CHAPTER IV

METHOD AND PROCEDURES
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STATEMENT OF THE PROBLEM

“Characteristic behavioural differentials of learning disabled and normal children across levels of intelligence.”

OPERATIONAL DEFINITIONS

- **Learning disabled children (LD):** refers to those children who were identified by Diagnostic Test of Learning disability (DTLD; Swarup & Mehta, 1993) as having learning disabilities. It excludes the mentally challenged and severely handicapped or physically impaired children. In addition dictation in Hindi and English was taken to check for the spelling mistakes and other related problems which are normally associated with the LD. Mathematical problems were also given to check for the problems in basic computational skills and symptoms of dyscalculia.

- **Normal children (NC):** refers to children other than those who were identified by Diagnostic Test of Learning disability (DTLD; Swarup & Mehta, 1993) as having learning disabilities. It excludes the mentally challenged and severely handicapped or physically impaired children.

- **Intelligence:** as measured by the Standard Progressive Matrices (SPM; Raven et al, 2000).

- **Characteristic behavioural differentials:** Here the term ‘differentials’ points out the variables which would bring out the differences between learning disabled children (LD) and normal children (NC). And the term ‘characteristic’ implies ‘typical’, ‘distinctive’ or ‘representative’ differentials – with the intention to delimit the scope of behavioral differentials to those prominent differentials which have the possibilities of differentiating or bringing about the differences between learning disabled and normal children. In the present study, researcher had taken up variables, namely, achievement motivation; styles of learning; styles of thinking; self-esteem and study habits.
to explore how learning disabled children (LD) differ from normal children (NC).

- **Achievement motivation:** as measured by Deo-Mohan Achievement Motivation (n-Ach) Scale. (Deo & Mohan, 1985)

- **Styles of learning:** refer to the preferred styles of learning as measured by five sub-components of styles of learning (viz., verbal; content preference; class preference; learning preference; interest) using SOLAT (Venkataraman, 1994).

- **Styles of thinking:** refer to the preferred styles of thinking as measured by five sub-components of styles of thinking (viz., logical / fractional; divergent / convergent; creativity; problem solving; imagination) using SOLAT (Venkataraman, 1994).

- **Self-esteem:** as measured by Self-Esteem Inventory (SEI, by Coopersmith, 1987).

- **Study habits:** as measured by the adapted form of Study Habit Inventory (SHI, by Mukhopadhaya & Sansanwal, 1983).

**DESIGN OF THE STUDY**

The present study is descriptive survey research intended to assess the behavioural characteristics of the learning disabled children (LD) and the normal children (NC) and thereby to study the differentials between these two groups. As mentioned earlier, five behavioural characteristics, viz. achievement motivation (n-Ach); styles of learning (SL); styles of thinking (ST); self-esteem (SE) and study habits (SH), were taken up for the investigation. In addition academic achievement (MARKS) was studied as a dependent variable. To achieve the stated objectives LDs of 5th class were identified and categories as average intelligent LD (LD_{AI}); above average intelligent LD (LD_{A{AI}}) and high intelligent LD (LD_{HI}). Matching normal children (matching of NC with LD was done on the basis of intelligence; gender; class; & school) were also categories as average intelligent NC (NC_{AI}); above average intelligent NC (NC_{A{AI}}) and high intelligent NC (NC_{HI}). The LD and NC groups were assessed on above mentioned behavioural characteristics using standardized tools and data on academic achievement was also collected from school records. Comparisons
between LD and NC groups were made to study the differentials. Figure 4.1 gives the figural representation of the design of the present study.

**Figure 4.1**

**Design of the study**

<table>
<thead>
<tr>
<th>LD = 98</th>
<th>NC = 98</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDnA = 46</td>
<td>NCnA = 46</td>
</tr>
<tr>
<td>LDn = 33</td>
<td>NCn = 33</td>
</tr>
<tr>
<td>LDnH = 19</td>
<td>NCnH = 19</td>
</tr>
</tbody>
</table>

Where: LD = learning disabled children; NC = normal children.

AI – average intelligence; AAI – above average intelligence; HI – high intelligence.

**SAMPLE**

For the purpose of sample collection, multistage randomized sampling technique combined with matching was applied.

At the initial stage, investigator prepared a sector-wise list of Government Model Senior Secondary Schools (English medium) of U.T., Chandigarh, out of which 8 schools were selected randomly by the lot of draws. After contacting the principals of the selected schools for the permission of data collection, the target schools for data collection were short listed to 6 schools.

**Initial Sample:** An initial sample of 725 children studying in fifth class was selected from randomly selected six Government Model Senior Secondary Schools of
Chandigarh. All 725 children were administered Diagnostic Test of Learning Disability (DTLD) and Raven’s Standard Progressive Matrices (SPM).

**Final Sample:** Out of the initial sample of 725 children, learning disabled (LD) were identified (on the basis of DTLD) and categorized (on the basis of their intelligence scores given by SPM). The normal children (NC) were matched with the LD children on the basis of intelligence scores; gender; class and school. The final sample, therefore, comprised of 98 LD and 98 NC. Out of 98 LD, 46 were in the average intelligence category \( \text{LD}_{\text{AI}} = 46 \); 33 in the above average intelligence category \( \text{LD}_{\text{AAI}} = 33 \) and 19 in the high intelligence category \( \text{LD}_{\text{HI}} = 19 \). Similarly, out of 98 NC, 46 were in the average intelligence category \( \text{NC}_{\text{AI}} = 46 \); 33 in the above average intelligence category \( \text{NC}_{\text{AAI}} = 33 \) and 19 in the high intelligence category \( \text{NC}_{\text{HI}} = 19 \).

**HYPOTHESES**

In accordance with the objectives of the present study following null hypotheses were framed:-

1: There would be no significant differences between learning disabled children (LD) and normal children (NC) on behavioural characteristics.

2: There would be no significant differences between average intelligent learning disabled children \( \text{LD}_{\text{AI}} \) and average intelligent normal children \( \text{NC}_{\text{AI}} \) on behavioural characteristics.

3: There would be no significant differences between above average intelligent learning disabled children \( \text{LD}_{\text{AAI}} \) and above average intelligent normal children \( \text{NC}_{\text{AAI}} \) on behavioural characteristics.

4: There would be no significant differences between high intelligent learning disabled children \( \text{LD}_{\text{HI}} \) and high intelligent normal children \( \text{NC}_{\text{HI}} \) on behavioural characteristics.

5: There would be no significant differences among learning disabled children (LD) on behavioural characteristics across the levels of intelligence.
5 (a): There would be no significant differences between average intelligent learning disabled children (LD$\text{ai}$) and above average intelligent learning disabled children (LD$\text{aai}$) on behavioural characteristics.

5 (b): There would be no significant differences between average intelligent learning disabled children (LD$\text{ai}$) and high intelligent learning disabled children (LD$\text{m}$) on behavioural characteristics.

5 (c): There would be no significant differences between above average intelligent learning disabled children (LD$\text{aai}$) and high intelligent learning disabled children (LD$\text{m}$) on behavioural characteristics.

6: There would be no significant differences among learning disabled children (LD) on behavioural characteristics at the same level of intelligence.

7: There would be no significant differences among normal children (NC) on behavioural characteristics across the levels of intelligence.

7 (a): There would be no significant differences between average intelligent normal children (NC$\text{ai}$) and above average intelligent normal children (NC$\text{aai}$) on behavioural characteristics.

7 (b): There would be no significant differences between average intelligent normal children (NC$\text{ai}$) and high intelligent normal children (NC$\text{m}$) on behavioural characteristics.

7 (c): There would be no significant differences between above average intelligent normal children (NC$\text{aai}$) and high intelligent normal children (NC$\text{m}$) on behavioural characteristics.

8: There would be no significant differences among normal children (NC) on behavioural characteristics at the same level of intelligence.

9: There would be no significant gender differentials on behavioural characteristics.

9 (a): There would be no significant gender differentials on behavioural characteristics between the entire sample of males (N=110) and the entire sample of females (N=86).

9 (b): There would be no significant gender differentials on behavioural characteristics between LD males (N=55) and LD females (N=43).
9 (c): There would be no significant gender differentials on behavioural characteristics between NC males (N=55) and NC females (N=43).

10: There would be no significant differences on academic achievement.

10 (a): There would be no significant differences on academic achievement between learning disabled children (LD) and normal children (NC) across the levels of intelligence.

10 (b): There would be no significant differences on academic achievement among learning disabled children (LD) and among normal children (NC) across the levels of intelligence.

10 (c): There would be no significant differences on academic achievement among learning disabled children (LD) and among normal children (NC) at the same level of intelligence.

10 (d): There would be no significant gender differentials on academic achievement.

11: There would be no significant relationship between intelligence; academic achievement; achievement motivation; styles of learning; styles of thinking; self-esteem and study habits.

TOOLS USED FOR DATA COLLECTION

For data collection following tools were used:

- **Diagnostic Test of Learning Disability (DTLD)** by Swarup and Mehta (1993).
- **Standard Progressive Matrices (SPM)** by Raven, Raven and Court (2000).
- **Study Habit Inventory (SHI)** by Mukhopadhyay and Sansanwal (1983) – (adapted by the researcher).
- **Style of Learning and Thinking (SOLAT)** by Venkataraman (1994).
- **Self-Esteem Inventories (SEI)** by Coopersmith (1987).
- **DEO-MOHAN Achievement Motivation Scale (n-Ach)** by Deo and Mohan (1985).
- In addition, researcher conducted **dictation in Hindi and English** by taking a paragraph from the prescribed text books of the 5th class in order to identify
and trace the symptoms associated with LD. Also, mathematical problems were given to identify the problems in basic computational skills.

- Information on academic achievement was obtained from the school records.

**DESCRIPTION OF TOOLS**

**Diagnostic Test of Learning Disability (DTLD) by Swarup and Mehta (1993).**

The behavioural analysis of the school going population reveals that not all are able to be efficient learners. Children fail to learn, due to a variety of reasons and difficulties, such as intellectual handicap (MR), sensory handicap (visual or hearing impairment) or social environmental factors (psycho-social). However these categories do not exhaust the entire population of poor performers. There is still a group of children who fails to learn and defies any of the existing categories of exceptionality. These are learning disabled children.

The Diagnostic Test of Learning Disability (DTLD) is a tool constructed to identify those children, who experience learning problems, because of learning disability. Since Learning Disability could span over a variety of abilities, ten areas, each representing a basic psychological process, have been selected. A deficit in any of the area or areas or a combination of any, would lead to 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 relations (SR) and (6) Auditory perception (AP).

The next four areas represent the aspects of cognitive functioning, viz., (7) Cognitive abilities (CA); (8) Memory (M); (9) Receptive language (RL) and (10) Expressive language (EL).

**Subtest I: Eye-hand-coordination (EHC)** – It measures the ability to co-ordinate vision with the movements of the hands for effective use. This subtest assesses the graphic motor sequencing ability and the quality of the movement, i.e., smooth, controlled and continuous so imperative for writing. Subjects having poor handwriting problems because of dysgraphia will score low on this subtest.
Subtest II: Figure ground perception (FG) – It is also called selective attention. It is the ability to attend only to that stimulus which require one’s attention at a given period and ignore the other stimuli present, in order to encode the perceptual experience meaningfully. It measures the subject’s ability to select, control and direct attentional processes leading to clear perception.

Subtest III: Figure constancy (FC) – It measures the subject’s ability to identify symbols, figures, shapes despite its apparent change in size, direction and position. It involves the recognition of pictures, shapes, graphics, symbols, letters, and figures. It also entails the transfer of the visual imprint from a three dimensional to a two dimensional level. The aim of this subtest is to test whether or not the subject has conserved the important perceptual details about shapes, graphics, and letters, so relevant for any reading or writing activity.

Subtest IV: Position in space (PS) – It measures the ability to perceive the relationship between the observer and the object in space, i.e., of it being above, below, behind, in front of, next to, etc. to the person observing. This grows out of the individual’s inherent ability to organize and see order in space. It is also necessary that subject comprehends words designating position in space when he/she reads or hear it, for adequate comprehension.

Subtest V: Spatial relations (SR) – It measures the ability to see a relationship between two or more objects in relation to self and in relation to each other. It is an outgrowth of position in space. A child needs an adequate SR for matching blocks, copying patterns, completing incomplete pictures and also doing reading, writing, spelling and arithmetic, comprehending graphs, maps, etc. This becomes the basis for processing information at an abstract level later. It involves simultaneous processing in various directions and thought flexibility.

Subtest VI: Auditory perception (AP) – It refers to an ability to provide meaning to auditory stimuli. The items included in this subtest measures the following:-

(i) Item no. 1 represents auditory reception of non-verbal information, basis for any learning and rules out a sensory impairment.
Item no. 2 tests the auditory sequencing, an outgrowth of the auditory perception. It assesses one’s encoding ability, a prerequisite for any language learning – reading, spelling, writing at a later stage.

Item no. 3 represents auditory discrimination. It tests the subject’s ability of phonemic analysis and segmentation. Phonemic discrimination is important for phonemic awareness, again basic for reading and consequently for comprehension.

Item no. 4 measures the subject’s phonemic association and indirectly his verbal fluency. Possessing a repertoire of vocabulary is essential for completing a task.

Item no. 5 measures the subject’s morpheme grapheme association and his verbal fluency. A sound repertoire of vocabulary is required to do this task.

**Subtest VII: Cognitive abilities (CA)** – The items included in this subtest measures the following:-

(i) Item no. 1 represents the subject’s ability to manipulate the stimuli in reversed order, i.e., reverse the stimulus letters and numbers. It calls for a cognitive retracing.

(ii) Item no. 2 tests the subject’s ability of categorization. Indirectly it also measures the level of his cognitive processing, involving encoding and memory of the input from the range of his experiential world. Prior knowledge of the distinguishing features of each item given and the class they belong to, is required to enable the subject to perform correctly.

(iii) Item no. 3 measures the subject’s higher level processing abilities, i.e., see variance within the homogeneity. The ability to recognize the subtle difference within its common category is required for adequate task performance. The ability to abstract the similarities and recognize the differences to categorize the experience in meaningful chunks is measured by this item. This ability facilitates concept formation which further leads to higher level cognitive functioning.

(iv) Item no. 4 also represents higher level cognitive processing abilities. This item assesses simultaneously the abilities of abstraction, categorization and
generalization. All these require higher level processing of incoming information. Children who have processed information at these various levels would be able to organize their thoughts adequately and answer the items correctly.

**Subtest VIII: Memory (M)** – It tests memory which is the necessary facilitator for almost all learning. This subtest measures the child’s memory at surface level as well as at the deeper level. The subject’s range of observation and knowledge could be measured by the items included in this subtest and one may also determine the extent to which the subject is capable of some incidental learning, by retrieving relevant information at an appropriate time.

**Subtest IX: Receptive language (RL)** – The items included in this subtest measures the following:-

(i) Item no. 1 aims at testing the encoding processes of verbal visual stimuli, i.e., spontaneous semantic processing to ensure comprehension. The problems in input and processing can be diagnosed by this item.

(ii) Item no. 2 aims at testing the subject’s verbal fluency, whereby he is expected to make new words. Though an element of expression is inherent here, the focus is on understanding the given instructions and performing accordingly.

(iii) Item no. 3 and 4 test the subject’s verbal fluency which is generally related to long term memory level and the retrieval. It also throws light on the subject’s skill of observation, exposure, vocabulary and potential for incidental learning.

**Subtest X: Expressive language (EL)** – The items included in this subtest measures the following:-

(i) Item no. 1 tests the subject’s ability to use proper syntax in language. The type of response he gives would indicate whether his level of language is at a concrete descriptive level or is at a higher level where he processes the information more abstractly (i.e., stating the function and the like rather than just naming the figure).

(ii) Item no. 2 aims at testing the subject’s awareness of syntactical structures and metalinguistic structures.
Item no. 3 aims at testing the subject’s perceptual reception of the stimulus. It tests the subject’s semantic syntactic co-ordination abilities. It altogether assesses the subject’s perceptual awareness, visuo-motor integration and level of language expression.

A profile of the subject’s scores in all ten areas indicates the strengths and weaknesses in the tested ten areas.

**Scoring Procedure:** Each item of the subtests has to be scored separately to the instructions given. Any doubtful response has to be given a zero. The score of each area and the total composite score has to be counted. It is likely that the score obtained may be in fractions, it must be entered into the profile as it is (the individual figures are not to be rounded up except the total score).

- A score of 3 or less, obtained in any subtest, indicates a severe problem.
- A score of 4 is indicative of a moderate problem.
- A score of 5 reflects a mild problem.
- A score of 6 – 7 in any subtest has to be checked in relation to the subject’s scores in other subtests, for diagnostic purposes.
- A score of 8 – 10, in any subtest, may be accepted as a relatively stronger sub area.

**Reliability:** The authors established test-retest reliability by re-administering the test on 1050 children after a gap of 20 days and by computing reliability coefficients for each sub-test and the total test which is mentioned below:

**Table 4.1**

<table>
<thead>
<tr>
<th>Type of Reliability</th>
<th>Sub-tests</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test - Retest</td>
<td>1  .65</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>2  .71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3  .73</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4  .64</td>
<td></td>
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<tr>
<td></td>
<td>5  .61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6  .67</td>
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<tr>
<td></td>
<td>7  .75</td>
<td></td>
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<tr>
<td></td>
<td>8  .76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9  .60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 .82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 .79</td>
<td></td>
</tr>
<tr>
<td>Reliability Index</td>
<td>1  .81</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>2  .84</td>
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</tr>
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<td></td>
<td>3  .85</td>
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<td></td>
<td>4  .80</td>
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<td></td>
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<td></td>
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<td></td>
<td>10 .89</td>
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</tbody>
</table>

157
Validity: – The authors established content validity on the basis of the expert opinions and comments. The items were carefully sampled from the areas covered in the test. The construct validity was determined by item analysis which established the internal consistency of the test.


The Standard Progressive Matrices (SPM) test is constructed to measure the eductive component of g as defined in Spearman’s theory of cognitive ability. Eductive ability is the ability to forge new insights, the ability to discern meaning in confusion, the ability to perceive, and the ability to identify relationships. Since perception is primarily a conceptual process, the essential feature of eductive ability is the ability to generate new, largely non-verbal, concepts which make it possible to think clearly.

According to Spearman, g has a second component: reproductive ability. This is the ability to recall, and use, a culture’s store of explicit, verbalized, concepts.

The SPM test is a non-verbal test made up of five Sets, or series, of diagrammatic puzzles exhibiting serial change in two dimensions simultaneously. Each puzzle has a part missing, which the person taking the test has to find among the options provided. It consists of 60 problems divided into five Sets (A, B, C, D, and E), each made up of 12 problems. In each Set the first problem is as nearly as possible self-evident. The problems which follow build on the argument of those that have gone before and become progressively more difficult. The order of the items provides the standard training in the method of working. The five Sets provide five opportunities to grasp the method of thought required to solve the problems and five progressive assessments of a person’s capacity for intellectual activity. To ensure sustained interest and freedom from fatigue, each problem is boldly presented, accurately drawn, and, as far as possible, pleasing to look at.

The test has been designed to cover the widest possible range of mental ability and to equally useful with persons of all ages, whatever their education, nationality, or physical condition.

It has been designed to provide a reliable estimate of a person’s capacity to think clearly when allowed to work steadily and undisturbed at his or her own speed.
It covers the whole range of intellectual development from the time a child is able to grasp the idea of finding a missing piece to complete a pattern to the levels of ability required to form comparisons and reason by analogy. It is short enough not to be unduly exhausting or unwieldy.

All respondents, whatever their age, are given exactly the same series of problems in the same order and asked to work at their own speed, without interruption, from the beginning to the end of the test. As the order of the problems provides the standard training in the method of working, the test can be given as an individual, a self-administered, or a group test. A person’s total score provides an index of intellectual capacity. The consistency between the contributions which each of the five Sets makes to the total indicates the reliability of the estimate.

Following upon earlier mental development between the ages of 8 and 11 there appears to be an almost complete transformation in a child’s processes of reasoning. Before it has occurred, children can comprehend little more than the kind of problem presented in Sets A and B of the SPM. Their vocabulary tends to be limited, and their education largely depends on practical work and visual aids. Afterwards, children are able not only to form comparisons and reason by analogy, but also to adopt this way of thinking as a consistent method of reasoning, progressing without difficulty from the problems in Sets A and B to those in Sets C, D, and E. This apparently decisive stage in intellectual maturation distinguishes the intellectually immature person from the person of normal, or higher than normal, intellectual ability.

The SPM allows discriminating between people of all levels of ability to the extent that is justified by the explanatory power of the theoretical construct – eductive ability – being assessed. The test has items which discriminated effectively between those who, on the one hand, were least able to perceive and think clearly, and, on the other, those who were best able to do so – at least insofar as these abilities are measured by the test.

**Scoring Procedure:** When the SPM test is given to the subject, he or she is provided with an easy-score answer sheet on which subject gives his or her responses. Scoring key is provided for easy scoring of the SPM test. A person’s score on the test
is the total number of problems solved correctly when allowed to work quietly through the series from the beginning to the end.

The SPM provides norms tables for various groups of population. In the present study Indian norms, developed by Deshpande and Ojha (2002), were used to convert the raw scores into centiles and then to classify the subjects into categories of average intelligence, above average intelligence and high intelligence.

**Reliability:** – Over 40 studies dealing with the reliability of the SPM have been reported in the literature. They cover a wide age – range, many cultural groups, and clinical as well as normal populations. The summary of all these studies provide a general picture of good reliability, whether in terms of internal consistency or retest reliability.

**Validity:** – SPM has been described as one of the purest and best measures of $g$ or general intellectual functioning available. Evidence for this claim comes from several factor-analytic studies involving large numbers of children and adults. Factor-analytic research suggests that while SPM is a relatively good measure of general intellectual ability it is not a pure $g$ estimate.

**Study Habit Inventory (SHI) by Mukhopadhyay and Sansanwal (1983)** – (adapted by the researcher).

The study habit is a very important characteristic of all human beings who are ‘being educated’ and ‘are educated’. As much study habit is important for higher academic achievement of the students as much it is important for their fruitful use of leisure time. Thus, study habit as a habit is generic than specific in terms of its importance. It has very long reaching effects deep into the life of individuals, and by cumulative and interactive effects in the society.

While one can and usually does presume a delta point in the life of an individual whereby the study habits get fixed by certain age, possibly such patterns get fixed only in the overt behaviour like study sets, drilling, etc. The covert behaviour, like concentration, comprehension, task orientation changes with each important change in the life stages.
In this inventory, the study habits have been considered to be constituted of nine different kinds of study behaviour. These are:-

(i) **Comprehension:** - There are certain specific behaviours with respect to a student’s study behaviour which are geared to better comprehension, for example, before reading a lesson intensively the student may try to catch on what the lesson is about. By so doing he may actually try to establish a mental set for studying a particular content. Similarly, he may try to relate the materials learned in one subject with these learned in another so that he may subsume the new learning with the previous knowledge. *(SHI has 10 items on comprehension)*

(ii) **Concentration:** - Concentration is a very important predictor of effective study habits. Some students are capable of concentrating easily and for long, some others take time to concentrate, but once they concentrate, they can continue for long, while still some others find it difficult to concentrate at all. Some may read only when they are in a mood to do so. Others may require stimulations through tea, coffee, smoking, etc., for concentration. *(SHI has 12 items on concentration)*

(iii) **Task orientation:** - If a student has to study a series of subjects and has to develop different levels of cognition, the task orientation is an important component of the study habits. For example, some students study different subjects according to a fixed routine – daily, weekly, or monthly. Certain students fix the time target for completing certain academic tasks. Students’ orientation and behaviours towards accomplishment of the tasks in a pre-decided time frame is task orientation. *(SHI has 9 items on task orientation)*

(iv) **Sets:** - Study sets mean the physical and situational characteristics which a student adopts for study. For example, some students read only in the night; some students learn more when they read lying on the bed, whereas some others may as well sleep if they read lying on the bed. *(SHI has 7 items on sets)*

(v) **Interaction:** - Interaction of a student with his teacher or parents or his friends contributes positively towards better learning. Thus interaction is a significant
component of study habit. For example, when a student does not understand while studying he may go to some of his friends for a discussion. *(SHI has 3 items on interaction)*

(vi) **Drilling:** - Drilling means practicing a particular learning again and again. Drilling is a common practice at school; level. It is almost essential in case of learning of certain subjects. Students, therefore, may revise the topics and tasks already learned more than once. *(SHI has 3 items on drilling)*

(vii) **Supports:** - Study in any particular discipline gets a sound backup from a broader study base. A student’s habit of studying different types of books other than textbooks, or newspapers and magazines may be helpful in the learning of subjects. *(SHI has 3 items on supports)*

(viii) **Recording:** - For good performance of the students, it is also necessary to record in the form of text, class notes or preparing ones’ own study notes. Some students prepare their own notes on the basis of class teaching which form the basis for their own independent study. Many students depend only on the class notes dictated by the teacher. *(SHI has 2 items on recording)*

(ix) **Language:** - Language capability is an important predictor of effective study habits. For example, where the medium of instruction is English, it is important to see with what facility and ease does a student read books in English. This affects his concentration, comprehension and duration of study. *(SHI has 2 items on language)*

In the present study, the investigator slightly modified the SHI inventory as per the relevance and requirement of the study. The modifications carried in the SHI were as listed below:-

(i) Items numbered 6, 8, 13, 22, 24, 27, 28, 34, 40, 43, 46, 47, 50, 51 & 52 of the SHI were not included for the purpose of data collection and scoring as these items had little relevance for the group from which the data was to be collected.

(ii) Study habits were re-numbered as mentioned below for the purpose of tabulation of the data and discussion of the results:
### Table 4.2
Study habits of SHI with distribution of items

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Habit</th>
<th>No. of positive items</th>
<th>No. of negative items</th>
<th>Maximum possible scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Comprehension</td>
<td>8</td>
<td>1</td>
<td>36</td>
</tr>
<tr>
<td>II</td>
<td>Concentration</td>
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<td>8</td>
<td>36</td>
</tr>
<tr>
<td>III</td>
<td>Sets</td>
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<td>0</td>
<td>24*</td>
</tr>
<tr>
<td>IV</td>
<td>Drilling</td>
<td>3</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
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<td>Interaction</td>
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<td>1</td>
<td>8</td>
</tr>
<tr>
<td>VI</td>
<td>Language</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>VII</td>
<td>Recording</td>
<td>2</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>VIII</td>
<td>Task Orientation</td>
<td>0</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>16</strong></td>
<td><strong>124</strong>*</td>
</tr>
</tbody>
</table>

**Note:** Marks on study habit – Sets not to be included in the total score as Sets cannot be classified in terms of desirability or undesirability.

**Scoring Procedure:** The manual of SHI contains the guide to the scoring. The inventory consists of positive and negative items. Each item offers five options for response, viz., Always; Frequently; Sometimes; Rarely; & Never. For positive items the scoring is 4, 3, 2, 1, 0 and for negative items the scoring is 0, 1, 2, 3, 4 respectively.

**Style of Learning and Thinking (SOLAT) by Venkataraman (1994).**

Most people are somewhat flexible in their use of styles and they try with varying degrees to adopt themselves to the stylistic demands according to situation. Parents and teachers are able to perceive the children and their natural tendencies of how they think, act and learn in different ways and in different situations.
Styles are propensities rather than abilities. They are ways of directing the intellect which an individual finds comfortable. The style of learning and thinking are as important as levels of ability.

Styles are not etched in stone at birth. They are in large part developed due to environmental condition and by way of nurturing by their parents and teachers. Some individuals may have one preferred style at one and another preferred style at some other stage. Styles are not fixed, but changeable.

Hemisphericity is the cerebral dominance of an individual in retaining and processing modes of information in his own style of learning and thinking. Researches have shown that the human left cerebral hemisphere is to be specialized for primarily verbal, analytical, abstract, temporal and digital operations. The right cerebral hemisphere is to be specialized for primarily non-verbal, holistic, concrete, creative, analogical and aesthetic functions.

Researches indicate that it is possible to modify a person’s preferred style of learning and thinking over relatively brief period (six to ten weeks).

SOLAT consists of 50 items, 25 each for the style of learning and style of thinking. The description of the tool is being given under two heads: - (i) Styles of Learning & (ii) Styles of Thinking.

Styles of Learning:
SOLAT consists of five dimensions of learning styles and for each dimension it contains 5 items. Each item consists of two statements, first statement of each item indicates right hemisphericity and the second statement of each item indicates left hemisphericity The five dimensions are:-

- Verbal (5 items:- item no. 1 to 5);
- Content Preference (5 items:- 6 to 10);
- Class Preference (5 items:- 11 to 15);
- Learning Preference (5 items:- 16 to 20);
- Interest (5 items: - 21 to 25).
| Table 4.3 |
| Styles of Learning |

**A: Right Hemisphere**

**Style of Learning: VERBAL (SLj)**
- Understanding movements of action; Talking while reading or writing; **Learn best by visual presentation**; Likes to draw pictures;
- Understanding verbal explanation; Getting things quiet while reading or studying; **Learn best by verbal instruction**; Likes to talk and write;

**Style of Learning: CONTENT PREFERENCE (SL2)**
- Interest in soft sciences; **Open ended lessons**;
- Likes to learn through main ideas/basic concepts; Writing / likes fiction; Learning through exploration;
- Interest in hard sciences; **Structured lessons**;
- Likes to learn through details and specific facts; Writing non-fiction; Learning through examine

**Style of Learning: CLASS PREFERENCE (SL3)**
- Get clarity while learning experimentally; Learning everything by synthesizing; Likes concrete learning; Slow acquisition of habits;
- Get clarity through logical reasoning;
- Understand better while learning critically and analytically; Likes to learn in an abstract way;

**Style of Learning: LEARNING PREFERENCE (SL4)**
- Divergent; Concentrate with several things simultaneously; Competitive; Unsocial, mysterious;
- Convergent; Concentrate with one thing at a time; Individuality; Social, active;

**Style of Learning: INTEREST (SL5)**
- Invent something new and imaginative; Likes to solve complex problems; Artistic and aesthetic interest;
- Improve upon something; Likes to solve simple problems; Temporal interest;

**Styles of Thinking**: SOLAT consists of five dimensions of thinking styles and for each dimension it contains 5 items. Each item consists of two statements, first statement of each item indicates right hemisphericity and the second statement of each item indicates left hemisphericity. The five dimensions are:-

- Logical / Fractional (5 items:- item no. 26 to 30);
- Divergent / Convergent (5 items:- 31 to 35);

165
• Creative (5 items: 36 to 40);
• Problem Solving (5 items: 41 to 45);
• Imagination (5 items: 45 to 50).

Table 4.4
Styles of Thinking

<table>
<thead>
<tr>
<th>A: Right Hemisphere</th>
<th>B: Left Hemisphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style of Thinking: LOGICAL/FRACTIONAL (ST₁)</td>
<td></td>
</tr>
<tr>
<td>Holistic approach; recall faces; retention and recalling shapes and figures; good command over total memory; organizing capacity</td>
<td>Fractional approach; recall names; retention and recalling numerical figures; analyzing speech and sound qualities</td>
</tr>
<tr>
<td>Style of Thinking: DIVERGENT/CONVERGENT (ST₂)</td>
<td></td>
</tr>
<tr>
<td>Deductive learning; independent thinking; likes to make guesses</td>
<td>Inductive learning; mentally receptive and responsive to what is heard; not interested in guesses</td>
</tr>
<tr>
<td>Style of Thinking: CREATIVE (ST₃)</td>
<td></td>
</tr>
<tr>
<td>Creative thinking; likes to pre-plan; intuitive; judgments through feelings and experience; playful approach in problem solving</td>
<td>Intellectualty; likes to day-dream; logical approach in judgments; business like approach</td>
</tr>
<tr>
<td>Style of Thinking: PROBLEM SOLVING (ST₄)</td>
<td></td>
</tr>
<tr>
<td>Optimistic view; absence of repression and suppression; passive; stronger determination and ambition</td>
<td>Pessimistic view; presence of repression and suppression; aggressive/short tempered</td>
</tr>
<tr>
<td>Style of Thinking: IMAGINATION (ST₅)</td>
<td></td>
</tr>
<tr>
<td>Strong memory and remembrance for images; haptic and tactile perception; imagine and summarize; imaginary analysis</td>
<td>Remembering language and pictures; lacks haptic and tactile perception; outline; imaginary analysis</td>
</tr>
</tbody>
</table>

Scoring Procedure: SOLAT has an in-built scoring key which makes scoring easy. In the tool, checking of the first statement of the item indicates right hemisphere; checking of the second statement of the item indicates left hemisphere and checking of both the statements of the item indicates integrated hemisphere (or whole brained).
Reliability: the reliability of the tool was measured by test-retest method. The reliability coefficient of correlation for the right hemisphere function was found to be .89; for the left hemisphere function the coefficient of correlation was found to be .65 and the coefficient of correlation for the integrated score was .71.

Validity: The content; construct and concurrent validities were established revealing that SOLAT possesses reasonable level of validity.

Self-Esteem Inventories (SEI) by Coopersmith (1987).

Children are not born with concerns of being good or bad, smart or stupid, lovable or unlovable. They develop these ideas. They form self-images based largely on the way they are treated by the significant people, the parents, teachers, and peers, in their lives. The self-image is the content of a person’s perceptions and opinions about him- or herself. The positive or negative attitudes and values by which a person views the self-image and the evaluations or judgments he or she makes about it form the person’s self-esteem.

Self-Esteem Inventories (SEI) had been designed to measure evaluative attitudes toward the self in social, academic, family, and personal areas of experience. In relation to the SEI, the term ‘self-esteem’ refers to the evaluation a person makes, and customarily maintains, of him- or herself; that is, overall self-esteem is an expression of approval or disapproval, indicating the extent to which a person believes him- or herself competent, successful, significant, and worthy.

The SEI includes questions which are related to several different areas of activity so that the extent to which the appraisal differed could be determined. These questions are related to school, family, peers, self, and general social activities. The school form of SEI consists of fifty-eight items which yield scores on General Self; Social SelfPeers; HomeParents; SchoolAcademic and Total score along with lie score. The scale allows for variance in perceptions of self-esteem in different areas of experience.
Table 4.5
Subscales of SEI

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Items</th>
<th>Max score</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Self (SE\textsubscript{GEN})</td>
<td>1, 3, 4, 7, 10, 12, 13, 15, 18, 19, 24, 25, 27, 30, 31, 34, 35, 38, 39, 43, 47, 48, 51, 55, 56, 57</td>
<td>26</td>
</tr>
<tr>
<td>Social Self – Peers (SE\textsubscript{SOC})</td>
<td>5, 8, 14, 21, 28, 40, 49, 52</td>
<td>8</td>
</tr>
<tr>
<td>Home – Parents (SE\textsubscript{H})</td>
<td>6, 9, 11, 16, 20, 22, 29, 44</td>
<td>8</td>
</tr>
<tr>
<td>School – Academic (SE\textsubscript{SCH})</td>
<td>2, 17, 23, 33, 37, 42, 46, 54</td>
<td>8</td>
</tr>
<tr>
<td>Total (SE\textsubscript{T})</td>
<td>58 items – 8 items of lie scale = 50</td>
<td>50 × 2 = 100*</td>
</tr>
</tbody>
</table>

Scoring Procedure: The SEI can be scored in a few minutes by using the scoring keys. If scoring key is not available, scoring can be carried by following the general rules listed below:

- Score negative items correct (for example, “I get upset easily at home”) if they have been answered “unlike me”.
- Score positive items correct (for example, “I’m pretty sure of myself”) if they have been answered “like me”.

Reliability: SEI was administered on over 600 students in grades 5, 9, 12. Obtained coefficients were .81 for grade 5, .86 for grade 9, and .80 for grade 12. The coefficients indicate adequate internal consistency for students in all three grades.

Validity: Various studies have established the construct validity, concurrent validity and predictive validity of the SEI rendering it to be a valid tool for assessing self-esteem.

DEO-MOHAN Achievement Motivation Scale (n-Ach) by Deo and Mohan (1985).

The term motivation refers to any organismic state that mobilizes activity which is in some sense selective or directive with respect to the environment. Achievement motivation which is the acquired tendency and is one of the most important social needs, has been defined as a disposition to strive for success in competition with others with some standard of excellence, set by the individual.
DEO-MOHAN Achievement Motivation Scale (n-Ach) is a standard verbal measure of the achievement motivation. Factors providing the bases to prepare the items in the n-Ach scale include:

(i) **Academic factors:** academic motivation; need achievement; achievement anxiety; importance of grades/marks; etc.

(ii) **Factors of general field of interest:** competition in curricular and co-curricular activities.

(iii) **Social interests:** organizing and participating in social activities, etc.

The n-Ach scale consists of 50 items out of which 13 are negative and 37 are positive items. The factor-wise distribution of items is as follows:

**Table 4.6**

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Academic motivation</td>
<td>4</td>
</tr>
<tr>
<td>2. Need for achievement</td>
<td>4</td>
</tr>
<tr>
<td>3. Academic challenge</td>
<td>4</td>
</tr>
<tr>
<td>4. Achievement anxiety</td>
<td>1</td>
</tr>
<tr>
<td>5. Importance of grades/marks</td>
<td>2</td>
</tr>
<tr>
<td>6. Meaningfulness of task</td>
<td>4</td>
</tr>
<tr>
<td>7. Relevance of school to future goals</td>
<td>2</td>
</tr>
<tr>
<td>8. Attitude towards education</td>
<td>4</td>
</tr>
<tr>
<td>9. Work methods</td>
<td>5</td>
</tr>
<tr>
<td>10. Attitude towards teachers</td>
<td>3</td>
</tr>
<tr>
<td>11. Interpersonal relations</td>
<td>4</td>
</tr>
<tr>
<td>12. Individual concern</td>
<td>2</td>
</tr>
<tr>
<td>13. General interests</td>
<td>4</td>
</tr>
<tr>
<td>14. Dramatics</td>
<td>2</td>
</tr>
<tr>
<td>15. Sports, etc.</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total = 50**

**Scoring Procedure:** Two stencil scoring keys are used for scoring of the n-Ach response sheet, one for the positive items and other for the negative items. A positive item carries the weights of 4, 3, 2, 1, & 0 respectively for the categories of Always,
Frequently, Sometimes, Rarely and Never. The negative item carries 0, 1, 2, 3, & 4 for the same categories respectively. The Total score is the summation of all the positive and negative items scores. The minimum possible score obtained can be zero and the maximum possible score is 200.

Reliability: Test-retest method was applied to obtain the reliability coefficient of the scale. Taking three different sets of sample the obtained r values for test-retest method were .69, .67 and .78 for the three sets of sample.

Validity: The item validity was established by the high-low discrimination method. Besides this, the scale was also used for validating the projective test of Achievement Motivation. The coefficient correlation for which came out to be .54.

PROCEDURE OF DATA COLLECTION

The data for the present study was collected in phased manner the details of which are as given below:-

Phase – I: The Principals of the randomly selected schools were personally contacted along with the written request for data collection. The purpose of the study for which data was to be collected, was explained to each of them. The Principals / Primary wing in-charges, after consulting the class teacher and the time-table of 5th class, permitted for data collection on particular dates, in particular periods.

Phase – II: As per the fixed dates and time, data was collected from 5th class children by administering Diagnostic Test of Learning Disability (DTLD) and Raven’s Standard Progressive Matrices (SPM). Also, short dictation in Hindi and in English was taken. Six mathematical problems (2 subtraction problems; 2 multiplication problems; & 2 division problems) were given. In this phase, data from 725 children was collected. Out of these 725 children, 98 LD children were identified and they were classified into three groups on the basis of their intelligence scores. Also, out of these 725 children, 98 normal children were matched with the 98 LD on the basis of intelligence score; gender; class & school.

Phase – III: After the annual examination, the principals were once again contacted to seek their permission for collecting information from the result records of the 5th class. The data on subject-wise marks as well as aggregate marks was obtained which provided information on the academic achievement of the 5th class learning disabled and normal children.
**Phase – IV:** Now that the children were in the 6th class, once again permission of the principal, in consultation with the class in-charge, was taken to collect further data. In this last phase (which included two visits to each school) children were administered Style of Learning and Thinking (SOLAT) by Venkataraman (1994); Study Habit Inventory (SHI) by Mukhopadhyay and Sansanwal (1983); Self-Esteem Inventories (SEI) by Coopersmith (1987) and DEO-MOHAN Achievement Motivation Scale (n-Ach) by Deo and Mohan (1985).

**STATISTICAL ANALYSIS**

In the present study, the researcher has made use of descriptive as well as inferential analysis.

- **Descriptive analysis:** Statistical procedures used in describing the properties of samples are referred to as descriptive statistics.
  
  In the present study researcher has employed mean as a measure of central tendency; standard deviation as a measure of variability; correlation coefficient (Pearsons’ product moment ‘r’) as a measure of relationship; and frequency distribution diagrams to describe the characteristic properties of the sample.

- **Inferential analysis:** Statistical procedures used in the drawing of inferences about the properties of populations from sample data are frequently referred to as inferential statistics.
  
  In the present study researcher has applied two-tailed t-test and chi-square ($X^2$) to infer the results. Both the inferential statistics have been applied and discussed at 0.01 or 0.05 level of confidence.

**DELIMITATIONS**

The impracticability to exhaustively cover all the variables and related areas/components and in order to make the study specific; focused and time bound, the researcher had delimited the present study to:-

- Children studying in 5th class.
- Children studying in the Government Model Senior Secondary Schools of the U.T., Chandigarh.
- Achievement motivation (n-Ach); styles of learning (SL); styles of thinking (ST); self-esteem (SE); & study habits (SH) were the variables included under the characteristic behavioural differentials.
LIST OF ABBREVIATIONS

LD – Children having Learning Disabilities
NC – Normal children
N_{LD} – Number of children with Learning Disabilities
N_{NC} – Number of normal children
N_{M} – Number of males
N_{F} – Number of females
M – Mean score
M_{LD} – Mean score of children with learning disabilities
M_{NC} – Mean score of normal children
SD – Standard deviation value
SD_{LD} – Standard deviation of children with learning disabilities
SD_{NC} – Standard deviation of normal children
AI – Children with average intelligence
AAI – Children with above average intelligence
HI – Children with high intelligence
LD_{AI} – Average intelligent children having learning disabilities
LD_{AAI} – Above average intelligent children having learning disabilities
LD_{HI} – High intelligent children having learning disabilities
NC_{AI} – Average intelligent normal children
NC_{AAI} – Above average intelligent normal children
NC_{HI} – High intelligent normal children
n-Ach – Achievement motivation
SL_{1A} – Overall right hemispheric learning style dominance
SL_{1B} – Overall left hemispheric learning style dominance
SL_{1AB} – Overall integrated hemispheric learning style dominance
SL_{2A} – Right hemispheric learning style dominance: Verbal
SL_{2B} – Left hemispheric learning style dominance: Verbal
SL_{2AB} – Integrated hemispheric learning style dominance: Verbal
SL_{2A} – Right hemispheric learning style dominance: Content Preference
SL_{2B} – Left hemispheric learning style dominance: Content Preference
SL_{2AB} – Integrated hemispheric learning style dominance: Content Preference
SL3A – Right hemispheric learning style dominance: Class Preference
SL3B – Left hemispheric learning style dominance: Class Preference
SL3AB – Integrated hemispheric learning style dominance: Class Preference
SL4A – Right hemispheric learning style dominance: Learning Preference
SL4B – Left hemispheric learning style dominance: Learning Preference
SL4AB – Integrated hemispheric learning style dominance: Learning Preference
SL5A – Right hemispheric learning style dominance: Interest
SL5B – Left hemispheric learning style dominance: Interest
SL5AB – Integrated hemispheric learning style dominance: Interest
STA – Overall right hemispheric thinking style dominance
STB – Overall left hemispheric thinking style dominance
STAB – Overall integrated hemispheric thinking style dominance
ST1A – Right hemispheric thinking style dominance: Logical/Fractional
ST1B – Left hemispheric thinking style dominance: Logical/Fractional
ST1AB – Integrated hemispheric thinking style dominance: Logical/Fractional
ST2A – Right hemispheric thinking style dominance: Divergent/Convergent
ST2B – Left hemispheric thinking style dominance: Divergent/Convergent
ST2AB – Integrated hemispheric thinking style dominance: Divergent/Convergent
ST3A – Right hemispheric thinking style dominance: Creative
ST3B – Left hemispheric thinking style dominance: Creative
ST3AB – Integrated hemispheric thinking style dominance: Creative
ST4A – Right hemispheric thinking style dominance: Problem Solving
ST4B – Left hemispheric thinking style dominance: Problem Solving
ST4AB – Integrated hemispheric thinking style dominance: Problem Solving
ST5A – Right hemispheric thinking style dominance: Imagination
ST5B – Left hemispheric thinking style dominance: Imagination
ST5AB – Integrated hemispheric thinking style dominance: Imagination
SEG – General self esteem
SESOC – Social-peers self esteem
SEH – Home-parents self esteem
SESCH – School-academics self esteem
SET – Total/overall self esteem
SH1 – Study habit: Comprehension
SHII – Study habit: Concentration
SHIII – Study habit: Sets
SHIV – Study habit: Drilling
SHV – Study habit: Interaction
SHVI – Study habit: Language
SHVII – Study habit: Recording
SHVIII – Study habit: Task orientation
SHIX – Study habit: Overall desirable study habits