CHAPTER - VIII

SUMMARY AND CONCLUSIONS
8.1 INTRODUCTION

We live in a world of materials, time and space. Mathematics provides a system for describing these in terms of quantity or magnitude. Without this system, it would be impossible to talk with others about this aspect of the world. It involves two levels of knowledge. On one hand are quantitative attributes and relationships of the objects in the world, and on the other are symbols used to represent these attributes and relationships. This dual nature of mathematics has important implication for what is taught as mathematics and how it is taught. In the past there has been a tendency to teach all of mathematics as if it were a symbol without reference to the world.

Teachers of mathematics have as their primary objective, the promotion of learning in mathematics. This is not a simple task. The content to be learned and the maturity of the students vary from grade to grade, and learning has varied aspects and can take place through many avenues. The students may not all learn
things in the same ways, or at the same speed, or with the same facility and completeness. The teacher has the dual task of setting appropriate classroom objectives and planning learning activities which in his judgement give promise of proceeding his student with kind of experiences that can bring them to the attainment of objectives.

Effective instruction can be guaranteed by any single simple formula. The teacher has to select subject-matter, mode of presentation, learning activities, suiting to the age and intellectual development of students. So they require different teaching strategies for themselves to be taught as no one method of teaching is sufficient. Due to individual differences, a teacher has to use a combination of methods to make his teaching success and fruitful.

8.2 **STATEMENT OF THE PROBLEM** :

"To study the effectiveness of different strategies of teaching on achievement in Mathematics in relation to intelligence, sex and personality".

8.3 **OBJECTIVES OF THE STUDY** :

1. Whether achievement in Mathematics is affected by different strategies of teaching or not.

2. Whether different strategies have differential effects on achievement of male and female students.
3. Whether levels of intelligence interact with teaching strategies in terms of achievement, or not.

4. Whether personality acts as a potential factor in selection of a teaching strategy or not.

8.4 HYPOTHESES:

A study will be advanced on the basis of the following hypotheses:

1. Significant differences in mathematics achievement do not arise due to different strategies of teaching.

2. Intelligence does not account for differential achievement in mathematics.

3. Sex does not account for the differential achievement in mathematics.

4. Personality does not significantly affect achievement in mathematics.

5. (a) There is no significant interaction between levels of intelligence and strategies of teaching.
   
   (b) There is no significant interaction between sex and strategies of teaching.
   
   (c) There is no significant interaction between personality and strategies of teaching.
   
   (d) There is no significant interaction between personality and intelligence.
(e) There is no significant interaction between intelligence and sex.

(f) There is no significant interaction between sex and personality.

6. No significant interaction of second order or third order will be observed due to intelligence, sex, personality and strategies of teaching.

7. There is not significant interaction among levels of intelligence and sex.

8.5 DESIGN OF THE STUDY:

In the present study a factorial design has been employed. The independent variables in the study included strategies of teaching, sex, personality and intelligence and the criterion variable achievement in mathematics concepts. The classification variable of sex included boys and girls, the variable of personality involved extroverts and introverts, the variable of intelligence involved three levels of intelligence i.e. low, average and above average, the treatment variable, strategies of teaching was varied in three ways namely- Lecture - discussion strategy (St A₁), Inductive-drill strategy (St A₂) and auto-instruction-group discussion strategy (St A₃).

8.6 SAMPLE:

The sample of 300 students was raised randomly from IX class students. Four schools were selected randomly from Government High/
Higher Secondary Schools of Chandigarh (U.T.). The average age of the sample was 14 years.

8.7 TOOLS:

The mathematics achievement test, the group test of general mental ability and personality inventory were used as basic tools for the collection of data.

8.8 DEVELOPING THE PROGRAMMED TEXTS:

One programmed text in linear style made by Shri Chanchal Singh, on the topic of set theory was used. One programmed text in linear style on the topic of Trigonometry was locally developed. The text was developed, keeping in view, educational objectives expressed in behavioural terms.

8.9 VALIDATION OF PROGRAMMES:

Linear programmed text was validated against internal criteria of 10 percent error rate at individual, small group and field testing stage.

8.10 DEVELOPING ACHIEVEMENT TEST:

An achievement test was locally developed to measure achievement in different categories of educational objectives taught through different modes of instruction. The test was developed in order to measure achievement in six categories of
educational objectives as classified by B.S. Bloom in the
cognitive domain. The test was validated at three stages.
The final draft of the achievement test consisted of fifty
items. Items were of multiple choice type, completion type,
involving calculations and short answer types. The reliability
of test was calculated by test-retest method and was found
to be .81, and the test, was validated against content
validity.

8.11 ANALYSIS OF DATA:

The data was analyzed by rising descriptive statistics
such as mean, medians, standard deviation, skewness and kurtosis.
To test the hypotheses, analysis of variance (3 x 2 x 2 x 3)
was employed. In order to test the significance of differences
between means, the t-ratios were calculated.

8.12 RESULTS:

The results of analysis of variance and mean achievement
scores are shown in Tables 8.1 and 8.2 respectively:
### TABLE 8.1

**Summary of Analysis of Variance**

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-ratio</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies (A)</td>
<td>2</td>
<td>96.333</td>
<td>48.166</td>
<td>1.692</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Sex (B)</td>
<td>1</td>
<td>92.042</td>
<td>92.042</td>
<td>3.233</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Personality (C)</td>
<td>1</td>
<td>9.375</td>
<td>9.375</td>
<td>0.30293</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Intelligence (D)</td>
<td>2</td>
<td>374.520</td>
<td>187.263</td>
<td>6.578</td>
<td>Significant at .01 level</td>
</tr>
<tr>
<td>Strategy and Sex (A x B)</td>
<td>2</td>
<td>127.440</td>
<td>63.721</td>
<td>2.238</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Strategy and Personality (A x C)</td>
<td>2</td>
<td>47.444</td>
<td>23.722</td>
<td>0.833</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Strategy and Intelligence (A x D)</td>
<td>4</td>
<td>547.130</td>
<td>136.780</td>
<td>4.805</td>
<td>Significant at .01 level</td>
</tr>
<tr>
<td>Sex and Personality (B x C)</td>
<td>1</td>
<td>17.225</td>
<td>17.225</td>
<td>0.605</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Sex and Intelligence (B x D)</td>
<td>2</td>
<td>193.750</td>
<td>96.875</td>
<td>3.403</td>
<td>Significant at .01 level</td>
</tr>
<tr>
<td>Personality and Intelligence (C x D)</td>
<td>2</td>
<td>43.250</td>
<td>24.125</td>
<td>0.847</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Strategy x Sex x Personality (AxBxC)</td>
<td>2</td>
<td>21.370</td>
<td>10.685</td>
<td>0.375</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Strategy x Sex x Intelligence (AxBxD)</td>
<td>4</td>
<td>52.471</td>
<td>13.117</td>
<td>0.460</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Strategy x Personality x Intelligence (AxCxD)</td>
<td>4</td>
<td>383.30</td>
<td>95.825</td>
<td>3.366</td>
<td>Significant at .01 level</td>
</tr>
<tr>
<td>Sex x Personality x Intelligence (BxCxD)</td>
<td>2</td>
<td>10.953</td>
<td>5.4765</td>
<td>0.192</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Strategies x Sex x Personality x Intelligence (AxBxCxD)</td>
<td>4</td>
<td>89.486</td>
<td>22.371</td>
<td>0.785</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Error Variance</td>
<td>180</td>
<td>5123.8</td>
<td>28.465</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total** 215
### Table 8.2
Table showing Mean Scores

<table>
<thead>
<tr>
<th>Ability</th>
<th>High</th>
<th>Average</th>
<th>Below Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRATEGY I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introverts</td>
<td>16.17</td>
<td>22.17</td>
<td>16.50</td>
</tr>
<tr>
<td>Extroverts</td>
<td>16.67</td>
<td>17.83</td>
<td>17.75</td>
</tr>
<tr>
<td>STRATEGY II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introverts</td>
<td>18.50</td>
<td>13.58</td>
<td>16.08</td>
</tr>
<tr>
<td>Extroverts</td>
<td>19.42</td>
<td>17.08</td>
<td>13.92</td>
</tr>
<tr>
<td>STRATEGY III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introverts</td>
<td>21.25</td>
<td>12.58</td>
<td>13.92</td>
</tr>
<tr>
<td>Extroverts</td>
<td>18.83</td>
<td>18.67</td>
<td>13.83</td>
</tr>
</tbody>
</table>

### 8.13 Conclusions:

1. All the three teaching strategies namely -
   - Strategy I: Lecture-Deduction-Discussion
   - Strategy II: Induction-Discussion-Drill
   - Strategy III: Programmed Instruction-Discussion-Demonstration

   were found to be equally effected in terms of achievement.
in mathematics, disregarding the levels of intelligence, sex and personality type.

2. Boys and girls of superior ability did not show any significant difference between their mean scores on achievement in mathematics. Likewise low ability boys and girls did equally well in mathematics at high school level.

3. Girls of average ability scored significantly higher means than boys of average ability. It can be concluded that average ability girls are superior than average ability boys on achievement in mathematics. The result implied that sex interacted with average level of intelligence.

4. When levels of intelligence were crossed with each strategy of teaching, the result showed that except below average level of intelligence the other two levels namely - high and average level of intelligence interacted with each of the strategies.

5. Strategy I, namely - Lecture-Deduction-Discussion, found favour with average ability students as they scored significantly higher mean than above average and below average groups.

6. Strategy II and Strategy III namely - Induction-Discussion-Drill; Programmed Instruction-Discussion-Demonstration respectively, suited more to students having above average intelligence than average and below average intelligence.
7. It can be concluded that superior ability students should be taught through either by strategy II or by strategy III and average students should be taught through strategy I.

8. Strategy I was found to be equally effective with above average and below average introverts as well as extroverts. Under strategy I there were no significant differences among the means of introverts and extroverts having high intelligence and low intelligence. However, average ability introverts scored significantly higher mean than average extroverts. From the results, it can be concluded that strategy I most suited to average ability introverts.

9. Extroverts of high ability, average ability and below average ability scored equally well when taught through strategy I.

10. Under strategy II average ability extroverts scored significantly higher mean than average ability introverts. In case of below average ability group introverts scored significantly higher than extroverts. The result implied that strategy II namely Induction - Discussion - Drill suited more to extroverts of average ability and introverts of below ability. High ability introverts and extroverts when taught through Strategy II did not differ significantly so far the achievement in mathematics is concerned.

11. Under Strategy III introverts and extroverts of average ability differed significantly in their achievement. High ability and low ability extroverts did not differ significantly than high ability and low ability introverts.
12. Teaching Strategy III, namely - Programmed Instruction-Discussion-Demonstration suited more to average ability extroverts than average ability introverts.

13. Introverts of high ability scored highest mean score than all the groups formulated by crossing personality type with intelligence. It can be concluded from this result that strategy III suited most to the high ability introverts than any other treatment combination.

14. Out of the three strategies, strategy I is more suitable as a teaching strategy for below average extroverts and introverts.

15. For average ability introverts strategy I was found to be more suitable whereas for extroverts of strategy III.

16. For high ability introverts strategy III and for high ability extroverts strategy II and strategy III both were found to be most suitable teaching strategy.

8.14 EDUCATIONAL IMPLICATIONS AND APPLICATIONS OF THE PRESENT STUDY:

The findings of the present investigation have very important implications for improving the quality of instruction in the subject of Mathematics at high school stage. This study is very much significant for teachers, administrators and Principals because in this study the investigation has been made to see the effectiveness of various teaching strategies to be employed by the
teachers while teaching their classes. The Mathematics teachers must teach their classes with different teaching strategies because in most of the schools a class is of average ability and the students have different sex and belong to different places of residence.

This study will help the teacher to formulate the teaching strategies, keeping in view, the type of the classes they are to deal with. The Principals can improve the teaching of Mathematics by suggesting different teaching strategies for students having differential intelligence, personality patterns and sex in their respective schools. This investigation also helps the administrators to chalk out the plans for effective teaching in the subject of Mathematics at high schools.

8.15 SUGGESTIONS FOR FURTHER STUDIES:

1. The present study can be replicated involving more topics or entire course of Mathematics at high school stage.

2. Research studies may be conducted by developing more teaching strategies in other school subjects.

3. In studying the efficacy of teaching strategies in relation to sex, intelligence and personality, the following factors can be added:
   (a) Place of Residence.
   (b) Age of the Student.
   (c) Socio-Economic Status.
   (d) Socio-Emotional Climate of the Class.
   (e) Other teaching strategies.