6.1 INTRODUCTION

The impact of philosophical, psychological, physiological, sociological changes and scientific advancement on education are so great that changes in educational theory and practice have become necessary to re-adjust educational objectives with changing concepts and growing needs of the society.

Education needs many improvements including in the field of teaching techniques. The competency in teaching can be enhanced by adopting innovative ways of instructions and their skillful handling by the teachers. An innovative practice in teaching can be brought by adopting model of teaching.

The models of teaching describe the process of specifying and producing particular environmental situation which causes interest in the student and a specific change occurs in his/her behaviour. Bruce and Weil have warned that a 'Model of teaching' is not a simple fixed formula for completing the subject. It provide guide lines of creating an environment from which students are likely to learn
certain kind of things. It has to be flexible, so as to modify it to fit different types of subject matter and to individual needs.

Inquiry Training Model belongs to informational processing family of models, developed by Richard Suchman. It is concerned with the intellectual development of students. This model emphasis the development of independent inquiry technique among students, promote active and autonomous learning as the students formulate questions and test ideas. The chief outcomes of inquiry training model are the processes involved- observing, collecting and organising data, identifying and controlling variables, making and testing hypotheses, formulating explanations and drawing inferences. The inquiry begins with a puzzling event and students inquire into it. After this, students formulate hypotheses and they collect data through questions and at this place the role of the teacher is to answer the questions in 'yes' or 'No' so that the students may find the solution of tentative guesses, and through this they find the solution of the problem.

6.2 STATEMENT OF THE PROBLEM

EFFECTIVENESS OF INQUIRY TRAINING MODEL OF TEACHING ON COGNITIVE DEVELOPMENT AND ACQUISITION OF PROCESS SKILLS IN RELATION TO SELF CONCEPT AND INTELLIGENCE.
6.3 OBJECTIVES OF THE STUDY

1. To study the effectiveness of inquiry training model as compared to conventional mode of instruction.

2. To study whether teaching strategies interact with the levels of intelligence or not.

3. To study whether teaching strategies interact with self concept or not.

4. To study whether the self concept of learner is related to cognitive structures and acquisition of process skills or not.

5. To study whether intelligence of learner effects the development of cognitive structures and acquisition of process skills.

6. To train students in the process of making scientific inquiry.

6.4 HYPOTHESES

The present study was conducted to test the following hypotheses:

1(a) There will be no significant difference in terms of mean scores on cognitive structures test between groups exposed to inquiry training model and conventional method of teaching.

1(b) There will be no significant difference in terms of mean scores on acquisition of process skills test between groups exposed to inquiry training.
model and conventional method of teaching.

2(a) There will be no significant difference between mean scores of high and Low self concept groups on the cognitive structures test.

(b) There will be no significant difference between high and low self concept groups with respect to acquisition of process skills.

3(a) Intelligence does not effect significantly the development of cognitive structures irrespective of the teaching model.

(b) Intelligence does not effect significantly the acquisition of process skills irrespective of the teaching model.

6.4.1 INTERACTIONAL HYPOTHESES

FIRST ORDER

1. a) There will be no significant interaction between levels of self concept and teaching strategies in the development of cognitive structures.

b) There will be no significant interaction between levels of self concept and teaching strategies in the acquisition of process skills.

2. a) There will be no significant interaction between levels of self concept and levels of intelligence in the development of cognitive structure.

b) There will be no significant interaction between levels of self concept and levels of intelligence
in acquisition of process skills.

3. a) There will be no significant interaction between levels of intelligence and teaching strategies in the development of cognitive structures.

b) There will be no significant interaction between levels of intelligence and teaching strategies in the acquisition of process skills.

SECOND ORDER INTERACTION

1. a) There will be no significant interaction among the variables of teaching strategy, self concept and intelligence in the development of cognitive structures.

b) There will be no significant interaction among the variables of teaching strategy, self concept and intelligence in the acquisition of process skills.

6.5 SAMPLE

For conduct of experiment, a sample of 200 students was raised randomly from X class students. Four schools were selected randomly from Govt. Model High/Senior Secondary School of Chandigarh Administration (U.T.). The average age of the sample was 14-15 years. Another two samples of 55 students each were raised randomly for construction and development of acquisition of process skills test.

6.6 TOOLS USED

The following tools were used to collect data.
1. General Mental Ability Test [Revised test (72)] developed and published by S. Jalota (1976) was used to measure intelligence.

2. Self concept of Ability Test by Sodhi and Tejinder Mohini. This test was used to measure self concept.

3. Content comprehension test by Sodhi and Tejinder Mohini. This test was used to measure development of cognitive structures.

4. Process skills test was developed and standardized by the investigator to measure acquisition of process skills.

6.7 PROCEDURE
The scheme for the experiment was as under:

PHASE 1
Following tests were administered on total samples.

1. Jalota's General mental ability test for juniors to measure intelligence level.

2. Sodhi and Tejinder Mohini's self concept ability test to measure self concept.

3. Sodhi and Tejinder Mohini's test of formal thinking to measure cognitive structures (as pre test).

4. A test of acquisition of process skills developed by investigator to measure acquisition of process
skills (as pre test).

**PHASE II**

Total sample was divided into two equal groups. One group was taught 10 topics with traditional method of teaching and the other group with inquiry training model.

**PHASE III**

At the end of teaching both the groups were administered content comprehension test and acquisition of process skills test as post-test to measure the development of cognitive structures and acquisition of process skills respectively.

6.8 **ANALYSIS OF DATA**

The data were analysed using descriptive statistics namely mean, median, standard deviation, skewness and kurtosis. To test the hypotheses analysis of variance on gain scores was employed separately on scores of cognitive structures and acquisition of process skills. In order to test the significance of difference between means, t-ratios were also calculated.

**RESULTS**

The results of analysis of variance are shown in the tables 6.1 and 6.2.
Table 6.1 Summary of analysis of variance in respect of cognitive structures

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MSS</th>
<th>F-ratio</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Model)</td>
<td>434.59</td>
<td>1</td>
<td>434.5</td>
<td>38.28</td>
<td>Significant at 0.01 level</td>
</tr>
<tr>
<td>B (Self concept)</td>
<td>27.22</td>
<td>1</td>
<td>27.22</td>
<td>2.39</td>
<td>Insignificant</td>
</tr>
<tr>
<td>C (Intelligence)</td>
<td>12.80</td>
<td>2</td>
<td>6.40</td>
<td>0.56</td>
<td>-do-</td>
</tr>
<tr>
<td>A x B (Model x Self concept)</td>
<td>1.07</td>
<td>1</td>
<td>1.07</td>
<td>0.094</td>
<td>-do-</td>
</tr>
<tr>
<td>A x C (Model x intelligence)</td>
<td>14.28</td>
<td>2</td>
<td>7.14</td>
<td>0.629</td>
<td>-do-</td>
</tr>
<tr>
<td>B x C (Self concept x intelligence)</td>
<td>24.12</td>
<td>2</td>
<td>12.06</td>
<td>1.06</td>
<td>-do-</td>
</tr>
<tr>
<td>A x B x C (Model x self concept x intelligence)</td>
<td>8.76</td>
<td>2</td>
<td>4.38</td>
<td>0.38</td>
<td>-do-</td>
</tr>
<tr>
<td>Error within</td>
<td>2133.88</td>
<td>188</td>
<td>11.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2656.72</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.2 Summary of analysis of variance in respect of acquisition of process skills

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MSS</th>
<th>F-ratio</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Model)</td>
<td>2168.66</td>
<td>1</td>
<td>2168.66</td>
<td>140.27</td>
<td>Significant at 0.01 level</td>
</tr>
<tr>
<td>B (Self concept)</td>
<td>0.2696</td>
<td>1</td>
<td>0.2696</td>
<td>0.017</td>
<td>Insignificant</td>
</tr>
<tr>
<td>C (Intelligence)</td>
<td>35.31</td>
<td>2</td>
<td>17.65</td>
<td>1.14</td>
<td>-do-</td>
</tr>
<tr>
<td>A x B (Model x Self concept)</td>
<td>57.82</td>
<td>1</td>
<td>57.82</td>
<td>3.37</td>
<td>Significant at 0.05 level</td>
</tr>
<tr>
<td>A x C (Model x intelligence)</td>
<td>23.32</td>
<td>2</td>
<td>11.66</td>
<td>0.75</td>
<td>Insignificant</td>
</tr>
<tr>
<td>B x C (Self concept x intelligence)</td>
<td>18.19</td>
<td>2</td>
<td>9.09</td>
<td>0.61</td>
<td>-do-</td>
</tr>
<tr>
<td>A x B x C (Model x self concept x intelligence)</td>
<td>107.57</td>
<td>2</td>
<td>53.78</td>
<td>3.47</td>
<td>Significant at 0.05 level</td>
</tr>
<tr>
<td>Error within</td>
<td>2907.68</td>
<td>188</td>
<td>15.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5319.60</td>
<td>199</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0.05 level of significance = 3.04
6.9 CONCLUSIONS DRAWN ON THE BASIS OF ANALYSIS OF VARIANCE

1. Inquiry training model of teaching was found to be more effective in the acquisition of science process skills as compared to conventional method of teaching.

2. There was a significant difference in the development of the cognitive structures of students exposed to inquiry training model as compared to conventional method of teaching.

3. Students having high self concept did not differ in mean scores on acquisition of science process skills test from students having low self concept.

4. High self concept as well as low self concept students scored equal mean scores on development of cognitive structures test.

5. Intelligence was found to be redundant variable. Intelligence of learner did not change scores significantly on process skills test.

6. Levels of intelligence also did not effect mean scores in the development of cognitive structures test, so intelligence acted as a redundant variable.

7. Teaching strategies did not interact significantly with levels of self concept in the development of cognitive structures.
8. Teaching strategies interact significantly with levels of self concept in terms of acquisition of science process skills.

9. Teaching strategies did not interact with levels of intelligence in terms of acquisition of science process skills.

10. Levels of self concept did not interact significantly with levels of intelligence in the development of cognitive structures as well as in the acquisition of science process skills.

11. Teaching strategies did not interact significantly with levels of self concept or with different levels of intelligence in development of cognitive structures.

There is an appreciable interaction among teaching strategies x levels of self concept x levels of intelligence. Low self concept students having average and below average intelligence acquired a higher level of mastery when taught through inquiry training model, they did better than even students having high self concept and high intelligence but taught through conventional method of teaching.

6.10. **IMPLICATIONS AND APPLICATIONS OF THE PRESENT STUDY**

The findings of the present study have some important implication for improving the quality of instructions in the acquisition of science process skills at
high school stage.

In schools, the teacher must be trained to utilise the inquiry training model.

Inquiry training model is very useful for development of thought processes among students. It gives freedom to the child to think independently. They can find the solution on their own. Inquiry training model also trains the child in the mental faculty in asking pointed questions. It enhances the comprehension of the students.

Inquiry training model can be applied in the classroom teaching with other strategies of teaching. It is more useful for teaching physical sciences in which the pupils are provided with laboratories and materials and they can conduct experiments on their own.

Inquiry training model makes the child in building up a theory and then to test it, thus it inculcate scientific attitude among pupils.

The findings of the study will help the teacher to adjust their strategies of teaching keeping in view the type of class and the type of educational objectives to be attained by the students.

The findings of the present study show that students with low self-concept having average and below average intelligence acquired higher level of mastery when taught through inquiry training model then the students having high self-concept and high intelligence but taught
through conventional method of teaching.

6.11. **SUGGESTIONS FOR FURTHER STUDY**

1. Comparison of this model can be done with other models or strategies of teaching.

2. The present study may be conducted in other subjects at different levels.

3. Effectiveness of the study may be conducted by involving more variables such as
   a) Creativity
   b) Sex
   c) Personality
   d) Age of students
   e) Socio-economic status
   f) Climate of the class

4. The present study may be conducted at college level on other subjects specially in physics and chemistry where practicals can be performed easily.

5. Effectiveness of this model can be seen on the pre-service teachers.

6. For arriving at results having wider applicability the present study may be replicated on the large sample.