CHAPTER - IV
CHAPTER IV

METHOD OF THE STUDY

The present chapter deals with the method of the study which covers the sample, design of the study, procedure and statistical techniques used for the data analysis.

4.1. SAMPLE

The research investigation was carried out on the students of Class VII taken from two representative English medium, secondary schools of Chandigarh. The schools were selected on the basis of the organizational climate. The age of the students ranged between 11 and 13 years. Fifty five per cent of the students were males. Students of the democratic and authoritarian schools belonged to middle and upper middle SES group in an equal proportion. One group consisting of high and equal proportion of low intelligence levels was randomly allocated to the Integrated System of Instruction (ISI) and the other matching group to the Traditional Instruction (TI) in both the schools. The final sample comprised of 166 students with 84 students from the Democratic climate school and 82 students from the Authoritarian climate school. The Table 4.1 shows the sample distribution with respect to the number of students in each sub-sample:

<table>
<thead>
<tr>
<th></th>
<th>AUTHORITARIAN</th>
<th>DEMOCRATIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISI</td>
<td>TI</td>
</tr>
<tr>
<td>HI</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>LI</td>
<td>20</td>
<td>21</td>
</tr>
</tbody>
</table>

n = 82
n = 84

T = .166

HI - High Intelligence
LI - Low Intelligence
Two groups of students with high and low intelligence levels were selected on the basis of top and bottom 27 per cent intelligence scores as suggested by Kelly (1939). The table below shows the means and S.D.'s of the Treatment (ISI) and Control (TI) groups of the final sample:

**TABLE 4.2**

**MEANS AND S.D.'S OF INTELLIGENCE SCORES OF TREATMENT AND CONTROL GROUPS**

<table>
<thead>
<tr>
<th></th>
<th>AUTHORITARIAN</th>
<th>DEMOCRATIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISI</td>
<td>TI</td>
</tr>
<tr>
<td>HI</td>
<td>M = 65.95</td>
<td>M = 67.24</td>
</tr>
<tr>
<td></td>
<td>S.D. = 5.62</td>
<td>S.D. = 7.57</td>
</tr>
<tr>
<td>n</td>
<td>20 + 20</td>
<td>21 + 21</td>
</tr>
<tr>
<td>LI</td>
<td>M = 32.5</td>
<td>M = 31.62</td>
</tr>
<tr>
<td>n</td>
<td>20 + 20</td>
<td>21 + 21</td>
</tr>
</tbody>
</table>

HI - High Intelligence  LI - Low Intelligence

**4.2 DESIGN OF THE STUDY:**

Educational research is described as "experimental" when the researcher has, firstly, specified the finite set of researchable hypotheses and secondly, has established a systematic program of data gathering, under precisely defined conditions in an effort to test those hypotheses. The hypotheses provide a network of statements relating the impact of an independent variable or a set of independent variables on some outcome variable or dependent variable(s) (Ingersoll, 1984).

Weiner (1977) has rightly remarked that the experimental method which is suitable for testing hypotheses, is the strongest available method for developing and understanding psychological concepts. Any experimental problem has two interrelated aspects, the design of the experiment and the statistical analysis of the data. The latter aspect is directly dependent upon the former aspect. Statistical methods can greatly increase the efficiency of an experiment and also strengthen the conclusions so obtained (Montgomery, 1984).
The good experimental design should provide some information with respect to all the objectives of the experiment (Winer, 1971) and be kept as simple as possible (Montgomery, 1984). Accordingly, a 2x2x2x2 factorial design combined with ANCOVA (Campbell and Stanley, 1963) was employed. The factorial design was used as it permits to evaluate the combined effect of two or more experimental variables when used simultaneously. Information obtained from factorial design experiment is more complete than that obtained from a series of single factor experiments in the sense that, evaluation of interaction effects can be made. Also, the population to which inference can be made is more inclusive than the corresponding population for a single factor experiment (Winer, 1971).

The single covariate in the analysis of covariance was the respective pre-test scores on the Achievement Test. ANCOVA was preferred to increase the precision of analysis of the experimental data, which utilized both the pre-test and the post-test scores. The present study employed three replications of the 2x2x2x2 factorial designs with four fixed variables of which the measures on one variable were repeated. The model was a fixed one because all the levels of the four variables in each of the designs were determined on a logical basis and were not selected by sampling (Guilford and Fruchter, 1976). Computational procedure was followed according to the technique given by Winer (1971). When a factorial design follows a fixed model in the technique of ANCOVA, the error term is always the "within treatment mean squares" (Edward, 1971).

In the three replications of the 2x2x2x2 design, there were different sets of dependent and independent variables. The one 2x2x2x2 factorial design was computed by ANCOVA for the total scores. Here, instructional design, school climate, intelligence and learning types for levels of objectives, were the independent variables. Each one of these variables was studied at two levels. The total attainment was the dependent variable. The variable of instructional design was studied for Integrated System of Instruction (T1) and Traditional Instruction (T2). The variable of school climate was studied at Authoritarian (S1) and Democratic (S2) levels. The third variable of intelligence was studied at high intelligence (I1) and low intelligence (I2) levels and lastly the learning type for levels of objectives, viz., Knowledge (O1) and Comprehension (O2). The schematic layout of the design has been presented in the Fig. 4.1.
Fig. 4.1
Schematic Layout of 2x2x2x2 ANCOVA for Total Scores

ACHIEVEMENT SCORES

T₁  T₂
S₁  S₂
I₁  I₁  I₂  I₂
O₁  O₁  O₁  O₁
O₂  O₂  O₂  O₂

T₁ - Integrated System of Instruction
T₂ - Traditional Instruction.
S₁ - Authoritarian Climate.
S₂ - Democratic Climate.
I₁ - High Intelligence.
I₂ - Low Intelligence.
O₁ - Knowledge Level.
O₂ - Comprehension Level.
The second 2x2x2x2 factorial design was analyzed with the help of ANCOVA for the scores on concept attainment. Here, there were four independent variables, instructional design, school climate, intelligence and levels of learning. The concept attainment was the dependent variable. Each one of the four independent variables were studied at two levels. The variables of instructional design, climate, and that of intelligence were studied at levels specified above. The fourth variable of learning type was studied at two levels of concept learning, viz., concept learning at knowledge level (O₁,C) and concept learning at comprehension level (O₂,C). The schematic layout of the design has been presented in Fig. 4.2.

**Fig. 4.2**

Schematic Layout of 2x2x2x2 ANCOVA for Concept Scores

Achievement Scores

<table>
<thead>
<tr>
<th></th>
<th>T₁</th>
<th>T₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>S₁</td>
<td>I₁ O₂ C</td>
<td>I₂ O₂ C</td>
</tr>
<tr>
<td>S₂</td>
<td>I₁ O₂ C</td>
<td>I₂ O₂ C</td>
</tr>
</tbody>
</table>

- T₁ - Integrated System of Instruction.
- T₂ - Traditional Instruction.
- S₁ - Authoritarian Climate.
- S₂ - Democratic Climate.
- I₁ - High Intelligence.
- I₂ - Low Intelligence.
- O₁ C - Concept learning at knowledge level.
- O₂ C - Concept learning at comprehension level.
The third 2x2x2x2 factorial design was computed with the help of ANCOVA on the scores of principle learning. This design comprised of four independent variables, instructional design, school climate, intelligence and levels of learning and the dependent variable was attainment scores of principle learning. Each one of the independent variables was studied at two levels. The variables of instructional design, climate and that of intelligence were studied at the levels already specified in the first design. The fourth variable of types of learning was studied at the two levels of principle learning, viz., principle learning at knowledge level (O₁P) and principle learning at comprehension level (O₂P). The schematic layout of the design has been presented in the Fig. 4.3.

Fig. 4.3

Schematic Layout of 2x2x2x2 ANCOVA for Principle Learning

ACHIEVEMENT SCORES

\[ \begin{array}{cccc}
T_1 & & & T_2 \\
S_1 & S_2 & S_1 & S_2 \\
I_1 & I_2 & I_1 & I_2 \\
O_{1P} & O_{1P} & O_{1P} & O_{1P} \\
O_{2P} & O_{2P} & O_{2P} & O_{2P} \\
\end{array} \]

T₁ - Integrated System of Instruction.
T₂ - Traditional Instruction.
S₁ - Authoritarian Climate.
S₂ - Democratic Climate.
I₁ - High Intelligence.
I₂ - Low Intelligence.
O₁P - Principle learning at Knowledge level.
O₂P - Principle learning at comprehension level.
4.3. CONTROL OF VARIABLES

In order to improve the clarity of the research problem and to facilitate the interpretation of data, certain controls were introduced by the researcher. A brief explanation of these experimental controls follows:

4.3.1. Organismic Variables:

In research, frequent use was made of response-inferred organismic variables (Edwards, 1968), which means a classification based upon prior observation of responses. Intelligence was the organismic variable in the present study, upon which classification was based in schools of different organizational climates. Intelligence was controlled by equating the number of high and low intelligence subjects in each group.

4.3.2. Stimulus Variables:

The general class of things that relate to the environment of conditions of stimulation are referred to as the stimulus variables. Control on this experimental variable was exercised by assigning the same teacher to all the "ISI" groups. The activities involved in treatment were exactly similar in different schools. Randomized administration of treatment also ensured the control on stimulus variable. In the present experiment, it was desired to see the difference in attainment scores when subjects were involved with an "authoritarian" teacher in one group and with a "democratic" teacher in the other. Behaviour of the teachers varied, but all the other aspects of the stimulus situation were maintained uniformly.

4.3.3. Response/Behavioural Variables:

It refers to any variable which involves some action or response of an organism. To control such variables, Criterion Test/Achievement Test was administered for a pre-test as well as post-test measurement. Every effort was made to administer the pre-test and post-test under the similar conditions of room, instructions, etc.

It was not possible for the experimenter to administer the treatments to all the groups during the same treatment period. The gap between pre-test of the two schools was 25 days. However, this limitation was overcome by the application of 2x2x2x2 ANCOVA, where initial differences were taken care of by the statistical analysis.

4.4. TOOLS:

The following tools were used for the purpose of data collection:
4.4.1 Integrated System of Instruction. (See details 3.1).
4.4.2 Achievement Test. (See details 3.2).
4.4.3 Jalota's Group Test of General Mental Ability (GTGMA).
4.4.4 Halpin and Croft's organizational Climate Description Questionnaire (OCDQ).
4.4.5 Rating Scales (See details 3.3).

All the tools but Jalota's GTGMA and Halpin and Croft's OCDQ were developed by the investigator herself. The development of each one has been reported in Chapter III. Jalota's test of General Mental Ability was selected from the range of available tests of Mental ability because it was validated on Panjab population. Reliability and validity of this test were comparable with other tests of mental ability. Finally, it was readily available in its latest version. Halpin and Croft's Organizational Climate Description Questionnaire was chosen as it has been used in a number of studies in India and abroad and has been found a reliable tool for assessing organizational climate of school. The description of these tools has been presented below.

4.4.3. Jalota's Group Test of General Mental Ability (GTGMA):

This test was utilized to measure the intelligence of the group. The test consists of 100 items pertaining to numerical reasoning similarities, analogies and language ability, etc. Time limit is 20 minutes. This form of the revised test was developed for the age-range 12 to 18 years. Reliability was calculated by odd-even method and was found to range between .879 to .979 for class VIII to X. The Concurrent Validity of the revised test ranged from 0.50 to 0.78 against the criteria of examination marks. Further, the factor analysis gave a pattern of three centroid factors, which exhibited an identification of the Verbal, Numerical and Reasoning factors. When all the tests are pooled together, the total sample is somewhat platykurtic with a kurtosis of 0.647 and a negative skewness of 0.271.

4.4.4. Halpin and Croft's Organizational Climate Description Questionnaire (OCDQ):

The OCDQ permits the portrayal of the organizational climate of a school. The OCDQ is composed of 64 Likert-type items which represent brief descriptions of teacher-teacher and teacher-principal social interaction in school organizations. It requires only 30 minutes for administration. The 64 items in the OCDQ are assigned to eight sub-tests which were delineated by factor-analytic methods. Four of these sub-tests pertain to characteristics of the group and the other four to characteristics of the principal as a leader. From the scores on these eight sub-tests, a profile for the school can be constructed, which depicts the school’s organizational climate.
By comparing profiles of different schools, the distinguishing features of their schools can be spotted, and thereby analyse the climate of a particular school.

The eight subtests that represent dimensions of organizational climate are: disengagement, hindrance, espirit, intimacy, aloofness, production emphasis, thrust and consideration. The difference between the open and closed climates is defined by the difference between the two profiles. The scale against which the respondent indicated the extent to which each statement characterized his/her school was defined by four categories, viz.,

1. Rarely occurs.
2. Sometimes occurs.
3. Often occurs.
4. Very frequently occurs.

In order to construct the school profiles, a school mean subtest score for each of the eight subtests needs to be computed.

4.5. **PROCEDURE**:

Procedure of the experiment was comprised of two main stages. They are:

(i) Selecting the experimental sample.
(ii) Conducting the experiment.

4.5.1. **Selecting the Experimental Sample**:

This stage involved the identification of schools in the Union Territory of Chandigarh on the basis of their organizational climates. For this, Halpin and Croft's OCDQ was administered to the teachers who were requested to respond frankly to each item without any fear and reservation, as their responses were kept strictly confidential. For collecting the requisite information from teachers, the investigator took about two weeks commencing from mid-September, 1984.

In each of the fourteen English medium secondary schools of Chandigarh, i.e., eight Government Model Schools and six private model schools, the ten teachers who taught Class VII were selected randomly and were invited to participate in voluntarily filling up the questionnaire. The responses on the OCDQ were scored for all the participants.
Scores of teachers on each of the eight dimensions of OCDQ, i.e., Disengagement (D), Hindrance (H), Espirit (E), Intimacy (I), Aloofness (A), Production Emphasis (P.E.), Thrust (T) and Consideration (C) were pooled up for each school and thus, eight means were calculated for each school. This was followed by the conversion of the raw scores into standard scores with an arbitrary mean of 50. The Table 4.3 below shows the standard scores for the fourteen schools on the eight dimensions of OCDQ.
<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Names of Schools</th>
<th>D</th>
<th>H</th>
<th>E</th>
<th>I</th>
<th>A</th>
<th>PE</th>
<th>T</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Govt. Model High School-10</td>
<td>61.48</td>
<td>46.60</td>
<td>50.96</td>
<td>60.20</td>
<td>66.30</td>
<td>63.00</td>
<td>58.63</td>
<td>61.42</td>
</tr>
<tr>
<td>2.</td>
<td>Govt. Model High School-19</td>
<td>63.16</td>
<td>56.60</td>
<td>51.79</td>
<td>59.60</td>
<td>56.70</td>
<td>64.18</td>
<td>54.24</td>
<td>66.01</td>
</tr>
<tr>
<td>3.</td>
<td>Govt. Model High School-16</td>
<td>41.09</td>
<td>50.60</td>
<td>46.02</td>
<td>29.40</td>
<td>37.70</td>
<td>41.24</td>
<td>36.93</td>
<td>37.57</td>
</tr>
<tr>
<td>4.</td>
<td>Govt. Model High School-22</td>
<td>36.62</td>
<td>62.60</td>
<td>50.14</td>
<td>46.09</td>
<td>55.20</td>
<td>46.33</td>
<td>53.51</td>
<td>61.42</td>
</tr>
<tr>
<td>5.</td>
<td>Govt. Model High School-32</td>
<td>59.25</td>
<td>44.60</td>
<td>37.80</td>
<td>55.99</td>
<td>60.25</td>
<td>50.65</td>
<td>51.07</td>
<td>55.00</td>
</tr>
<tr>
<td>6.</td>
<td>Govt. Model High School-35</td>
<td>53.10</td>
<td>49.93</td>
<td>39.97</td>
<td>54.43</td>
<td>44.84</td>
<td>33.00</td>
<td>37.66</td>
<td>39.40</td>
</tr>
<tr>
<td>7.</td>
<td>Govt. Model High School-37</td>
<td>60.64</td>
<td>55.30</td>
<td>46.60</td>
<td>66.40</td>
<td>65.99</td>
<td>38.88</td>
<td>56.40</td>
<td>50.87</td>
</tr>
<tr>
<td>8.</td>
<td>Govt. Model High School-20</td>
<td>48.63</td>
<td>62.60</td>
<td>41.60</td>
<td>47.13</td>
<td>41.97</td>
<td>57.71</td>
<td>39.12</td>
<td>38.49</td>
</tr>
<tr>
<td>9.</td>
<td>Shivalik Public School</td>
<td>63.99</td>
<td>61.30</td>
<td>49.04</td>
<td>54.43</td>
<td>48.06</td>
<td>63.59</td>
<td>43.51</td>
<td>40.78</td>
</tr>
<tr>
<td>10.</td>
<td>Sarv Hitkari School</td>
<td>44.16</td>
<td>42.60</td>
<td>71.30</td>
<td>65.05</td>
<td>58.46</td>
<td>55.35</td>
<td>64.24</td>
<td>64.17</td>
</tr>
<tr>
<td>11.</td>
<td>International Public School</td>
<td>49.19</td>
<td>58.60</td>
<td>42.20</td>
<td>53.91</td>
<td>46.63</td>
<td>48.88</td>
<td>46.68</td>
<td>42.16</td>
</tr>
<tr>
<td>12.</td>
<td>St. Stephens School</td>
<td>33.55</td>
<td>31.30</td>
<td>72.40</td>
<td>53.91</td>
<td>36.95</td>
<td>51.82</td>
<td>72.05</td>
<td>54.08</td>
</tr>
<tr>
<td>13.</td>
<td>St. Kabir School</td>
<td>41.65</td>
<td>43.90</td>
<td>46.29</td>
<td>36.70</td>
<td>41.61</td>
<td>35.94</td>
<td>40.34</td>
<td>45.37</td>
</tr>
<tr>
<td>14.</td>
<td>Manav Mangal School</td>
<td>43.60</td>
<td>33.90</td>
<td>53.98</td>
<td>36.70</td>
<td>39.46</td>
<td>49.47</td>
<td>50.59</td>
<td>43.53</td>
</tr>
<tr>
<td>M'S</td>
<td>Means</td>
<td>50.01</td>
<td>50.03</td>
<td>50.01</td>
<td>49.99</td>
<td>50.01</td>
<td>50.02</td>
<td>50.36</td>
<td>50.02</td>
</tr>
</tbody>
</table>

D = Disengagement,  H = Hindrance,  E = Espirit,  I = Intimacy,  A = Aloofness,  PE = Production Emphasis,  
T = Thrust,  C = Consideration.
Fig. 4.4.1 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 10
BASED ON STANDARD MEANS OF 8 SUB-TESTS OF
ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

Fig. 4.4.2 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 19
BASED ON STANDARD MEANS OF 8 SUB-TESTS OF
ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
Fig. 4.4.3 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 16 BASED ON STANDARD MEANS OF 8 SUB-TESTS OF ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

Fig. 4.4.4 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 22 BASED ON STANDARD MEANS OF 8 SUB-TESTS OF ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
Fig. 4.4.5 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 32
BASED ON STANDARD MEANS OF 8 SUB-TESTS OF
ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

Fig. 4.4.6 PROFILE OF GOVT MODEL HIGH SCHOOL SECTOR 35
BASED ON STANDARD MEANS OF 8 SUB-TESTS OF
ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
Fig. 4.4.7 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 37
BASED ON STANDARD MEANS OF 8 SUB-TESTS OF
ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

STANDARD SCORES

D - DISENGAGEMENT
H - HINDRANCE
E - ESPIRIT
I - INTIMACY
A - ALOOFNESS
PE - PRODUCTION EMPHASIS
T - THRUST
C - CONSIDERATION

Fig. 4.4.8 PROFILE OF GOVT. MODEL HIGH SCHOOL SECTOR 20
BASED ON STANDARD MEANS OF 8 SUB-TESTS OF
ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
Fig. 4.4.9 Profile of Shivalik Public School based on standard means of 8 sub-tests of Organizational Climate Description Questionnaire.

Fig. 4.4.10 Profile of Sarv Hitkari School based on standard means of 8 sub-tests of Organizational Climate Description Questionnaire.
Fig. 4.11 PROFILE OF INTERNATIONAL PUBLIC SCHOOL BASED ON STANDARD MEANS OF 8 SUB-TESTS OF ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

Fig. 4.12 PROFILE OF ST. STEPHEN'S SCHOOL BASED ON STANDARD MEANS OF 8 SUB-TESTS OF ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
Fig. 4.4.13 PROFILE OF St. KABIR SCHOOL BASED ON STANDARD MEANS OF 8 SUB-TESTS OF ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE

Fig. 4.4.14 PROFILE OF MANAV MANGAL SCHOOL BASED ON STANDARD MEANS OF 8 SUB-TESTS OF ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
In accordance with the specifications of Halpin and Croft, the following Table 4.4 was constructed showing the various levels, i.e., Low, Moderate and High levels for the eight sub-tests for closed and open climates.

**TABLE 4.4**

**LEVELS OF DIMENSIONS FOR DIFFERENT CLIMATES**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Open</th>
<th>Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disengagement</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Hindrance</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Espirit</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Intimacy</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Aloofness</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Production Emphasis</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Thrust</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Consideration</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

For interpretation of the results, American norms were not followed as such but were considered only as guidelines. The raw scores were taken in relation to their respective group means for each of the eight sub-tests. The group mean of each school on each sub-test was the basis for identifying whether that particular school was low or moderate or high on a particular dimension. Hence, low disengagement, high espirit, low aloofness, moderate intimacy and high thrust were identified as representatives of open climate and high disengagement, low espirit, low thrust, moderate intimacy and moderate aloofness as determinants of the closed climate. This led to the identification of the schools on the basis of their organizational climate. Thus, as observed from their profiles from Figs. 4.4.1 to 4.4.14, the Government Model High School - 22, Sarv Hitkari School, St. Stephens School and Manav Mangal School were identified as open schools and the Government Model High School - 33, Government Model High School - 20 and Shivalik Public School were identified as closed schools. No clear trend was observed in Government Model High School - 10, Government Model High School - 19, Government Model High School - 16, Government Model High School - 32, Government Model High School - 37, International Public School and St. Kabir School.
Croft, the co-developer of OCDQ suggested a procedure that provides an index of teacher's perceptions of the **relative openness** of their schools' climates. This is done by subtracting the Disengagement subtest score from the sum of the Espirit and Thrust scores for each subject. The higher the resulting score, the more open is the respondent's perception of the school's organizational climate. (Helsel, Aurbach and Willower, 1969).

For each respondent, a score was obtained after calculation through Croft's formulation, viz., \((E+T) - D\). Thereafter, a mean for each school was obtained from the scores of 10 respondents of a particular school. For all the fourteen schools under consideration, corresponding means exhibiting their relative openness were calculated. They have been exhibited in Table No. 4.5.

**TABLE 4.5**

MEANS SHOWING RELATIVE OPENNESS OF SCHOOLS

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name of Schools</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>St. Stephens School</td>
<td>54.6</td>
</tr>
<tr>
<td>2.</td>
<td>Sarv Hitkari School</td>
<td>47.2</td>
</tr>
<tr>
<td>3.</td>
<td>Govt. Model High School - 22</td>
<td>37.8</td>
</tr>
<tr>
<td>4.</td>
<td>Manav Mangal School</td>
<td>35.5</td>
</tr>
<tr>
<td>5.</td>
<td>Govt. Model High School - 10</td>
<td>31.3</td>
</tr>
<tr>
<td>6.</td>
<td>Govt. Model High School - 19</td>
<td>29.2</td>
</tr>
<tr>
<td>7.</td>
<td>St. Kabir School</td>
<td>29.0</td>
</tr>
<tr>
<td>8.</td>
<td>Govt. Model High School - 16</td>
<td>27.9</td>
</tr>
<tr>
<td>9.</td>
<td>International Public School</td>
<td>27.6</td>
</tr>
<tr>
<td>10.</td>
<td>Govt. Model High School - 37</td>
<td>27.1</td>
</tr>
<tr>
<td>11.</td>
<td>Govt. Model High School - 32</td>
<td>24.2</td>
</tr>
<tr>
<td>12.</td>
<td>Govt. Model High School - 20</td>
<td>23.7</td>
</tr>
<tr>
<td>13.</td>
<td>Shivalik Public school</td>
<td>23.5</td>
</tr>
</tbody>
</table>
Out of the three relatively typical open/democratic schools and three relatively closed/authoritarian schools, two schools each representing different organizational climates were selected on the criteria of:

(a) Co-operation of school authorities and teaching staff,
(b) Administrative facility of parting with vital periods of time on the time-table and
(c) The number of subjects. (about 150 in Class VII of each school).

Thus, Government Model High School - 22 and Shivalik Public School were selected for the experiment; the former school as representative of an open democratic climate and the latter school as representative of a closed/authoritarian climate.

In order to select the experimental sample, Jalota's test of General Mental Ability was administered to 307 students of Class VII in November, 1984, from the two selected schools, as per instructions given in its manual. Time limit for the test was 20 minutes which was adhered to strictly. Separate answer sheets were provided to the students to enable reuse of the test booklets. Scoring was done with the help of the scoring key. The raw scores obtained were used as such in the study.

The students were arranged in ascending order of their intelligence scores in both the schools separately. The 27 percent upper and 27 percent lower scoring subjects were selected and the middle groups were dropped. Each one of the selected group was randomly allocated to the two sub-groups. One sub-group from the high scoring and another from the low, was allotted to the ISI treatment and the similar matching group to TI treatment. The plan of allocation was uniformly followed for the other schools also. The means and S.D.'s of the intelligence scores of the 8 - experimental subgroups have already been given in Table 4.2.

4.5.2. Conducting the Experiment:
The experiment was conducted in five phases given below:-

Phase 1: Instructions for classroom climate.
Phase 2: Administration of Pre-Test.
Phase 3: Instructional Program.
Phase 4: Administration of Post-Test.
Phase 5: Administration of Retention Test.
PHASE 1: INSTRUCTIONS FOR CLASSROOM CLIMATE

After identification of the schools with open and closed organizational climate and selecting from both the high and low intelligence groups, the instructions for management of the classroom climate on the democratic and authoritarian patterns were administered to the concerned teachers. The open organizational climate was supplemented by the democratic management and the closed organizational climate by the authoritarian management of the classroom climate. The former was typically termed as democratic school climate and latter, the authoritarian school climate.

The teachers participating in the experiment were presented with a pen picture of a typical democratic and a typical authoritarian teacher in behavioural terms.

The democratic teacher is supposed to:
- encourage students for participating in classwork.
- take co-operative decisions alongwith students.
- conduct classroom with active co-operation of students.
- deliver lectures and give information.
- solve their learning problems.
- provide opportunity to students for self-learning followed by group discussion.
- show regards for new ideas and initiative.
- maintain environment of mutual trust and friendship.

A typical authoritarian teacher is supposed to:
- exercise centralized control.
- do all the planning of the class.
- direct all instructional activities of the students.
- deliver all information that students are expected to receive.
- clarify doubts and present explanations.
- observe strict discipline with respect to the code of conduct in school and outside.
All these instructions were discussed in detail with the teachers who were participating in the experiment. They willingly agreed to comply with the above instructions.

**PHASE 2 : ADMINISTRATION OF PRE-TEST :**

An Achievement/Criterion Test was administered uniformly to all the selected groups. The time limit for the test was one hour. Separate response sheets were provided. The answer sheets were scored with the help of the scoring key. The scores indicated the previous knowledge possessed by the students.

**PHASE 3 : INSTRUCTIONAL PROGRAM :**

The Treatment Group was taught by the investigator herself via the ISI, a new instructional model, incorporating the integration of a number of ideas, assumed or proved to be essential for efficient and effective classroom instruction by the researchers in the field of Educational Technology.

The instructional program lasted for twelve days. For this duration, one period of 40 minutes daily allotted to the Science subject in the school timetable of Class VII was given to the instructional treatment. The lessons were delivered to the students. The instructional procedures and measures incorporated in the ISI have been described below:

Firstly, student's enthusiasm for learning science through a novel method of instruction was exploited for motivating the group. The students were also encouraged to participate in the instructional program.

In every instructional unit, appropriate new stimulus material was presented to the students without an overdose of new information. The over-head projector was utilized to project the instructional material and diagrams imprinted on the transparencies. The same was also used to sketch diagrams in the classrooms during instruction. Both the teacher-made and ready made transparencies were utilized.

Students were directed to take class-notes. At the beginning of lessons, the hand-outs were distributed to the class, that served as enrichment material. New information presented to the students was supplemented with examples and illustrations and was related to the students' experiential domain, thereby following
the guide-lines of the pre-developed twelve lessons. Thus, the principle of application of classroom instruction and learning in the actual life was followed.

The content was recapitulated and summarized at intervals in the process of imparting classroom instruction. During instruction, students were required to make responses, that forced them to demonstrate acquisition of the new information. Corrective feedback or confirmation were provided as and when needed.

Developmental questions were used to help in the progress of the lesson from time to time. Towards the completion of each lesson, a semi-structured criterion test consisting of 5 to 10 short-answer, objective type items on the content of the lesson was conducted each day. Its results were given to the students the following day. It served as a feedback for students that helped them to assess as well as modify their learning. This enabled the students to take charge of their own learning approximately to the terminal behaviour.

In order to prevent the accumulation of deficiencies that may cause serious learning problems towards the end of the lesson, students' doubts were clarified by means of Remedial Instruction. Students were given Home assignment which included reading the relevant part of the chapters from their science textbook, drawing diagrams on their notebooks and observation of simple scientific phenomenon, etc.

The Control Group was taught by the regular science teacher in a conventional way. The content and the time of instruction for this group were equated with that of the Treatment Group.

Information related to the "Manners" and "Initiative" of students of the ISI and TI groups of both high and low intelligence levels was obtained from the teachers through two rating scales developed by the investigator. Four teachers were asked to rate each student on a 5-point scale on the traits of "Manners" and "Initiative" and to make the ratings relative to other children in the classroom.

**PHASE 4 : ADMINISTRATION OF THE POST-TEST**

At the end of the twelve lessons, the Achievement/Criterion Test was administered to the students of both the Treatment and Control groups. Time limit was one hour. After completion of the test, the students were thanked for
their co-operation and were given no indication of the later test. The answer sheets were scored with the aid of the scoring key.

PHASE 5: ADMINISTRATION OF THE RETENTION TEST

Fifteen days later, the same Achievement/Criterion Test was again administered to the students to get a measure of retention. Time limit was one hour. Again the obtained answer sheets were scored with the help of the scoring key.

These five phases marked the end of the experiment in one school. Similarly, all the phases were replicated in the other schools. Date schedule of the experiment has been given in the table below:

TABLE 4.6
DATE SCHEDULE OF THE EXPERIMENT

<table>
<thead>
<tr>
<th>Phase</th>
<th>Democratic School</th>
<th>Authoritarian School</th>
</tr>
</thead>
</table>

The data thus obtained was subjected to statistical analysis.

4.6. STATISTICAL TECHNIQUES:
The following statistical techniques were employed to analyse the data obtained from the experiment in order to test the hypotheses:

1. Graphical presentations.
2. Calculation of index of instructional effectiveness.
3. Qualitative analysis of Criterion scores.
(5) Three replications of fixed model of 2x2x2x2 factorial design employing ANCOVA.

(6) Non-parametric statistics, i.e., Chi-square calculation for Retention scores.

(7) 2x2 ANOVA for analysis of rating scores for 11 traits of "MANNERS" and 6 traits of "INITIATIVE".

The analysis of data through the application of the above mentioned statistical techniques have been reported in the following chapter.