

A detailed description of the tools used for the study follows

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3.8.1 Personal Data Sheet

This sheet was designed to collect data about the personal details of the pupil like 1) Name 2) Sex 3) Age 4) Class 5) Community 6) Name of the School and Place 7) Father’s Education 8) Father’s Occupation 9) Family Type. The personal data sheet was translated into Tamil also.

3.8.2 Mathematics Performance Test

Mathematics Performance Test is a test to diagnose the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in Mathematics. Since there were no tools readily available to diagnose mathematical disabilities/difficulties in primary classes in the Indian context, the Mathematics Performance Test was developed and validated by the present investigator and the guide.

Planning

With the intention of diagnosing the disabilities/difficulties faced by the students in doing mathematical problems at the primary school level, the investigator carefully scrutinized the syllabus followed in State and Matriculation Schools up to fourth standard. The areas which are common to the syllabi followed in state and matriculation schools were selected for constructing the test. The test items represented problems related to Arithmetic and Geometry. All the test items were constructed in the form of objective type.
In order to realise the objective of analysing the problems faced by Learning Disabled and Academically Backward pupils, the areas in Mathematics have been identified by referring to the researches conducted in India and abroad. Thus the ten areas were identified in mathematics namely Number Recognition, Basic Number Facts, Sequencing, Left-Right Recognition, Mathematical Terms, Mathematical Symbols, Computation, Word Problems, Visual Perception, Measurement, Money & Time.

The test was subjected to pilot study with the sample drawn from normal population and the items were selected for the final study taking into consideration the two criteria namely Facility Index (FI) and Discrimination Index (DI).

The details of each area of the Test are as follows

1. **Number Recognition**

   Some pupils have the difficulty in recognizing the numerals and the number names. This test is intended to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in recalling number names when corresponding numerals are given and vice versa.

2. **Basic Number Facts**

   Many pupils have persistent trouble in memorizing Basic Number Facts in all four operations. This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in using Basic Number Facts.
3. **Sequencing**

Pupils have trouble in learning number series. They sequence the numbers without knowing how they are related. This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in counting forward, backward and skip counting.

4. **Left-Right Recognition**

Some pupils have left-right confusion or directionality problems. They have the problem of reversing left and right direction when they read any object or number. This test is to identify directionality problems of Learning Disabled and Academically Backward pupils.

5. **Mathematical Terms**

Pupils display weakness in mastering the vocabulary of number and quantitative concepts such as before, after, less than, greater than etc. These terms often cause confusion. This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in understanding Mathematical Terms.

6. **Mathematical Symbols**

This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in understanding and differentiating Mathematical Symbols such as +, -, x, ÷, >, <, =.
7. **Computation**

Some pupils are inconsistent in doing Mathematical Problems. They do not pay attention to the operational signs, borrowing or carrying appropriately and sequencing the steps in complex operations. This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in performing addition, subtraction, multiplication and division.

8. **Word Problems**

Many pupils have the difficulty in comprehending mathematical ideas and making calculations. This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in choosing the principles for solving problems in arithmetic reasoning.

9. **Visual Perception**

Some pupils have coordination problem in visual organization, which may result in weak or poor understanding of concepts, number sense, pictorial representations, relative position on a number line, similarities and differences in given figures. This test is to identify perceptual disabilities/difficulties faced by Learning Disabled and Academically Backward pupils.

10. **Measurement, Money & Time**

These three areas are important for functional living and many pupils find it difficult to handle concepts of Measurement, Money & Time. In primary
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classes, they have confusion in understanding the principles of measurement and different measuring units. Similarly in money, they may get anxiety when asked to deal with coins and rupees in smaller denominations. Peterson (1973) suggests that poor sequence of time and the complexity of the clock's number system contribute to poor-time telling skills. Pupils may find it difficult to tell time because they cannot discriminate between numbers (6 and 9, 3 and 9 etc) or because of simple counting difficulty. The terminology used in telling time is also equally confusing. This test is to identify the disabilities/difficulties faced by Learning Disabled and Academically Backward pupils in understanding the principles of Measurement, Money & Time.

Construction of Test Items

The Draft Test was prepared consisting of 150 items divided into 15 items under each of ten areas of Mathematics. The English version of the question paper was translated into Tamil inorder to administer the test to Tamil medium pupils also. The items were selected in such a way to give equitable distributions to the objectives of learning Mathematics that is Knowledge, Understanding, Application and Skill.

Thus 30% items were constructed to test the objective of Knowledge, 50% to test Understanding 15% to test Application and 5% to test the Skill. The distribution of questions under different objectives are given in the blue print shown in Table (3.2)
Table 3.2

Blue Print – Draft Test

<table>
<thead>
<tr>
<th>Units</th>
<th>Objectives</th>
<th>K</th>
<th>U</th>
<th>A</th>
<th>S</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td>5</td>
<td>8</td>
<td>2</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>V</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>VI</td>
<td></td>
<td>7</td>
<td>8</td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>VII</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>VIII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>IX</td>
<td></td>
<td>3</td>
<td>9</td>
<td></td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>X</td>
<td></td>
<td>5</td>
<td>6</td>
<td></td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>45</td>
<td>75</td>
<td>23</td>
<td>7</td>
<td>150</td>
</tr>
</tbody>
</table>

(30%) (50%) (15%) (5%) (100%)

From the Blue print shown in Table (3.2), it may be clear that the number of questions under Knowledge, Understanding, Application and Skill are 45, 75, 23 and 7 respectively, which are distributed among ten areas of mathematics stated elsewhere.

Pilot Study

In the first step, to find out the difficulty or ambiguity if any, in the wording of the draft test consisting of 150 items and to fix the time limit required for the draft test, it was administered to a small group of 20 pupils in standard V comprising of 10 boys and 10 girls. After this, some items were modified as per the suggestions of the majority of the group and the time limit of the draft test was fixed as two hours as it was the average taken by the pupils to answer the test.
In the second step, the draft test consisting of 150 items was administered to a sample of 324 pupils studying in standard V. These pupils have been selected from the Government, Corporation and Private Aided Schools which follow state board syllabus and Matriculation Schools which follow Matriculation Board Syllabus. The distribution of sample is given in Table (3.3).

**Table 3.3**

**Distribution of Sample for Pilot Study**

<table>
<thead>
<tr>
<th>Type of Schools</th>
<th>Number of Schools</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>1</td>
<td>-</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Corporation</td>
<td>3</td>
<td>41</td>
<td>49</td>
<td>90</td>
</tr>
<tr>
<td>Private Aided</td>
<td>2</td>
<td>45</td>
<td>40</td>
<td>85</td>
</tr>
<tr>
<td>Matriculation</td>
<td>3</td>
<td>68</td>
<td>35</td>
<td>103</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>154</td>
<td>170</td>
<td>324</td>
</tr>
</tbody>
</table>

Proper instructions were given before starting the test. Also it was mentioned that answers should be marked in the question paper itself. Since all the test items were of objective type, one score was assigned to every correct answer and zero to the incorrect response.
**Item Analysis**

The procedure used to judge the quality of an item is called item analysis. The primary purpose of the item analysis is to improve the quality of the test for future administration.

The two important characteristics desired for a test item are its Facility Index (FI) and Discrimination Index (DI). Facility Index (FI) gives an indication of the easy or difficulty of an item and is simply expressed as the proportion of the number of candidates who selected the correct response of the item to the number of candidates taken the test. The formula for facility index is given by

\[
FI = \frac{R}{N}
\]

Where
- \( R \) = Number of pupils who answered the item correctly
- \( N \) = Total number of pupils who tried the item

Values of FI ranged from 0.00 (extremely difficult) to 1.00 (extremely easy). Since the objective of the present test is to diagnose the disabilities/difficulties faced by pupils, it was decided to select the items which had facility index ranging from 0.35 to 0.70.

The Discrimination Index (DI) of an item indicates the effectiveness of the item in distinguishing between the better and poor performing pupils. An estimate of an item discrimination index may be obtained by using the formula

\[
\text{Discrimination Index (DI)} = \frac{R_{11} - R_{1}}{\text{No. of pupils in a group}}
\]
Where

\[ R_U = \text{Number of correct responses from the upper group} \]
\[ R_L = \text{Number of correct responses from the lower group} \]

The items having zero or negative discrimination indexes must be discarded. In general, the higher the discrimination index, the better the item would be. In the present study, it was decided to select the items which had discrimination index ranging from 0.35 to 0.70.

For the purpose of finding out facility index and discrimination index, the two groups were formed namely upper and lower groups. The procedure suggested by Ebel (1966) was adopted for this purpose. 27% criteria was used for finding the upper and lower groups. Based on the total scores in the test, the papers were arranged in the descending order of the scores. Then top 27% and bottom 27% were selected for the analysis which formed upper and lower group respectively. Item analysis was done for English and Tamil version separately. In both Tamil and English version tests, the items which are of FI and DI ranging from 0.35-0.70 were selected. Thus 70 items in English and 70 items in Tamil version were selected. Taking into account the items selected under English and Tamil version, they were not one and the same. Hence the investigator decided to select those items which are common to both English and Tamil versions for the final test. Thus 50 items were selected for the final test. Blue print for the final test was prepared and the same is given in Table (3.4).
From the blue print shown in Table 3.4 it may be clear that number of questions under Knowledge, Understanding, Application and Skill are 9 (18%), 31 (62%), 8 (16%) and 2 (4%) respectively.

### Reliability and Validity of Mathematics Performance Test

The reliability of the Mathematics Performance Test has been established by calculating the Cronbach Alpha \( r=0.93 \) and the intrinsic validity was established by taking the square root of reliability coefficient i.e. \( \sqrt{r} = \sqrt{0.93} = 0.96 \). Thus from the two coefficients, it may be inferred that this test is highly reliable and valid.

### Administration

The investigator went personally to all the schools and administered the test. Proper instructions were given before starting the test. Duration for completing the test was approximately 2 hours.
Scoring

A score of 1 was given to each right answer and 0 to wrong answer. The total score may range from 0 to 50.

3.8.3 Home Life Experience Questionnaire

Home Life Experience Questionnaire was developed by Hemalatha and Kumaran (2000). It consisted of 40 items with ‘yes’ or ‘No’ alternative responses. It was administered to the pupils to measure the following four factors of Home Life Experience

1. Educational Encouragement
2. Family Climate
3. Peer Group Participation
4. Extra Curricular Activities

There were 9, 11, 11, 9 items under each factor respectively. This test was translated into Tamil also.

Reliability

The authors established the reliability of the test by calculating Cronbach Alpha which was 0.85. In the present study, the investigator revalidated the tool by calculating the reliability coefficient and it was found to be 0.87.

Validity

The validity of the tool was calculated using the square root of reliability coefficient which is otherwise called intrinsic validity. Thus the authors have
established the validity coefficient of the test as 0.92. Similar calculation done in the present study revealed the intrinsic validity as 0.93.

From the above coefficients, it may be inferred that the test is highly reliable and valid.

Administration

Instruction for responding the Home Life Experience Questionnaire was personally explained by the investigator herself. The pupils were asked to respond in the given questionnaire itself. Duration for completing the scale was 15 minutes.

Scoring

Since all the items were of positive in nature '1' was given for the response 'Yes' and '0' for 'No'. The total score of the pupil was taken as the measure of his or her Home Life Experience. The maximum possible score will be 40.

3.8.4 Intelligence Test - Cattell’s Culture Fair (Scale 2, Form A)

The culture fair intelligence tests measure individual intelligence in a manner designed to reduce as much as possible, the influence of verbal fluency, cultural climate and educational level. The tests which may be administered individually or in a group, are non verbal and require only that examinees be able to perceive relationships in shapes and figures. This test is likely to give an estimate of general mental ability comparatively free of cultural influences as
Cattell contends that what is called fluid general ability factor shows itself particularly in the culture fair tests (Cattell, 1973)

In the present study, the investigator selected Scale 2, Form A to test the intelligence of the pupils. It can appropriately be used with children of 8 years and equally appropriately with older children up to 14 years. It consists of 4 subtests. They are 1) Series 2) Classifications 3) Matrices 4) Conditions (topology).

The number of items and time allotted for each subtest are given in Table 3.5

<table>
<thead>
<tr>
<th>Subtests</th>
<th>Number of Items</th>
<th>Time Allotted (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Series</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>2. Classification</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>3 Matrices</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>4 Conditions</td>
<td>8</td>
<td>2 1/2</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>12 1/2 minutes</td>
</tr>
</tbody>
</table>

Reliability

Consistency over items, parts and time were estimated by the author as 0.76, 0.67 and 0.73 respectively. The researcher established the reliability of the test by test retest method with an interval of three weeks. The reliability coefficient thus obtained for the test was 0.82 for N=30

Validity

Concept validity and concrete validity were estimated by the author as 0.81 and 0.70 respectively. The researcher established the intrinsic validity of
the test as 0.91 by calculating the square root of reliability. Thus the coefficients of reliability and validity determined by the author and the researcher were found to be fairly high.

**Administration**

Proper instructions were given before starting the test. Examples were explained in a detailed manner. Time limit was also specified. Pupils were asked to mark their responses in the question paper itself.

**Scoring**

After obtaining the raw scores, these were converted to an interpretable standard score with the help of the table provided to carry out the transformation.

**3.8.5 Mathematics Attitude Questionnaire**

In order to measure pupil's attitude towards Mathematics, the investigator and the guide developed a suitable questionnaire. The questionnaire had 25 items dealing with positive and negative attitude towards Mathematics. There were 16 positive statements (S Nos 1 to 16) and 9 negative statements (S.Nos 17 to 25) in the questionnaire. There were no right or wrong answers. The answers to all the questions were to be given as Yes or No. This tool was translated into Tamil also.
Reliability

Reliability coefficient (Cronbach Alpha) was calculated to be 0.97.

Validity

Intrinsic validity coefficient was calculated to be 0.98.

Thus the reliability and validity coefficients show that Mathematics Attitude questionnaire was highly reliable and valid.

Administration

Proper instructions were given in the beginning. The pupils were asked to respond in the given questionnaire itself. Duration for completing the scale was 10 minutes.

Scoring

For the positive statements, ‘Yes’ response was awarded 1 point and every ‘No’ response was awarded 0 point. For the negative statements, the scoring procedure was reversed. The total score of the pupils was taken as the measure of his/her Mathematics Attitude.

3.8.6 Scale for Screening the Learning Disabled

A thorough examination of the literature on identification of Learning Disabilities revealed that a systematic procedure adopted by Hamada and Tamikawa (1986) to develop a rating scale for Screening the Learning Disabilities (Windward Rating Scale) yielded very good results in identifying...
the children for specific Learning Disabilities. With a view to develop a similar scale for screening the disabilities in Indian children, the investigator and the guide developed a ‘Scale for Screening the Learning Disabled’ (Details regarding the development and validation of the scale are given in Appendix)

This scale consists of 75 behaviour problems/statements and to be filled in by the respective teachers. These statements are keyed to identify the following four factors of behaviour problems such as 1) Problems in Academic Performance, 2) Psychosocial Problems, 3) Anxiety and 4) Problems in Perceptual & Motor Performance. The number of statements grouped under four factors were 41 (S. Nos 1 to 28, 30 to 32, 34 to 37, 39, 43, 65, 66, 68, 69), 22 (S. Nos 45 to 60, 70 to 75), 7 (S. Nos 29, 33, 61 to 64, 67), and 5 (S. No 38, 40 to 42, 44) in order.

The items are to be rated against four points Always, Often, Sometimes and Never reflecting the severity of the problem in the particular child. This scale was translated into Tamil also.

Reliability

The split-half reliability coefficient was calculated to be 0.85

Validity

The intrinsic validity coefficient was calculated as 0.92. From the two coefficients, it may be inferred that the rating scale is reliable and valid.
Administration

The scale was given to the respective class teachers with the name of each child who has learning problems in the classroom and were requested to mark the degree which most appropriately describes the behaviour of each child. The responses of the teachers were collected and scored.

Scoring

A score of 4 points was given to a response of ‘Always’, 3 points to ‘Often’, 2 points to ‘Sometimes’ and 1 point to ‘Never’. The maximum score possible was 300 and the minimum was 75. A score of 135 and above was taken as the indication of the existence of Learning Disability.

3.9 Sample

For the purpose of the present study, 50 schools have been selected from Chennai City by giving due representation to the Management (3 were managed by Government, 21 Corporation, 10 Private Aided, 16 Private Unaided) and Board of Affiliation (34 followed State Board and 16 followed Matriculation) of the school. In this study, 682 pupils of Standard V from 50 schools who had learning problems as per school records and observation report of the concerned teachers were taken as the sample. Out of the wider sample of 682 pupils, the Learning Disabled pupils were identified by taking into consideration the two criteria.

1. The pupils with average intelligence i.e. IQ 90 and above. [Johnson and Myklebust (1967), Gearheart (1973), Virudhagirinathan (1998)]

2. The pupils with Behaviour Problem score of 135 and above. [Kumaran and Menon, (2002)]
Thus as per the two criteria stated above, 309 pupils out of 682 were identified as Learning Disabled (who have satisfied both the criteria). The remaining 373 pupils were taken as Academically Backward as they were also identified as pupils with learning problems as per the school records and observation report of the teachers.

The distribution of the sample based on personal and school related variables are given in Table 3.6.

### Table 3.6
Sample Distribution According to Personal and School Related Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Learning Disabled</th>
<th>Academically Backward</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Sex</td>
<td>Boys</td>
<td>171</td>
<td>55.30</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>138</td>
<td>44.70</td>
<td>189</td>
</tr>
<tr>
<td>Community</td>
<td>Backward</td>
<td>174</td>
<td>56.30</td>
<td>176</td>
</tr>
<tr>
<td></td>
<td>Most Backward</td>
<td>22</td>
<td>7.10</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Scheduled</td>
<td>113</td>
<td>36.60</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>(Caste &amp; Tribe)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father’s Education</td>
<td>Elementary</td>
<td>239</td>
<td>77.30</td>
<td>226</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>16</td>
<td>5.20</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Higher secondary</td>
<td>24</td>
<td>7.80</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Graduation</td>
<td>30</td>
<td>9.70</td>
<td>45</td>
</tr>
<tr>
<td>Father’s Occupation</td>
<td>Coolie</td>
<td>200</td>
<td>64.70</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>35</td>
<td>11.30</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Self-employed</td>
<td>74</td>
<td>23.90</td>
<td>114</td>
</tr>
<tr>
<td>Family Type</td>
<td>Nuclear Family</td>
<td>148</td>
<td>47.90</td>
<td>182</td>
</tr>
<tr>
<td></td>
<td>Joint Family</td>
<td>161</td>
<td>52.10</td>
<td>191</td>
</tr>
<tr>
<td>Management of the School</td>
<td>Government</td>
<td>25</td>
<td>8.10</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Corporation</td>
<td>130</td>
<td>42.10</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>Private Aided</td>
<td>78</td>
<td>25.20</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Private Unaided</td>
<td>76</td>
<td>24.60</td>
<td>129</td>
</tr>
<tr>
<td>Board of Affiliation</td>
<td>Matriculation</td>
<td>76</td>
<td>24.60</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>State</td>
<td>233</td>
<td>75.40</td>
<td>244</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>309</td>
<td>100.00</td>
<td>373</td>
</tr>
</tbody>
</table>
3.10 Collection of Data

The investigator contacted the Principals/Heads of the selected schools and permission was obtained for data collection. The permission from the Educational Officer of Chennai Corporation was also obtained. The willingness and corporation of the respective class teachers were also established.

Teachers were requested to identify the pupils who are having learning problems in their respective classes. They identified 682 standard V pupils with Learning Problems by using their experience with their pupils in the classroom activities and academic performance in school subjects. The teachers were also requested to rate their children by way of giving their responses to the Scale for Screening the Learning Disabled.

The data was collected personally by the investigator from these 682 pupils. Proper instructions were given before starting each test. Pupils marked their responses in the space provided in the question paper itself. Time limit was strictly kept for all the tests. On the first day, during the first session the Personal Data Sheet was filled up and the Home Life experience Questionnaire was administered. After an interval of 15 minutes, the Intelligence Test was administered. On the second day, during the first session the students took the Mathematics Attitude Questionnaire. After giving a break of 10 minutes, the Mathematics Performance Test was administered. The same procedure for data collection was followed in all the schools from where the data was collected.
3.11 Statistical Techniques Used for Analysing the Data

The following statistical techniques were adopted to realise the said objectives and hypotheses.

1. Descriptive Analysis (such as Mean and S D)
2. Differential Analysis (t-values, F ratios)
3. Stepwise Multiple Correlation and Regression Analysis
4. Discriminant Function Analysis

3.12 Limitations of the Study

Even though the investigator tried her best to make the study as successful as possible, there are certain limitations. The limitations are

1. The sample for the study is not a statewide sample but confined to schools in Chennai city only
2. The study has been conducted on the students belonging to one educational level i.e. Standard V only

3.13 Structure of the Report

Chapter I is an introduction to the study and deals with Learning Disability, Academic Backwardness, the variables such as Home Life Experience, IQ, Mathematics Attitude and Behaviour Problems

In Chapter II, a review of the studies related to the present investigations carried out in India and Abroad have been given
In Chapter III, statement of the problem and its significance, objectives, hypotheses, method of study, variables under study, sample drawn, tools used, data collection procedures, limitations and statistical techniques used for analysis are explained.

The procedure for analysis, results of statistical analysis and the interpretation of results are described in Chapter IV.

Chapter V presents, in addition to the summary of the study in retrospect, major findings, conclusion, educational implications of the study and suggestions for further research are given.

Bibliography is given following Chapter V. Then the materials containing copies of the tools, scoring key, etc are appended at the last.