Chapter-3

Methods & Procedure
CHAPTER – III
METHODS AND PROCEDURE

In this chapter, the methods and procedures employed in the study have been described. It includes design of the study, sample selection, tools used, data collection and statistical techniques employed for the study.

3.1 DESIGN OF THE STUDY

The present study aims to study the ‘effectiveness of cognitive strategies as remedial treatment on learning disabled in relation to emotional intelligence and anxiety’ through pre-test, post-test 3x2x2 factorial design. In this study pre-test post-test experimental design was used. Emotional Intelligence and Anxiety (studied at two levels) each were taken as Independent or classifying variables. The groups under high and low emotional intelligence and high and low anxiety were classified on the basis of median. Cognitive strategies were taken as treatment variable and achievement in related topics of class VII in the subject of Science as dependent variable.

After identifying the learning disabled students from the various schools of Chandigarh, the identified sample was divided into three groups. Each group was taught through a different intervention strategy. One group was given the treatment through Self Monitoring, second group through Mediated Learning and third group through, Reciprocal teaching. The gain achievement scores from pre and post achievement test were subjected to statistical treatment as per the statistical design drawn for the study. Conclusions were drawn on the basis of descriptive and inferential statistics.
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The 3x2x2 factorial design is shown in figure 3.1.

![Diagram of 3x2x2 factorial design]

Cognitive strategies – A
A1 – Self Instructional Technique
A2 – Mediated Learning
A3 – Reciprocal Teaching

Emotional Intelligence – B
B1 – High Emotional Intelligence
B2 – Low Emotional Intelligence

Anxiety – C
C1 – High Anxiety level
C2 – Low Anxiety level

Figure 3.1 Figure Showing (3 X 2 X 2) Factorial Design
Methods and Procedure

3.2 SAMPLE

The population of the study was class VII students studying in various schools of Chandigarh. A sample of 479 students of Class VII was taken from different Government Model Senior Secondary Schools of Chandigarh for identifying learning disabled students. After diagnosing learning disabled students, the sample of 96 learning disabled students from the selected schools were divided into three different groups of 32 each. Each group was subjected to a separate cognitive strategy. Another sample of 100 normal students was taken for development and standardization of achievement test.

3.3 TOOLS USED FOR IDENTIFICATION OF LEARNING DISABLED STUDENTS

Following tools were used for the identification of learning disabled students of class VII.

- Previous Academic Records of sample students for segregating the students. It includes total marks and marks secured in the subject of Science and English in previous year final examination.
- Teacher Made Referral Form (appendix-II) for class VII students for taking the views of the teacher regarding the sample students.
- Draw-A-Man test for Indian Children (2006) developed by Dr. Pramila Phatak, Child Development Unit, M.S. University, Baroda for IQ testing of students.
- Diagnostic Test of Learning Disability (DTLD-1993) by Swarup and Mehta for identifying learning disabled student from the sample.
- Schonell’s Spelling Age Test by Fred J Schonell, 1932 for judging the spelling age of the sample.
- Schonell’s Reading Age Test by Fred J Schonell, 1971 for judging the reading age of the sample.
- Teacher made Diagnostic test of Comprehension in the subject of Science for identifying problems of class VII students in the subject.
Methods and Procedure

The description of the tools is as under:

3.3.1 Teacher Made Referral Form

It is a referral form constructed by the investigator herself. It contained questions relating to the students behavior, achievement, participation in class, problems during speaking, reading, writing and comprehension and other weaknesses of the student. The purpose of the form was to get the feedback of the science teacher regarding the various learning problems faced by the identified students at the first stage. The sample of the referral form is attached in the Appendix-II.

3.3.2 Draw-A-Man test for Indian Children

Draw-A-Man test for Indian Children (2006) by Dr. Pramila Phatak for testing the IQ of the children can be used for the children of age group 4-13 years. It may be administered to a single child at a time or to a group. Material for administering Draw-A-Man test is simple and handy, just the sheets and pencils. It can be administered anywhere where the child is ready to work. Child is required to draw a drawing of a man. He is evaluated according to the type of drawing he made.

Reliability

The reliability of the test was found through test–retest method. The overall reliability coefficient was found to be 0.9

Validity

The validity coefficient was calculated against different criteria in various studies.

Scoring

Every aspect of the features of a person drawn were evaluated such as eyes, nose, mouth, head, forehead, chin, ears, hair on head, face, trunk, arms, neck, palm and fingers, legs, feet and toes, proportion of feet, legs, head, arms, motor control, dress, indication of sex of the figure, full figure. Marks were awarded according to the type of drawing. The description of the scoring pattern can be found in the manual.
Methods and Procedure

3.3.3 Diagnostic Test of Learning Disability (DTLD)

The 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 a learning problem.

The first six areas represent the processes involved in visual & auditory perception viz. (1) Eye-hand-coordination (EHC) (2) Figure ground perception (FG) (3) Figure constancy (FC) (4) Position in space (PS) (5) Special relations (SR) (6) Auditory perception (AP) (7) Memory (M) (8) Cognitive abilities (CA) (9) Receptive language (RL) (10) Expressive language (EL). Though no line of demarcation can be drawn between the perceptual and cognitive areas, yet for the purpose of analysis and diagnosis, the two have been separated. They should not be understood as two broad categories in which the symptoms of problem are manifested.

In the DTLD, we therefore, move from a perceptual to a cognitive domain incorporating thinking, memory, receptive and expressive language late to get an insight into the subject’s overall cognitive structure. The purpose for this diagnostic tool is to find the locus of the problem and to provide a sound basis for a structured and an effective remedial programme. The DTLD can be administered individually as well as in group.

Diagnosis would be based on the analysis of the subject’s test performance which would become the basis for effective remediation.

The test consists of the following sub tests:

**Subtest 1** measures Eye hand Co-ordination (EHC) which is the ability to co-ordinate vision with the movements of the hands for effective use. This subject assesses the graphic motor sequencing ability, and the quality of the movement i.e. smooth, controlled and continuous so imperative for writing. Subjects having hand-writing problems because of dysgraphia will score low on this subtest.
Subtest 2 is meant for Figure Ground perception (FG) also called selective attention. It is the ability to attend only to those stimuli 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 attention processes leading to clear perception.

Subtest 3 aims at measuring Figure Constancy, (FC). It is 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, letters, so relevant for any reading or writing activity e.g. A is as ‘A’ be it in capital, small or cursive form.

Subtest 4 measures Position-in-space (PS) which is 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 he comprehends words designating position in space when he reads or hears it, for adequate comprehension.

Subtest 5 tests spatial relation (SR) which is the ability to see a relationship between two or more objects in relation to self and in relation to each other. 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 6 measures auditory perception ((AP) that refers to an ability to provide hearing to auditory stimuli.
Methods and Procedure

- Item No. 1 of this subtest 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 auditory-reception. It possesses 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 comprehension.
- Item No. 4 measures the subject’s phonemic association and indirectly his verbal fluency. Possessing a repertoire of vocabulary is essential for completing the task.

Subtest 7 Cognitive Abilities

- Item No. 1 represents the subject’s ability to manipulate the stimuli in reverse order i.e. reverse the stimulus letters and numbers. It calls for a cognitive retracing.
- 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.
- Item No. 3 the ability to recognize the subtle difference within its common category is required for adequate task performance. From the given 6 balloons, he has to perceive the difference in their shapes and make groups on that basis. This measures the subject’s higher level processing abilities i.e. see variance within the homogeneity. 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.
Item No. 4 This also represents higher level cognitive processing abilities. The subject first has to generalize the characteristics/qualities; the given pair of stimulus items has in common within the framework of apparent difference that both are not the same. Yet more processing has to be undertaken to mention two common features that the given pair has. The subject is expected to trace some homogeneity within the given variance. 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 8** tests memory which is the necessary facilitator for almost all learners. The item nos. 1 and 2 aims at measuring the child’s memory at surface levels. Item no.3 measures it at a deeper level. The subject's range of observation and knowledge could be measured by these items 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 9: Receptive Language (RL)**

- Item No. 1 it aims at testing the encoding processes of verbal visual stimuli the spontaneous semantic processing to ensure comprehension. The problems in input and processing can be diagnosed by this item.
- 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.
- 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.
Methods and Procedure

Subtest 10: Expressive Language (EL)

- 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).
- 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, find out the correct words in his lexical structure to represent the stimulus and use the words in correctly formed sentences. In other words 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.

Reliability

A test- Retest method was used to establish reliability of the test. The reliability coefficient of the test was 0.80 and reliability index was 0.87.

Validity

Content validity was established on the basis of the expert opinions and comments. The items were carefully selected.

Construct validity was also checked to test the internal consistency of the test.

Scoring

Each item of the sub tests has to be secured separately according to the instructions given in the manual. The score of each area and the composite score has to be counted it is likely that the score obtained may be in fractions.
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- A score of 3 or less, obtained in any subset, 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 sub test has to be checked in relation to the subject’s score in other sub tests, for diagnostic purpose.
- A score of 8-10 in any sub test may be accepted as a relatively stronger sub area.

3.3.4 Schonell Spelling Age Test:

This test was constructed by Fred J Schonell, 1932. The assessment area of the test is English Spellings. It can be administered on an individual or a group. It assesses dictated spellings. The purpose of the test is to provide a quick and easy assessment of spelling attainment. It measures spelling ages of the subjects.

Reliability:

The reliability of the test was established by calculating reliability coefficient of 50 subjects of 7th class. Test- Retest method was used to find the reliability coefficient which comes out to be 0.59.

Validity:

The content validity of the test was established on the basis of expert opinion and comments. There was total agreement among the experts regarding the purpose of the test that it provides a quick and easy assessment of spellings.

Scoring:

The scoring of the spelling age was done by using the formula:

\[
\text{Spelling Age} = \frac{\text{no. of correctly spelt words}}{10} + 5
\]

E.g. \[
\text{Spelling Age} = \frac{25}{10} + 5 = 7.5 \text{ years}
\]
Methods and Procedure

3.3.5 Schonell Reading Age Test:

This test was constructed by Fred J Schonell, 1932. The norms were revised in 1971. The assessment area of the test is English Reading. It can be administered on an individual or a group. It assesses most basic decoding and comprehension skills. It measures reading ages of the subjects.

Reliability:

The reliability of the test was established by calculating reliability coefficient of 50 subjects of 7th class. Test- Retest method was used to find the reliability coefficient which comes out to be 0.62.

Validity:

The content validity of the test was established on the basis of expert opinion and comments. There was total agreement among the experts regarding the purpose of the test that it provides most basic decoding and comprehension skills and it measures reading ages of the subjects.

Scoring:

The scoring of the reading age was done by using the formula:

\[
\text{Reading Age} = \left( \frac{\text{no. of correctly read words}}{10} \right) + 5
\]

\[\text{e.g. Reading Age} = \frac{25}{10} + 5 = 7.5 \text{ years}\]

3.4 TOOLS USED FOR THE STUDY

Following tools were used to conduct the experiment and see the effectiveness of the cognitive strategies used in the study:

- Achievement test constructed and standardized by the investigator was used as pre-test and post-test (appendix-I).
- Emotional Intelligence Scale (EIS) developed by Anukool Hyde, Sanjyot Lelthe and Upinder Dhar, 2001 was used to determine EI score.
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- Academic Anxiety Scale for Children (1986) developed by Dr. A.K. Singh and Dr. A. Sen Gupta was used to determine the anxiety level of the sample student.
- Learning material for imparting Instruction through cognitive strategies was developed by the investigator (appendix-IV).

3.4.1 Development of Achievement Test

Achievement testing plays an important role in the school programme. It evaluates a learner’s understanding of a specific course. According to Dwyer (1972), ‘Achievement testing refers to the assessment of the outcomes of formal instructions in cognitive domain’.

According to Ebel (1979), it can also be thought of as a sample of indicator of a student’s knowledge taken at a particular point of time. It is helpful to both teacher and the student in assessing learning readiness, monitoring learning progress, diagnosing learning difficulties and evaluating outcomes.

As the investigator could not get an appropriate standardized achievement test for evaluating learner’s achievement in selected topics of general science of class 7th, the same was developed and standardized by the investigator herself.

The various steps undertaken to develop the test are given below:

3.4.1.1 Planning of the Test

According to Mehrens (1978), in developing a specific measuring instrument, the first task is to identify and describe objectives, then a table of specifications or a blue print should be constructed and finally there should be a match between every item and every instructional objective.

Since, the investigator was working with learning disabled students the following aspects were taken into consideration while planning the test.
Methods and Procedure

- The test was designed for the students of age group 11-13 years studying in class 7th grade in various schools of Chandigarh.
- Topics of General Science were taken for the test.
- Language of the test was kept simple
- Difficult level of the test was also kept low.

In light of the above suggestions objectives of the test were defined.

Content of the test

The test devised covered the contents of the following topics selected from class 7th General Science of CBSE Board.

- Animal Fibers
- Wool from sheep
- Processing fiber to wool
- Processing fiber to wool (Contd.)
- Heat – Temperature
- Temperature (contd.)
- Conduction
- Convection
- Radiation
- Clothing in winters

Blue Print

Blue print of the Achievement test contains the number of questions taken from each topic under the chosen instructional objectives. The blue print of the test so prepared is given in Table 3.1.

The achievement test prepared for use in the present study is given in Appendix-I.
Table 3.1 Blue Print of Achievement Test

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Objectives</th>
<th>Knowledge</th>
<th>Comprehension/Understanding</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Topics/Items</td>
<td>MCQ</td>
<td>Blanks</td>
<td>T/F</td>
</tr>
<tr>
<td>1</td>
<td>Animal Fibres</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Wool from sheep</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Processing fibre to wool</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Processing fibre to wool (Contd.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>HeatTemperature</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Temperature(contd)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Conduction</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Convection</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Radiation</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Clothing in winters</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>8</strong></td>
<td><strong>5</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

3.4.1.2 Construction of Achievement Test

For the construction of Achievement test following steps were undertaken:

**Writing of test items**

Multiple choice, fill in the blanks, true/false and short answer type questions were written to cover the entire content area and teaching objectives. Care was taken that no objective remained untested. Precautions were taken while writing test items. The language used was simple, precise and accurate; the instructions were clear and simple. Interdependence among the items was avoided. Adjectives such as always, seldom, sometimes were avoided. The test was got recognized from the subject experts, language experts and those having experience in writing test items (technical experts). The doubtful items were rewritten and changed. There were 10 multiple
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choice items, 10 fill in the blanks, 10 true/false type and 10 short answer type questions. Since the content designed was for learning disabled students, so the scope of writing test items was very limited. Due to this reason the selected number of items were modified and changed with the expert guidance. Scoring key to the test was also prepared and got scrutinized. The medium for the test was English.

Individual tryout

The test so prepared was given to 20 students of different schools of Panchkula. Problems faced by the students were noted and given the due consideration at the time of revision of the first stage draft. Answer scripts were evaluated. On the basis of the performance of the students, discussions were held with the subject teachers and students individually. Then the achievement test was reviewed. As a result language of test items was modified. Second draft was prepared after this change.

Group try out

A sample of 50 students of class VII of Carmel Convent School Sector-9, Chandigarh were administered the second draft of the test. The answer scripts were evaluated and the achievement test was subjected to item analysis.

Item analysis of data

After group tryout the answer scripts were arranged in descending order of scores. These were subjected to Kelly’s item analysis technique (1939).

According to Kelly, if upper twenty seven percent and lower twenty seven percent of answer scripts are compared then one could say with great confidence that those in the upper group are superior in ability then those in the lower group.

From the above 50 answer sheets arranged in descending order of their achievement scores, upper group and lower group were taken up for computing the discriminating power and the difficulty value of the test. The following formulae were used to calculate the difficulty value (Dv) and discriminating power (Dp).
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\[ D_v = \frac{RU + RL}{n} \quad D_p = \frac{RU + RL}{0.5n} \]

Where

\( D_v \) = difficulty value of the item
\( D_p \) = discriminating power of the item
\( RU \) = number of right responses in the upper group
\( RL \) = number of right responses in the lower group
\( n = \) total number of items in both the groups

For this selection of items the criteria recommended by Ebel (1966) were given due consideration.

Table 3.2 Table Showing the Criteria for Selection of Items on the Basis of Discriminating Power (\( D_p \))

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Discriminating Power</th>
<th>Item Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.40 and above</td>
<td>Very good</td>
</tr>
<tr>
<td>2</td>
<td>0.20 to 0.39</td>
<td>Marginal items usually subject to improvement</td>
</tr>
<tr>
<td>3</td>
<td>Below 0.19</td>
<td>Poor items</td>
</tr>
</tbody>
</table>

Table 3.3 Table Showing the Criteria for Selection of Items on the Basis of Difficulty Value (\( D_v \))

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Difficulty value (( D_v ))</th>
<th>Item Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Above 0.75</td>
<td>Very poor</td>
</tr>
<tr>
<td>2</td>
<td>0.60 to 0.75</td>
<td>Marginal items usually subject to improvement</td>
</tr>
<tr>
<td>3</td>
<td>0.21 to 0.59</td>
<td>Very good</td>
</tr>
<tr>
<td>4</td>
<td>Below 0.20</td>
<td>Very poor</td>
</tr>
</tbody>
</table>
Table 3.4 Table Showing Difficulty Value (Dv) and Discriminating Power (Dp) of Items of the Achievement Test

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Discriminating Power (Dp)</th>
<th>Difficulty value (Dv)</th>
<th>Accepted/Rejected/Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.43</td>
<td>0.57</td>
<td>Accepted</td>
</tr>
<tr>
<td>2</td>
<td>0.78</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>3</td>
<td>0.35</td>
<td>0.68</td>
<td>Modified &amp; Accepted</td>
</tr>
<tr>
<td>4</td>
<td>0.35</td>
<td>0.68</td>
<td>Modified &amp; Accepted</td>
</tr>
<tr>
<td>5</td>
<td>0.57</td>
<td>0.64</td>
<td>Modified &amp; Accepted</td>
</tr>
<tr>
<td>6</td>
<td>0.50</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>7</td>
<td>0.78</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
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<td>0.54</td>
<td>Accepted</td>
</tr>
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<tr>
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<tr>
<td>13</td>
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</tr>
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</tr>
<tr>
<td>18</td>
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<tr>
<td>19</td>
<td>0.64</td>
<td>0.54</td>
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### Methods and Procedure

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0.64</td>
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<td>Accepted</td>
</tr>
<tr>
<td>21</td>
<td>0.57</td>
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<td>Modified &amp; Accepted</td>
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<td>0.64</td>
<td>Accepted</td>
</tr>
<tr>
<td>23</td>
<td>0.64</td>
<td>0.54</td>
<td>Modified &amp; Accepted</td>
</tr>
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<td>24</td>
<td>0.64</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>25</td>
<td>0.78</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>26</td>
<td>0.43</td>
<td>0.57</td>
<td>Modified &amp; Accepted</td>
</tr>
<tr>
<td>27</td>
<td>0.50</td>
<td>0.60</td>
<td>Modified &amp; Accepted</td>
</tr>
<tr>
<td>28</td>
<td>0.64</td>
<td>0.54</td>
<td>Accepted</td>
</tr>
<tr>
<td>29</td>
<td>0.43</td>
<td>0.54</td>
<td>Accepted</td>
</tr>
<tr>
<td>30</td>
<td>0.64</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>31</td>
<td>0.78</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>32</td>
<td>0.64</td>
<td>0.46</td>
<td>Accepted</td>
</tr>
<tr>
<td>33</td>
<td>0.50</td>
<td>0.54</td>
<td>Accepted</td>
</tr>
<tr>
<td>34</td>
<td>0.64</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>35</td>
<td>0.58</td>
<td>0.50</td>
<td>Accepted</td>
</tr>
<tr>
<td>36</td>
<td>0.58</td>
<td>0.64</td>
<td>Modified &amp; Accepted</td>
</tr>
<tr>
<td>37</td>
<td>0.64</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>38</td>
<td>0.64</td>
<td>0.46</td>
<td>Accepted</td>
</tr>
<tr>
<td>39</td>
<td>0.50</td>
<td>0.60</td>
<td>Accepted</td>
</tr>
<tr>
<td>40</td>
<td>0.64</td>
<td>0.46</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
Methods and Procedure

Reliability of the test

To test the reliability of the achievement test prepared for the study, test-retest method was used. The test was administered to fifty students of class 7th of Carmel Convent School, sector 9, Chandigarh. These students were not included in the sample for the study. After a gap of 15 days the same test was again administered to the same group. The two tests scores x & y were used to calculate the coefficient of correlation/reliability coefficient of the test. The coefficient of reliability was found to be 0.92 indicating the test to be reliable.

Validity of the test:

Validity means truthfulness. The test refers to the degree to which it measures what it intends to measure. Mouly (1970) remarked that the validity of a test must be established prior to its use. For validation is an aspect of its development, not of its use in the solution of the problem. Regarding the method of establishing the validity of the test, Mouly stated that at the most elementary level it was necessary for all the tests to have content validity that is each question might be related to the topic. Under investigation there might be an adequate coverage of overall topics, the questions must be clear and unambiguous. A most adequate approach to validation consisted checking the agreement between the responses elicited by the question against the criterion.

In the present study the items were validated against the objectives. The distribution of items against the objectives is given in Table 3.5. To determine content validity, the test items and list of objectives were also given to the panel consisting of five experts in subject matter and five experts in writing test items. The experts found one to one correspondence of test items with the objectives and hence the test was found valid.

The achievement test developed was used as Pre test and Post test. Copy of the test is given in appendix 1.

The topics mentioned in the table 3.5 were taken to prepare learning material for intervention strategies. Instructional objectives were defined to bring in learning outcomes in the students.
# Methods and Procedure

## Table 3.5 Table Showing Topics and Instructional Objectives

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Topics</th>
<th>General Objectives</th>
<th>Specific Objectives</th>
<th>Item numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Animal Fibres</td>
<td>Acquire knowledge about wool yielding animals, Acquire knowledge about type of fibres, Acquire knowledge about the source of wool,</td>
<td>Identify the wool yielding animals, Identify the part of animal from where wool is obtained Identify the type of fibres, Define the term fleece,</td>
<td>1 11 21 31</td>
</tr>
<tr>
<td>2</td>
<td>Wool from sheep</td>
<td>Acquire knowledge about the term Scouring, Understand the eating habits of animals,</td>
<td>Define the term scouring, Identify the process of scouring, Correlate type of food and animal,</td>
<td>2 32 12, 22, 33</td>
</tr>
<tr>
<td>3</td>
<td>Processing fibre to wool</td>
<td>Acquire the knowledge about the weather conditions in which hair of sheep is removed, Acquire knowledge about the source of woolen yarn, Acquire the knowledge about the way the fleece is removed,</td>
<td>Identify the weather conditions in which hair of sheep is removed, Identify the source of woolen yarn, Recall the process of shearing,</td>
<td>3 13 14, 23</td>
</tr>
<tr>
<td>4</td>
<td>Processing fibre to wool (Contd.)</td>
<td>Acquire knowledge about sorting and colour of hair of sheep, Acquire the knowledge about the various steps in the processing of wool,</td>
<td>Define sorting, Identify the colour of hair of sheep, List the various steps in the processing of wool,</td>
<td>4, 24, 34</td>
</tr>
<tr>
<td>5</td>
<td>Heat-Temperature</td>
<td>Acquire the knowledge about temperature, Understand how the temperature of body is measured, Apply the knowledge about radiation,</td>
<td>Define temperature, Correlate degree of hotness and temperature, Give reasons for feeling hot under sun,</td>
<td>5, 25 15 35</td>
</tr>
<tr>
<td>6</td>
<td>Temperature (contd.)</td>
<td>Acquire knowledge about thermometer, Acquire knowledge about body temperature, Understand the way the body</td>
<td>Identify the temperature range of thermometer, Identify the material contained in thermometer, Recall the normal body</td>
<td>6 16 36</td>
</tr>
</tbody>
</table>
### Methods and Procedure

<table>
<thead>
<tr>
<th></th>
<th>Conduction</th>
<th>Convection</th>
<th>Radiation</th>
<th>Clothing in winters</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Acquire the knowledge about conductors and insulators, Understands the way the heat travels,</td>
<td>Acquire knowledge about convection, Understand convection, Understand the nature of air as conductor of heat,</td>
<td>Acquire knowledge about radiation, Understand the process of radiation,</td>
<td>Understand the type of clothes being worn in winters, Apply the knowledge of heat and temperature,</td>
</tr>
<tr>
<td></td>
<td>Identify conductors, Give examples regarding conductors and insulators, Explain conduction, Explain the path of movement of heat,</td>
<td>Define convection, Identify example of convection, Set up relationship of air with conduction of heat,</td>
<td>Explain the process of radiation, Identify the examples of radiation, Recall that radiation does not require medium to travel, Differentiate between conduction and radiation,</td>
<td>Give reasons for increase in temperature with heat, Differentiate the amount of heat absorbed by light and dark coloured objects, Explain the reason for wearing dark clothes in winters, explain the reason for using woolen clothes in winters,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>7</th>
<th>17, 27</th>
<th>8, 38</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>26</td>
<td></td>
<td>88</td>
</tr>
</tbody>
</table>
Normality of the Achievement test

A test is said to be normal if the difficulty level of the items is balanced. On the basis of the difficulty index calculated for the test items, many test items were modified which ensured that the difficulty index of the test items was normally distributed.

3.4.1.3 Administration of the test

The students were asked to sit in their chairs comfortably in straight lines in the classroom. Then they were distributed the response sheets and asked to fill in their particulars. They were explained the nature of the test items and the method of writing the responses. Test sheets were distributed to them and they were asked to read the instructions carefully before answering the questions. After one hour response sheet cum question paper were collected.

Scoring:

The scoring of the answer script was done using the scoring key. Every correct answer was awarded the score one and incorrect answer zero. The total of correctly answered questions was considered as achievement score of the students.

3.4.2 Emotional Intelligence Scale

Emotional Intelligence Scale prepared by Anukool Hyde, Sanjyot Pethe and Upinder Dhar (2001) contains 34 items categorized under self awareness, empathy, self motivation, emotional stability, managing relations, integrity, self development, value orientation, commitment and altruistic behavior. It is suitable for both individual and group testing.

3.4.2.1 Factors of Emotional Intelligence:

A. Self-awareness is being aware of oneness and is measured by items 6, 12, 18, 29. The items are “I can continue to do what I believe in even under severe criticism,” “I have my priorities clear”, “I believe in myself, and “I have built rapport and made and maintained personal friendship with work associates.” This factor is the strongest and explains 26.8 percent variance and has a total factor load of 2.77. The correlation of this factor with total score is 0.66.
B. *Empathy* is feeling and understanding the other person and is measured by items 9, 12, 15, 20 and 25. These are “I pay attention to the worries and concerns of others.” “I can list to someone without the urge to say something.” “I try to see the other person’s point of view.” “I can stay focused under pressure, and “I am able to handle multiple demands.” This fact explains 7.3 percent variance with a total factor load of 3.11. The correlation of the factor with total score is 0.70.

C. *Self motivation* is being motivated internally and is measured by 2, 4, 7, 8, 31 and 34. These items are “People tell me that I am an inspiration for them,” “I am able to assess the situation and then behave,” “I can concentrate on the task at hand inspite of disturbances,” “I think feelings should be managed, and “I believe that happiness is an attitude.” This factor explains 6.3 percent variance with a total factor load of 3.28. The correlation of this factor with total score is 0.77.

D. *Emotional stability* is measured by items 14, 19, 26 and 28. These are “I do not mix unnecessary emotions with issues at hand,” “I am able to stay composed in both good and bad situations,” “I am comfortable and open to novel ideas and new information, and “ I am persistent in pursuing goals despite obstacles and setbacks.” This factor explains 6.0 percent variance with a total factor load of 2.51. The correlation of this factor with total score is 0.75.

E. *Managing relations* is measured by 1, 5, 11 and 17. The statement that measure this factor are “I can encourage others to work even when things are not favourable,” “I do not depend on others’ encouragement to do my work well,” “I am perceive as friendly and outgoing, and “I can see the brighter side of any situation.” This factor explains 5.3 percent variance with a total factor load of 2.38. The correlation of this factor with total score is 0.67.

F. *Integrity* is measured by items 16, 27, and 32. “I can stand up for my beliefs,” “I pursue goals beyond what is required of me and “I am aware of my weaknesses” are the statements that measure the factor. This factor explains 4.6 percent variance with a total factor load of 1.88.
G. *Self-development* is measured by items 30 and 33 which are “I am able to identify and separate my emotions and “I feel that I must develop myself even when my job does not demand it: and explains 4.1 percent variance with a total factor load of 1.29.

H. *Value orientation* is measured by items 21, 22. The statements are “I am able to maintain the standards of honesty and integrity and “I am able to confront unethical actions in others” and explains 4.1 percent variance with a total factor load of 1.29.

I. *Commitment* is measured by the items 23 and 24. “I am able to meet commitments and keep promises and “I am organised and careful in my work." It explains 3.6 percent variance with a total load of 1.3.

J. *Altruistic behaviour* is measured by the items 3 and 13. The items are "I am able to encourage people to take initiatives and "I can handle conflicts around me." It explains 3.0 percent variance with a total factor load of 1.3.

**Reliability**

The reliability of the scale was determined by calculating reliability coefficient on a sample of 200 subjects. The split-half reliability coefficient was found to be 0.88.

The reliability of the scale was re-established by calculating reliability coefficient of 50 subjects of class 7th. The split-half reliability coefficient was found to be 0.79.

**Validity**

Besides face validity, as all items were related to the variable under focus, the scale has high content validity. It is evident from the assessment of judges/experts that item of the scale are directly related to the concept of Emotional Intelligence. In order to find out the validity from the coefficient of reliability (Garrett, 1981), the reliability index was calculated which indicated high validity on account of being 0.93.

**3.4.2.2 Administration of the Test**

The test was administered on the group of students. They were asked to give their views by putting a tick mark on any five alternatives of the items. They should tick that alternative which best suites them.
Methods and Procedure

Scoring

In this scale there are five options for every question. These five options are: strongly agree, agree, uncertain, disagree and strongly disagree. The score for the options are 5, 4, 3, 2, 1 respectively. Total score of the subject is one’s emotional intelligence score.

3.4.3 Academic Anxiety Scale for Children

Academic Anxiety Scale for Children (1986) was developed by Dr. A. K. Singh and Dr. A. Sen Gupta. This scale has been developed for use with school students of age range of 13-16 years. The final form of this scale has 20 items.

Reliability

The reliability of this scale was computed through test – retest method and split- half method. The test- retest reliability coefficient obtained was 0.60 and split-half reliability coefficient obtained was 0.65. The reliability of the scale was re-established by calculating reliability coefficient of 50 subjects of class 7th. The split- half reliability coefficient was found to be 0.58.

Validity

The present test was validated against Sinha anxiety test, Neuroticism scale of MPI and CAAT. Former two tests are the measures of general anxiety and the latter intends to measure academic anxiety among the school children.

Scoring

The maximum possible score of this test is 20. In this scale, each item of the test is scored as either +1 or 0. There are two types of items: positive and negative. All positive items which are endorsed by the subjects as ‘Yes’ and all negative items no. 4, 9, 16 &18 which are endorsed as ‘No’ are given +1. A score of ‘0’ is awarded to all other answers. Thus high score on test indicates high anxiety and low score on test indicates low anxiety.
Methods and Procedure

3.4.4 Preparation of Learning Material

For providing interventions through the three strategies, learning material was developed by the investigator. The learning material was based on the selected topics of NCERT science text book of 7th class.

Planning of the Learning Material

Since the investigator was working with learning disabled students, the following aspects were taken into consideration while preparing the learning material.

- The learning material was taken from the text book only.
- The language of the material was kept very simple.
- Very small amount of material was taken at each step.
- Before the students were asked to read the material, they were asked to get conversant with the key words used in the small module. They were supposed to know the spellings, meaning and pronunciation of the words.
- The same material was used for the three different strategies. Only the way the material was presented to the students was made different.
- The material was supplemented with number of different types of questions which formed the draft of achievement test at pre test and post test level.
- In total ten modules were prepared for the students.

Content of the learning material

The learning material covered the contents of the following topics.

- Animal Fibers
- Wool from sheep
- Processing fiber to wool
- Processing fiber to wool (Contd.)
- Heat – Temperature
- Temperature (contd.)
- Conduction
Methods and Procedure

- Convection
- Radiation
- Clothing in winters

Objectives of the Learning Material

The learning material was based on knowledge and understanding objectives of educations. Following changes in behaviour of the students were expected after completing the instructions.

The students will be able to:

- Identify the wool yielding animals, the part of animal from where wool is obtained and the type of fibers,
- Define the term fleece and scouring,
- Identify the process of scouring,
- Correlate type of food and animal,
- Identify the weather conditions in which hair of sheep is removed and the source of woolen yarn,
- Recall the process of shearing,
- Define sorting,
- Identify the colour of hair of sheep,
- List the various steps in the processing of wool,
- Define temperature,
- Correlate degree of hotness and temperature,
- Give reasons for feeling hot under sun,
- Identify the temperature range of thermometer and the material contained in thermometer,
- Recall the normal body temperature,
- Correlate the instrument and body temperature,
- Identify conductors,
- Give examples regarding conductors and insulators,
- Explain conduction and the path of movement of heat,
- Define convection,
- Identify example of convection,
Methods and Procedure

- Set up relationship of air with conduction of heat,
- Explain the process of radiation and identify the examples of radiation,
- Recall that radiation does not require medium to travel,
- Differentiate between conduction and radiation,
- Give reasons for increase in temperature with heat,
- Differentiate the amount of heat absorbed by light and dark coloured objects.

Preparation of Rough Draft and Editing

The rough draft of the learning material was prepared. The investigator at the first instant herself reviewed the material. Then it was subjected to editing by subject experts and language experts and technical experts. The material was given to ten different people for editing. The necessary changes were made.

Validation

After the editing was done, the same was evaluated for validation by the three ways- self evaluation, evaluation by students and expert appraisal. The content matter of the instructional material was checked by the investigator for factual accuracy as well as for its relevance to the objectives defined. To check whether the developed instructional material was according to the mental level of the students of 7th class and was effective in acquisition of the concepts taken, ten students studying in different schools were chosen to go through the material and give their feedback. Suggestions and comments of ten science teachers about the developed material were taken and incorporated in the material.

Final Draft of Learning Material

Taking into consideration the above suggestions final draft was prepared for the sample students. The final draft of the learning material is given in appendix IV.
3.5 PROCEDURE FOR IDENTIFICATION OF LEARNING DISABLED STUDENTS

The study was conducted on the learning disabled students. The sample of learning disabled students was identified from the various schools of Chandigarh. Following steps were undertaken to identify the sample.

- First of all, the investigator sought the permission of DEO schools, Chandigarh Administration, Chandigarh to conduct the study and collect the data related to the study. The total sample of 479 students was taken for the study.

- Investigator approached the Principals of the selected schools and requested for all the sections of class VII. Academic records (marks obtained in finals of class VI exams including marks obtained in subjects of Science and English) of the sample students were sought from the class teacher. The purpose was to separate out and delete from the study those students who were performing well in all the areas of study and were not showing any problem in academic areas. As a result, investigator dropped 145 students from the total sample taken. Especially the students showing problem in both the subjects of Science and English were included in the study.

- Further, investigator used Referral Form to know the details about the selected students. Since the number of students was large, so, the investigator took collective information from the concerned teachers about the problems faced by specific students in the area of Science and English. Those students who were recommended to be normal in studies were dropped from the study. Again, 90 students were dropped from the study.

In the next step, investigator tested the students for their IQ. Investigator used ‘Draw-A- Man test’ for Indian Children (2006) by Dr. Pramila Phatak to test the IQ of the sample students. The students with IQ less than 90 on ‘Draw-A- Man test’ for IQ was dropped from the study. Majority of the students had IQ more than 90. Only 34 students were dropped
from the sample. Now, the investigator was left with only 210 students for the study.

- In the next attempt, investigator gave Diagnostic Test of Learning Disability (DTLD) by Swarup and Mehta to the selected sample of 210 students to identify the learning disabled students. The analysis of the raw data of DTLD test helped to reduce the sample further. It has been found that the selected sample at this stage was strong at Eye-hand-coordination (EHC), Figure ground perception (FG), Figure constancy (FC) and secured less in Position in space (PS), Special relations (SR), Auditory perception (AP), Memory (M), Cognitive abilities (CA), Receptive language (RL) and Expressive language (EL). The score of 5 or less in any test was considered to be critical. Even students securing 6-7 marks in few tests were put under observation. The percentage mean scores of students under each category is shown in Table 3.6

Table 3.6: Table Showing Percentage Mean Scores of Sample Students under each Category of DTLD

<table>
<thead>
<tr>
<th>Areas of DTLD Test</th>
<th>EHC</th>
<th>FG</th>
<th>FC</th>
<th>PS</th>
<th>SR</th>
<th>AP</th>
<th>M</th>
<th>CA</th>
<th>RL</th>
<th>EL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Scores</td>
<td>7.80</td>
<td>7.90</td>
<td>8.33</td>
<td>5.63</td>
<td>4.94</td>
<td>4.26</td>
<td>4.26</td>
<td>4.0</td>
<td>4.8</td>
<td>2.44</td>
</tr>
<tr>
<td>Percentage Mean Scores</td>
<td>78</td>
<td>79</td>
<td>83.3</td>
<td>56.3</td>
<td>49.4</td>
<td>42.6</td>
<td>42.6</td>
<td>40</td>
<td>48</td>
<td>24.4</td>
</tr>
</tbody>
</table>

From this test investigator separated out 80 students.

- Further investigator administered Schonell’s Spelling Age and Schonell’s Reading Age test to look for the mental age of the students. It has been found that the sample students were 3-4 years less than their chronological age.
Methods and Procedure

Since the study undertaken was delimited to comprehension problems of learning disabled students in the subject of Science, so a Teacher made Diagnostic test of Comprehension in the subject of Science was given to the students under study. The purpose was to have that sample in which those students were there whose comprehension problem in English was effecting achievement in Science. Finally, dropping yet another 34 students, investigator, selected 96 students for the study.

The data of DTLD and Schonell's Spelling & Reading Age test is appended in Appendix-III.

3.6 PROCEDURE OF COLLECTION OF DATA

After identification of the learning disabled students the study was conducted in three phases. In phase I, the learning disabled students were subjected to Achievement Pre test, Emotional Intelligence test and the test of Anxiety. In Phase II, the L.D. students were divided into three groups which were subjected to three cognitive strategies, that is, (i) Self Instructional Technique, (ii) Mediated Learning and (iii) Reciprocal teaching. In Phase III Achievement Post test was administered on the selected sample. The raw data was collected by administering various tools. Schematic layout of the study is given in the table 3.7.

Table 3.7 Table Showing Schematic Layout of the Study

<table>
<thead>
<tr>
<th>SNo</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Achievement Pre- test Emotional Intelligence Scale Anxiety Scale</td>
<td>Achievement Pre-test Emotional Intelligence Scale Anxiety Scale</td>
<td>Achievement Pre-test Emotional Intelligence Scale Anxiety Scale</td>
</tr>
<tr>
<td>2</td>
<td>Intervention through Self Instructional Technique</td>
<td>Intervention through Mediated Learning</td>
<td>Intervention through Reciprocal Teaching</td>
</tr>
<tr>
<td>3</td>
<td>Achievement Post- test</td>
<td>Achievement Post- test</td>
<td>Achievement Post- test</td>
</tr>
</tbody>
</table>
3.7 STATISTICAL TECHNIQUES USED

The data collected was subjected to statistical analysis through descriptive and inferential. Descriptive statistics such as mean, median, mode, standard deviation, skewness and kurtosis were computed to study the nature and distribution of data. ANOVA (3 x 2 x 2) and t-test as inferential statistics were used to test the hypotheses.