CHAPTER-IV

ANALYSIS AND INTERPRETATION

➤ Introduction
➤ Analysis Related with Entry Behaviour Status of the Students
➤ Analysis Related with Terminal behaviour of the Students
➤ Verification of Hypothesis
CHAPTER-IV
ANALYSIS AND INTERPRETATION

4.0.0. INTRODUCTION

In the proceeding chapters, the theoretical framework of the problem, operationalisation of variables, review of related literature, the description of tools used in the study and method of the study were discussed. An attempt has been made in this chapter to present results emerging from the analysis of data. The inter relation of the results related to different variables of the study and their discussion have also been included in this chapter.

The tabulated data have no meaning unless these are analysed and interpreted by statistical techniques so as to arrive at significant conclusions and suggestions. It is necessary to get a meaningful picture of the raw information collected.

In the present study, the main objective was to compare the relative effect of Concept Attainment Model, Advance Organizer Model and Conventional Method of teaching on students' achievement in Economics. For this purpose, the data were collected in two parts: entry behaviour and terminal behaviour. Since, the study was experimental in nature, proper controls were employed. The study was conducted with the help of three groups, in which two groups were assigned as experimental group-I and experimental group-II and one group was assigned as control group. The students of the experimental group-I, experimental group-II and control group were taught Economics through Concept Attainment Model, Advance Organizer Model and conventional method, respectively.

To find out the relative effect of above said methods of teaching, the data were collected in two parts. In the first part, data were collected to match the students of the experimental groups and control group on the basis of their age, marks obtained in 10th class exam, pre-test achievement in Economics, socio-economic status and intelligence.
In the second part, the data were collected to evaluate the terminal behaviour of the subjects after giving the experimental treatment in terms of their achievement in Economics by administering criterion test in Economics (post-test). The analysis of the data has been discussed in the following sections:

4.1 Analysis related with entry behaviour status of the students.

4.2 Analysis related with terminal behaviour status of the students.

4.3 Verification of hypothesis.

4.1 ANALYSIS RELATED WITH ENTRY BEHAVIOUR STATUS OF THE STUDENTS

Here, the experimental group I, II and the control group were matched on the basis of age of the students, marks secured by the students in 10th class exam, their intelligence, their socio-economic status and criterion test scores in Economics (pre-test).

4.1.1 AGE WISE MATCHING

The ages of all the subjects of the three groups in complete years were taken from the school records. The means and SDs of age of all the subjects of three groups are shown in table 4.1.

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of Students</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruner’s Concept Attainment Model</td>
<td>30</td>
<td>15.83</td>
<td>0.778</td>
</tr>
<tr>
<td>Ausubel’s Advance Organizer Model</td>
<td>30</td>
<td>15.90</td>
<td>0.7895 or 0.79</td>
</tr>
<tr>
<td>Conventional Method of Teaching</td>
<td>30</td>
<td>15.97</td>
<td>0.795</td>
</tr>
</tbody>
</table>
The mean values for age of three groups came out to be 15.83, 15.90 and 15.97 respectively. These values show that the age of the subjects/students belonging to all the three groups was nearly the same.

4.1.2. MATCHING ON THE MARKS SECURED BY THE STUDENTS IN 10TH CLASS EXAMINATION

For matching the subjects on the basis of previous achievement, the marks secured by the students in 10th class exam were taken from school records. The means and SDs of the marks secured by all the subjects in 10th class for three groups are shown in table 4.2.

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of Students</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Bruner's Concept Attainment Model</td>
<td>30</td>
<td>46.67</td>
<td>5.676</td>
</tr>
<tr>
<td>II Ausubel's Advance Organizer Model</td>
<td>30</td>
<td>45.93</td>
<td>6.319</td>
</tr>
<tr>
<td>III Conventional Method of Teaching</td>
<td>30</td>
<td>45.80</td>
<td>5.231</td>
</tr>
</tbody>
</table>

The mean values for marks secured in 10th class by subjects in groups I, II and control group came out to be 46.67, 45.93 and 45.80 respectively. These values show that the subjects belonging to all the three groups were very similar as regards their marks in 10th class exam.

4.1.3 ACHIEVEMENT IN ECONOMICS

In the scheme of this study, students' achievement in Economics is the first outcome variable. This has been studied here focusing on the following objectives:
1. To compare the mean scores, on the criterion achievement test in Economics, of the three groups of students, to be taught Economics with the use of Concept Attainment Model (CAM), Advance Organizer Model (AOM), and Conventional Method (CM) of teaching, before the experimental treatment.

2. To compare the mean scores, on the criterion achievement test in Economics, of the three groups of students, to be taught Economics with the use of CAM, AOM and CM of teaching, after the experimental treatment.

3. To compare the gain scores, on the criterion achievement test in Economics, of the three groups of students, to be taught Economics with the use of CAM, AOM and Conventional Methods (CM) of teaching, after the experimental treatment.

Students' achievement in Economics has been adjusted on intelligence and socio-economic status by employing analysis of co-variance (ANCOVA). The ANCOVA results are given in Table 4.3 to 4.6 and Table 4.10 and 4.11.

The three groups have been further compared using ‘t’ test. For this purpose, Table 4.7 to 4.9 and Table 4.12. to 4.14 provide mean (M) standard deviation (S.D.) and ‘t’ values in respect of post-test and gain scores of experimental and control groups of students.

1) Comparison of mean achievement scores of Experimental Group I, Experimental Group II and Control Group, before the experimental treatment.

Table 4.3 and 4.4 provide ANCOVA results of students’ achievement in Economics adjusted on their intelligence and socio-economic status before the experimental treatment, i.e. at pre-test stage.
Table 4.3
ANCOVA FOR PRE-TEST ACHIEVEMENT SCORES SUMS AND MEANS OF EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II AND CONTROL GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Pre-test Achievement Scores</th>
<th>Intelligence Test Scores</th>
<th>Socio-Economics Status Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Σy</td>
<td>y</td>
<td>ΣX₁</td>
</tr>
<tr>
<td>I Bruner’s Concept Attainment Model</td>
<td>30</td>
<td>679</td>
<td>22.63</td>
<td>1475</td>
</tr>
<tr>
<td>II Ausubel’s Advance Organizer Model</td>
<td>30</td>
<td>690</td>
<td>23</td>
<td>1507</td>
</tr>
<tr>
<td>III Conventional Method of Teaching</td>
<td>30</td>
<td>656</td>
<td>21.867</td>
<td>1493</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>2025</td>
<td>67.497</td>
<td>4475</td>
</tr>
</tbody>
</table>

Table 4.4
SUMMARY OF ANCOVA FOR THE PRE-TEST ACHIEVEMENT SCORES IN ECONOMICS BETWEEN EXPERIMENTAL GROUP-I, EXPERIMENTAL GROUP-II AND CONTROL GROUP

<table>
<thead>
<tr>
<th>Sources of Variation</th>
<th>Degree of Freedom (df)</th>
<th>Residuals</th>
<th>F Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sum of Squares (Ss)</td>
<td>Mean Squares (Ms)</td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>2</td>
<td>196.8</td>
<td>98.4</td>
<td>2.847</td>
</tr>
<tr>
<td>Within</td>
<td>86</td>
<td>2972.5</td>
<td>34.564</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>3169.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note: The table value at 2/86 at 0.05 level of significance is 3.10 and at 0.01 level of significance is 4.86.

It is clear from the above Table 4.4 that the F value of 2.847 for df 2/86 for the experimental group-I, experimental group-II and control group is not significant at 0.01 as well as 0.05 level of significance. This reveals that there is no significant difference in the pretest mean achievement scores of two experimental groups and control group.

4.2 ANALYSIS RELATED WITH TERMINAL BEHAVIOUR OF THE STUDENTS

In the second part, the terminal behaviour of the experimental group-I, experimental group-II and control group was determined on the completion of the treatment. For this purpose the criterion test in Economics (post-test) was administered. The terminal behaviour of the three groups was analysed in the following tables.

(II) Comparison of mean achievement scores of the Experimental Group-I, Experimental Group-II and Control Group, after the experimental treatment:

ANCOVA results of students' achievement in Economics adjusted on their intelligence and socio-economic status scores after the experimental treatment, i.e. at post-test stage are provided in Table 4.5 and Table 4.6.
Table 4.5
ANOVA FOR POST-TEST ACHIEVEMENT SCORES SUMS AND MEANS OF EXPERIMENTAL GROUP-I, EXPERIMENTAL GROUP-II AND CONTROL GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Pre-test Achievement Scores</th>
<th>Intelligence Test Scores</th>
<th>Socio-Economics Status Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$\Sigma y$</td>
<td>$y$</td>
<td>$\Sigma X_1$</td>
</tr>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>1510</td>
<td>50.33</td>
<td>1475</td>
</tr>
<tr>
<td>Experimental Group-II</td>
<td>30</td>
<td>1416</td>
<td>47.20</td>
<td>1507</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>1199</td>
<td>39.97</td>
<td>1493</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>4125</td>
<td>137.5</td>
<td>4475</td>
</tr>
</tbody>
</table>

Table 4.6
SUMMARY OF ANOVA FOR THE POST-TEST ACHIEVEMENT SCORES IN ECONOMICS BETWEEN EXPERIMENTAL GROUP-I, EXPERIMENTAL GROUP-II AND CONTROL GROUP

<table>
<thead>
<tr>
<th>Sources of Variation</th>
<th>Degree of Freedom (df)</th>
<th>Residuals</th>
<th>$F$ Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sum of Squares (Ss)</td>
<td>Mean Squares (Ms)</td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>2</td>
<td>680.74</td>
<td>340.37</td>
<td>20.156</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
<tr>
<td>Within</td>
<td>86</td>
<td>1452.32</td>
<td>16.887</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>2233.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Table value at 2/86 df at 0.05 level of significance is 3.10 and at 0.01 level of significance is 4.86.

Table 4.6 indicates that the $F$-value of 20.156 for df 2/86 for the experimental group-I, experimental group-II and control is significant at 0.01.
as well as 0.05 level of significance. It shows that there is a significant
difference between the post-test mean achievement scores of experimental
group-I, experimental group-II and control group. This can further be tested by
applying the ‘t’ test. ‘t’ test has been applied to test the significance of
difference between the means of (i) experimental group-I and control group,
(ii) experimental group-II and control group,
(iii) experimental group-I and experimental group-II. These have been
discussed below:

Table 4.7
DIFFERENCE IN POST-TEST MEAN SCORES OF THE STUDENTS
OF EXPERIMENTAL GROUP-I AND CONTROL GROUP ON
ACHIEVEMENT IN ECONOMICS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>M(X)</th>
<th>S.D.</th>
<th>‘t’ Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>50.33</td>
<td>5.188</td>
<td>7.976</td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>39.77</td>
<td>4.868</td>
<td>7.976</td>
<td></td>
</tr>
</tbody>
</table>

Note: ‘t’ value (tabulated) at 0.05 level of significance is 1.96 and at 0.01
level of significance is 2.58.

From Table 4.7, it may be observed that the ‘t’ value of 7.976 for the
differences in the mean achievement scores, at the post-test stage, of the
students of experimental group-I and control group is significant at 0.01 as
well as 0.05 level of significance. The table also reveals that at the post-test
stage, the mean score of 50.33 of students of experimental group-I is higher
than the mean score of the control group which is 39.97. This indicates that
achievement in Economics of the students of experimental group-I is higher
than that of the control group after the treatment. Or in other words, we can
say that CAM is better than CM of teaching.
Table 4.8
DIFFERENCE IN POST-TEST MEAN SCORES OF THE STUDENTS OF EXPERIMENTAL GROUP-II AND CONTROL GROUP ON ACHIEVEMENT IN ECONOMICS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>M(X)</th>
<th>S.D.</th>
<th>'t' Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>47.2</td>
<td>3.2496</td>
<td>6.766</td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>39.97</td>
<td>4.868</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 't' value (tabulated) at 0.05 level of significance is 1.96 and at 0.01 level of significance is 2.58.

From Table 4.8, it is clear that at post-test stage, the 't' value 6.766 for the difference in mean scores of the students of experimental group-II and control group on achievement in Economics is significant at 0.01 as well as 0.05 level of significance. It may also be observed from the table that the mean score of 47.2 of the students of experimental group-II is higher than the mean score of 39.97 of the students of control group. This indicates that achievement in Economics of the students of experimental-II is higher than that of the control group, after the treatment. Or in other way it can be stated that here performance of the students taught through AOM is better than CM of teaching.

Table 4.9
DIFFERENCE IN POST-TEST MEAN SCORES OF THE STUDENTS OF EXPERIMENTAL GROUP-I AND EXPERIMENTAL GROUP-II ON ACHIEVEMENT IN ECONOMICS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>M(X)</th>
<th>S.D.</th>
<th>'t' Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>50.33</td>
<td>5.188</td>
<td>2.799</td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
<tr>
<td>Experimental Group-II</td>
<td>30</td>
<td>47.2</td>
<td>3.2496</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.9 indicates that at the post-test stage, the ‘t’ value 2.799 for the difference in mean scores of the students of experimental group-I and experimental group-II on achievement in Economics is significant at 0.01 as well as 0.05 level of significance. The mean score of 50.33 of the students of experimental group-I is higher than the mean score of the students of experimental group-II which is 47.2. This indicates that the achievement in Economics of the students of experimental group-I is higher than that of the experimental group-II. We can say that achievement in Economics is better of the students who are taught through CAM than that of taught through AOM.

(III) Comparison of mean gain achievement scores of Experimental Group-I, Experimental Group-II and Control Group, after the experimental treatment.

ANCOVA results of students’ achievement in Economics adjusted on their intelligence, socio-economic status scores and gain achievement scores in Economics after the experimental treatment are provided in the Tables 4.10 and 4.11.
### Table 4.10

**SUMMARY OF ANCOVA FOR THE MEAN GAIN POST-TEST ACHIEVEMENT SCORES IN ECONOMICS BETWEEN EXPERIMENTAL GROUP-I, EXPERIMENTAL GROUP-II AND CONTROL GROUP**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Pre-test Achievement Scores</th>
<th>Intelligence Test Scores</th>
<th>Socio-Economics Status Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$\sum y$</td>
<td>$y$</td>
<td>$\sum x_1$</td>
</tr>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>831</td>
<td>27.7</td>
<td>1475</td>
</tr>
<tr>
<td>Experimental Group-II</td>
<td>30</td>
<td>726</td>
<td>24.2</td>
<td>1507</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>543</td>
<td>18.1</td>
<td>1493</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>4125</td>
<td>70.0</td>
<td>4475</td>
</tr>
</tbody>
</table>

### Table 4.11

**ANCOVA FOR THE MEAN GAIN ACHIEVEMENT SCORES SUMS AND MEANS OF EXPERIMENTAL GROUP-I, EXPERIMENTAL GROUP-II AND CONTROL GROUP**

<table>
<thead>
<tr>
<th>Sources of Variation</th>
<th>Degree of Freedom (df)</th>
<th>Residuals</th>
<th>F Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sum of Squares (Ss)</td>
<td>Mean Squares (Ms)</td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>2</td>
<td>654.68</td>
<td>327.34</td>
<td>18.52</td>
</tr>
<tr>
<td>Within</td>
<td>86</td>
<td>1520.40</td>
<td>17.679</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>2175.08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The Table value for 2/86 df at 0.05 level of significance is 3.10 and at 0.01 level of significance is 4.86.
Table 4.11 exhibits that the F value 18.52 for df 2/86 for the experimental group-I, experimental group-II and control group is significant at 0.01 as well as 0.05 level of significance. Thus the application of 't'-test become necessary to compare the two groups at a time as was done at post-test stage.

Table 4.12
DIFFERENCE IN THE MEAN GAIN SCORES OF THE STUDENTS OF EXPERIMENTAL GROUP-I AND CONTROL GROUP ON ACHIEVEMENT IN ECONOMICS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>M(X)</th>
<th>S.D.</th>
<th>'t' Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>27.7</td>
<td>2.709</td>
<td>14.04</td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>18.1</td>
<td>2.586</td>
<td>11.11</td>
<td></td>
</tr>
</tbody>
</table>

Note: 't' value (tabulated) at 0.05 level of significance is 1.96 and at 0.01 level of significance is 2.58.

Table 4.12 indicates that the 't' value of 14.04 for the difference in the mean gain achievement scores in Economics of the students of experimental group-I and control group, is significant at 0.01 as well as 0.05 level of significance. The mean gain score of 27.7 of the students of experimental group-I is higher than that the control group which is 18.1. This indicates that the students of experimental group-I have gained significantly higher than the students of control group in achievement in Economics.

Table 4.13
DIFFERENCE IN THE MEAN GAIN SCORES OF THE STUDENTS OF EXPERIMENTAL GROUP-II AND CONTROL GROUP ON ACHIEVEMENT IN ECONOMICS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>M(X)</th>
<th>S.D.</th>
<th>'t' Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>24.2</td>
<td>1.536</td>
<td>11.11</td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>18.1</td>
<td>2.586</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note: 't' value (tabulated) at 0.05 level of significance is 1.96 and at 0.01 level of significance is 2.58.

It may be observed from Table 4.13 that the 't' value of 11.11, for the difference in mean gain scores of the students of experimental group-II and control group on achievement in Economics, is significant at 0.01 as well as 0.05 level of significance. Also, the mean gain score of 24.2 of the students of experimental group-II is higher than that of control group which is 18.1. This indicates that the students of experimental group-II have gained significantly higher than the students of control group.

Table 4.14
DIFFERENCE IN THE MEAN GAIN SCORES OF THE STUDENTS OF EXPERIMENTAL GROUP-I AND GROUP-II ON ACHIEVEMENT IN ECONOMICS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>M(X)</th>
<th>S.D.</th>
<th>'t' Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>30</td>
<td>27.7</td>
<td>2.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Group-II</td>
<td>30</td>
<td>24.2</td>
<td>1.536</td>
<td>6.156</td>
<td>Significant at 0.01 as well as 0.05 level of significance</td>
</tr>
</tbody>
</table>

Note: 't' value (tabulated) at 0.05 level of significance is 1.96 and at 0.01 level of significance is 2.58.

Table 4.14 indicates that the 't' value of 6.156 for the difference in mean gain scores of the students of experimental group-I and experimental group-II on achievement in Economics is significant at 0.01 as well as 0.05 level of significance. The mean gain score of 27.7 of students of experimental group-I is higher than that of experimental group-II which is 24.2. This indicates that the students of experimental group-I have gained higher than the students of experimental group-II.

The results obtained from Table 4.7 to 4.9 and from Table 4.12 to 4.14 indicate that the mean score and mean gain score on achievement in Economics of the students of:
(i) experimental group-I is significantly higher than that of control group.
(ii) Experimental group-II is significantly higher than that of control group
(iii) Experimental group-I is significantly higher than that of experimental group-II.

4.3 VERIFICATION OF HYPOTHESES

The present study was undertaken mainly to find out the comparative effectiveness of Bruner’s Concept Attainment Model, Ausubel’s Advance Organizer Model and Conventional Method of teaching on students achievement in Economics. The students were taken from three schools situated in Rohtak and they all were of grade XI.

In order to study the effect of different teaching techniques on students’ achievement in Economics, ANCOVA (Analysis of Co-variance) was considered to be the suitable method.

The following objectives were examined:

1. To compare the mean achievement scores, on criterion achievement test in Economics, of two groups of students to be taught Economics with and without the use of Concept Attainment Model, before experimental treatment.

2. To compare the mean achievement scores, on criterion achievement test in Economics, of two groups of students to be taught Economics with and without the use of Concept Attainment Model, after experimental treatment.

3. To compare the gain scores, on criterion achievement test in Economics, of two groups of students, one to be taught Economics with Concept Attainment Model and other with Conventional Method of teaching, after the experimental treatment.

4. To compare the mean achievement scores, on criterion achievement test in Economics, of two groups of students to be taught Economics
with and without the use of Advance Organizer Model, before the experimental treatment.

5. To compare the mean achievement scores, on criterion achievement test in Economics, of two groups of students to be taught Economics with and without the use of Advance Organizer Model, after the experimental treatment.

6. To compare the gain scores, on criterion achievement test in Economics, of two groups of students, one to be taught Economics with Advance Organizer Model and other with Conventional Method of teaching, after the experimental treatment.

7. To compare the mean achievement scores, on criterion achievement test in Economics, of two groups of students, one group to be taught Economics with the use of Concept Attainment Model and other group to be taught Economics with the use of Advance Organizer Model, before the experimental treatment.

8. To compare the mean achievement scores, on criterion achievement test in Economics, of two groups of students, one group to be taught Economics with the use of Concept Attainment Model and other group to be taught Economics with the use of Advance Organizer Model, after the experimental treatment.

9. To compare the gain scores, on criterion achievement test in Economics, of two groups of students, one to be taught Economics with Concept Attainment Model and other with Advance Organizer Model, after the experimental treatment.

In order to achieve the objective of the study, the investigator attempted to analyse and interpret the data collected under the following null hypothesis.

4.3.1 **HYPOTHESIS-I**

There is no significant difference in the mean achievement scores, on criterion achievement test in Economics, of the group of students taught Economics through Concept Attainment Model and the group of students
taught Economics through conventional method, before the experimental treatment.

According to Table 4.3 and 4.4, the pre-test mean achievement score of the students taught through CAM is 22.63 and that of taught through CM of teaching is 21.87. It is clear that the difference between the two means is insignificant. Also, the F-value is 2.847 which is also insignificant at 0.05 and 0.01 level of significance with 2/86 df. The table value of F at 0.05 level of significance is 3.10 and at 0.01 level of significance it is 4.86. We saw that the calculated value of ‘F’ is less than the table value at both levels of significance. So, we retain the above-said null hypothesis.

4.3.2. HYPOTHESIS-II

There is no significant difference in the mean achievement scores, on criterion achievement test in Economics, of the group of students taught Economics through Concept Attainment Model and the group of students taught Economics through conventional method, after the experimental treatment.

According to Table 4.6, the F value is 20.156 which is significant at both 0.05 and 0.01 level of significance. The calculated value of F is higher than the table value of F at 2/86 df. The table is 3.10 at 0.05 level of significance and 4.86 at 0.01 level of significance. Also according to table 4.7, the ‘t’ value is 7.976 which is also significant at both, 0.05 and 0.01 level of significance. The table value of ‘t’ at 0.05 level of significance is 1.96 and at 0.01 level of significance it is 2.58. The calculated value of ‘t’ being higher than the table value, we reject the null hypothesis.

So, we can say that there is significant difference in the mean achievement scores of the students of the two groups. As per table 4.7, the students taught Economics through CAM have performed much better than the students who were taught through CM of teaching, after the experimental treatment.
4.3.3 HYPOTHESIS-III

There is no significant difference in the mean gain scores, on the criterion achievement test in Economics, of two groups of students, one taught Economics with Concept Attainment Model and the other with Conventional Method of teaching, after the experimental treatment.

According to table 4.11, the ‘F’ value is 18.52 which is significant at 0.05 level of significance (3.10) as well as at 0.01 level of significance (4.86) with 2/86 df. Calculated value being greater than table value, supports that there is significant gain in achievement of students in Economics after the experimental treatment.

Table 4.12 shows ‘t’ value = 14.04. This calculated value of ‘t’ is higher than the table value at both 0.05 level of significance (1.96) and 0.01 level of significance (2.58). So, ‘t’ value is significant at both the levels of significance indicating that the students of experimental group-I, who were taught with Concept Attainment Model have gained significantly higher (with mean gain score 27.7) than the students of control group who were taught with conventional method of teaching (with mean gain score 18.1) in achievement in Economics. So, we reject the above-said null hypothesis. In other words, we can say that the students taught Economics with CAM have gain higher scores than the students taught with Conventional Method.

4.3.4 HYPOTHESIS-IV

There is no significant difference in the mean achievement of the group of students taught Economics through Advance Organizer Model and the group of students taught Economics through conventional method, before the experimental treatment.

According to Table 4.3, before the experimental treatment, the mean achievement score of the students taught Economics through Advance Organizer Model is 23 and that of the students taught through conventional method is 21.867. The difference between the two means is insignificant. Also according to table 4.4, the ‘F’ value is 2.847 which is insignificant at both,
0.05 and 0.01 level of significance. The calculated ‘F’ value (2.847) is less than the table value (3.10 and 4.86).

So, we retain the abovesaid null hypothesis. In other words, we can say that at the pre-test stage, there is no significant difference in the mean achievement of the two groups of students, one taught through AOM and the other through CM of teaching.

4.3.5. **HYPOTHESIS-V**

There is no significant difference in the mean achievement scores of the group of the students taught Economics through Advance Organizer Model and the group of students taught Economics through conventional method, after the experimental treatment.

According to Table 4.6, the calculated ‘F’ value is 20.156 which is higher than the table value of ‘F’ at 0.05 level of significance (3.10) and at 0.01 level of significance (4.86) with 2/86 df. Also according to table 4.8, the ‘t’ value is 6.766 which is significant at both 0.05 and 0.01 level of significance. The table value of ‘t’ at these levels of significance is 1.96 and 2.58 respectively. The calculated value of ‘t’ is higher than the table value. Also the calculated value of ‘F’ is higher than the table value. So, we reject the above-said null hypothesis.

According to table 4.8, we can say that at the post-test stage, the students taught Economics through AOM have performed better (with mean achievement score 47.2) than the students taught Economics through CM of teaching (with mean achievement score 39.97).

In other words, we can say that AOM is much better than the CM of teaching.

4.3.6 **HYPOTHESIS-VI**

There is no significant difference in the mean gain scores, on the criterion achievement test in Economics, of two groups of students, one taught Economics with Advance Organizer Model and other with Conventional Method of teaching, after the experimental treatment.
Table 4.13 shows that the calculated ‘t’ value = 11.11, is higher than the table value at 0.05 and 0.01 level of significance (1.96 and 2.58 res.). Calculated value of ‘t’ being higher than the table value indicates that it is significant at both the levels of significance. This indicates that the students of experimental group-II who were taught with Advance Organizer Model have gained significantly higher (with mean gain score 24.2) than the students of control group who were taught with the conventional method of teaching (with mean gain score 18.1) in achievement in Economics. So, we can reject the above-said null hypothesis.

4.3.7 HYPOTHESIS-VII

There is no significant difference in the mean achievement scores of two groups of students, one group to be taught Economics with Concept Attainment Model and the other group to be taught Economics with Advance Organizer Model, before the experimental treatment.

According to Table 4.3, at the pre-test stage, the mean achievement score of the students taught Economics through Concept Attainment Model was 22.63 while that of the students taught Economics through Advance Organizer Model was 23. The difference between the two means is insignificant. Moreover, according to table 4.4, the calculated ‘F’ value at 2/86 df is 2.847 which is less than the table value of ‘F’ at 0.05 level of significance (3.10) as well as at 0.01 level of significant (4.86). The calculated value of ‘F’ is less than the table value, hence insignificant. So, we retain the above-said null hypothesis and can say that at the pre-test stage the two groups of students, one taught Economics through CAM and other through AOM do not differ significantly.

4.3.8 HYPOTHESIS-VIII

There is no significant difference in the mean achievement scores of two groups of students, one group taught Economics with Concept Attainment Model and the other group taught Economics with Advance Organizer Model, after the experimental treatment.
According to Table 4.6, the calculated value of ‘F’ is 20.156 with 2/86 df which is higher than the table value of ‘F’ at 0.05 level of significance (3.10) and at 0.01 level of significance (4.86). Calculated value being higher than the table value is significant. Also according to table 4.9, the mean achievement score of the group of students taught with CAM is 50.33 and that of taught with AOM is 47.2 with ‘t’ value 2.799. This value of ‘t’ is significant at both 0.05 level of significance (1.96) and at 0.01 level of significance (2.58) because calculated value is higher than the table value. So, we reject the above-said null hypothesis. In other words, we can say that the performance at post-test stage, of the group of students taught with CAM is better than that of the students taught with AOM.

4.3.9 HYPOTHESIS-IX

There is no significant difference in the mean gain scores, on the criterion achievement test in Economics, of two groups of students, one taught Economics with Concept Attainment Model and other with Advance Organizer Model, after the experimental treatment.

Table 4.14 shows that the calculated ‘t’ value is 6.156 which is significant at both 0.05 and 0.01 level of significance. The calculated value of ‘t’ (6.156) is higher than the table value (1.96 and 2.58) supporting that the students of experimental group-I, who were taught with Concept Attainment Model have gained higher (with mean gain score 27.7.) than the groups of students taught with Advance Organizer Model (with mean gain score 24.2) in achievement in Economics.

‘t’ value being significant we reject the above-said null hypothesis.

4.4 IN THE LIGHT OF THE ABOVE INTERPRETATION THE INVESTIGATOR CONCLUDED THAT

(i) Bruner’s Concept Attainment Model is more effective method of teaching Economics than the conventional method of teaching. The reasons for this result might be due to the following:

1. The course furnished by Bruner’s Concept Attainment Model might have proved to be helpful and interesting to the students
in understanding the content, at their own flow, initiative and control.

2. Students learn new and unfamiliar concepts with the help of this model as it teaches through the use of exemplars and non-exemplars. Therefore, concepts related with Economics have been taught effectively through this model.

3. This model stresses on the formation of categories of the complex and diverse stimuli that come from the situation/environment and help the learner to make sense of it.

4. Active involvement of the students in the learning of concepts in Economics by this model might have caused increased learning on the part of the students.

5. The students might have been helped to learn more by Concept Attainment Model due to the use of inductive reasoning method.

6. The students might have been more interested and sensitive to the novelty of learning experiences provided by Bruner's Concept Attainment Model and thus they learned more.

On the other hand, conventional method of teaching might have been less fascinating and less interesting to the students due to its becoming routinised.

The above result of the present study is supported by the findings conducted by Lemke (1965); Steve and Boutwell (1975); Douglas (1980); Cook (1981); Chitrive (1983); Lee (1983); Passi, Singh and Sansanwal (1985); Kaur (1985); Dutt (1987); Sushma (1987); Chaudhary (1988); Baveja (1988); Agarwal and Misra (1988); Chitrive (1988); Kamla Sood (1988); Kanta (1989); Das (1990); Chaudhari and Vaidya (1990); Kaur (1990); Kaimini (1991); Khan and Siddiqui (1992); Gupta (1995); Aggarwal (1997); Carbonaro (1998); Jalilvant (1999); Kaur (2000) and Perminder Singh (2004) who compared the effectiveness of Concept Attainment Model and the Conventional Method of teaching. These studies reveal that the group taught by Concept Attainment Model has better performance over others.
These researchers have conducted their studies on different levels of students and had taken different subjects.

Lemke (1965) identified the relationship between concept attainment and information processing tasks. The results generally supported studies using similar stimulus material and presentation modes. Douglas (1980) found that Bruner’s Model performance was better than conventional method. Cook (1981) found that the students taught with positive and negative instances in mathematics were better than those taught by positive instances only. Chitrive (1983) studied the effectiveness of Bruner’s strategy with traditional method on various criteria of concept acquisition and found that Bruner’s Model was more effective than traditional teaching method with respect to teaching of mathematical concepts. Kaur (1986) studied the effectiveness of Bruner’s Concept Attainment Model and conventional method of teaching for learning of concepts in science and found that Bruner’s Concept Attainment Model was superior to conventional method of teaching.

Sushma (1987) studied the effectiveness of this method in biology of eighth class and found that concept attainment model was more effective than traditional method of teaching. Chaudhary (1988) and Dass (1990), both studied this model for training pre-service teachers and it was found to be better than traditional method. Baweja (1988) also reported that instructional efficacy for attainment of concepts is higher through information processing model as compared to traditional method of teaching. Agarwal and Misra (1988) reported that this model is quite effective for enhancing the attainment of science concepts. Kanta (1989) studied this model in teaching chemistry concepts and found that Concept Attainment Model helped the students in attaining and learning the concepts. Chaudhari and Vaidya (1990) studied this model at B.Ed. level and they came to the conclusion that concept attainment model produced significantly better effects than the traditional method. Kaur (1990) investigated the effectiveness of this model for learning of concepts in economics and proved that there was a significant difference between the concept attainment model and conventional method of teaching. Jaimini (1991) studied this model on conceptual learning efficacy and retention of
chemistry concepts and found it effective. Aggarwal (1997) studied the effect of this model for concept learning in commerce and found that Concept Attainment Model was more effective than conventional method of teaching. Carbonaro (1998) studied computational cognitive model of concept attainment and concluded that constrained networks learned a set of rules, which produced greater discrimination among examples without any loss of correct categorization. Jalilvant (1999), Kaur (2000) and Perminder Singh (2004) also reported that concept attainment model was superior than conventional method of teaching.

Above result is not consistent with the findings of Kaur (1988); Goel (1990); Chopra (1999); Brown (1999) and Driver (2001). Kaur (1988) found that concept attainment model and conventional method of teaching were equally effective for teaching of concepts in mathematics. Goel (1990) also found that both Concept Attainment Model and conventional method were equally effective in terms of achievement in Hindi. Chopra (1994) also reported the same result in case of English language concepts. Driver (2001) studied the effect of direct instruction and concept attainment model on community college students in an on line college algebra and found no statistically significant difference in the two groups.

In the light of the analysis and interpretation of sample data collected as evidence to test the hypotheses, it is concluded that there is a significant difference in the efficacy of Bruner's Concept Attainment Model and Conventional Method of teaching for learning of concepts in Economics. Bruner's Concept Attainment Model is more effective than conventional method of teaching. So it is clear that models of teaching constitute a major factor which facilitate the students for learning of concepts in Economics.

(ii) The efficacy of Ausubel's Advance Organizer Model is more than that of the conventional method of teaching as far as the achievement in Economics is concerned.

The reasons for this result might be due to following:

1. The model began with an advance organizer and proceeded by developing a structural or conceptual hierarchy, and employed
the process of progressive differentiations and integrative reconciliation (Ricci, 1999).

2. Ausubel observes that the cognitive structure is most important variable affecting learning (Lawton and Wanska, 1979). Learning of the students might have been facilitated by the manipulation of the ideas and concepts already existing in their cognitive structure.

3. The model was inter-active. Students were involved in the lesson-discussion instead of passive listeners.

4. The students involved in this study might have the ideational scaffolding or meaningful context for the content taught to them to which essentially, meaningful new knowledge could be related, making it possible for them to utilize advance organizers.

5. The presentation of advance organizers at the start of the learning task and at a higher level of abstraction and inclusiveness than the learning task itself might have proved to be helpful to the students in learning the concepts in Economics.

6. The most inclusive ideas were presenting first followed by narrower and less inclusive ideas and the new ideas were consciously related to the previously learnt ideas while teaching.

7. This mode of presentation corresponds to the cognitive structure of the subjects where general concepts were presented first and the specific ones later. It is very likely that Advance Organizer Model might have helped the students in understanding new concepts.

8. The students might have been more attentive to the teacher, in a new teaching learning situation. On the other hand, conventional teaching might have been less interesting and less fascinating to the students due to its becoming routinised.
The above result of the present study is an agreement with the conclusions drawn by Ausubel (1960); Ausubel and Fitzgerald (1961); Ausubel and Yousuf (1963); Steinbrink (1970); Bernard (1975); Alexander, Frankiewicz and Williams (1979); Lawton and Wanska (1979); Chitrive (1983); Buddhi Sagar and Sansanwal (1989); Kaur (1990); Gupta (1991); Ruangruchira (1992); Pandey and Purohit (1993); Davidon (1997); Witiw (1997); Bharambe (1999); Mckenzie (1999); Wells (1999), Kaur (2000) and Perminder Singh (2004) who studied the effectiveness of Advance Organizer Model and reported that the groups taught by Advance Organizer Model had better performance over other groups taught by Conventional Method of teaching.

Ausubel (1960); Ausubel and Fitzgerald (1961) and Ausubel and Yousuf (1963) reported that the performances of the advance organizer groups were significant. Bernard (1975) conducted a study to investigate the use of advance organizer and reported that it facilitated learning. Laton’s (1977) study found the theory of learning and retention of the material. Chitrive (1993) found that advance organizer was superior to traditional teaching for acquisition of concepts in mathematics. Kaur (1986) studied the effectiveness of Ausubel’s Advance Organizer Model and conventional method of teaching for learning concepts in science. She found significant difference between advance organizer model and convention method of teaching for learning of concepts in science.

Kaur (1990) studied the efficacy of this model for learning of concepts in economics and found that advance organizer model was more effective than conventional method of teaching. Gupta (1991) reported that advance organizer model was effective in developing teaching competence among student teachers. Rungruchira (1992) studied the effect of advance organizer model on student-achievement in general chemistry. The results revealed that advance organizer group performed significantly better than the control group on achievement in post-test and retention-test. Pandey and Purohit (1993) concluded that advance organizer model was superior to conventional method of teaching in educational psychology of B.Ed. students. Agarwal (1997)
studied the effect of advance organizer model on learning and retention of concepts of eleventh class commerce. She found that advance organizer model was more effective than conventional method of teaching. Davidson (1997) conducted a study on this model in student centred rich environments. He came to the conclusion that the advance organizer did provide some focus to students. Witiw (1997) studied the effectiveness of advance organizers presented through technology on the academic success of basic aviation meteorology students. He found that use of technology significantly increased the achievement of students' knowledge. Mckenzie (1999) studied elementary teachers' opinions on the use of a content enhancement strategy: Graphic organizer, he found that advance organizer was more effective than conventional method of teaching. Wells (1999) studied the effectiveness of the use of concept maps as advance organizer in biology of college students and Kaur (2000) studied the effectiveness of advance organizer model for learning concepts in chemistry and found that advance organizer model was superior to conventional method of teaching. Perminder Singh (2004) found that AOM is better than conventional method of teaching for teaching concepts in Physics.

The results of the present study are not consistent with the findings of Luca (1972); Chanana(1983); Kirkman (1997); Renshaw (1997); Pruliere (1998); McManus (1998); Callahan (2000); Umar (2000); Underhill (2001) and Calandra (2003), who reported that advance organizer did not facilitate learning.

The results of the present study also support the results of those studies in which different researches have studied the effectiveness of different models, namely, Programmed Model, Inquiry Training Model, Mastery Learning Model, Problem solving Model, Jerry Juca's Memory Model, and Inductive thinking Model and have found that models used in their studies were more effective than the conventional method of teaching.

The results of the present study are also in agreement with those of Sodhi (1977); Basu (1981); Kaur 91983); Gautam and Pachauri (1990); Patel (1994); Prema and Gayathri (1994); who compared different teaching techniques with traditional method for teaching different subjects.
researchers have found different teaching techniques like Programmed Learning, Multimedia Programmed Material, and Models, are more effective than the conventional method of teaching.

So it can be concluded that Models of Teaching constitute a major factor which facilitate the students in learning of concepts in Economics.

In the light of the analysis and interpretation of sample data collected as evidence of test the hypotheses it is concluded that there is a significant difference in the efficacy of Advance Organizer Model and conventional method of Teaching for learning of concepts in Economics. Ausubel’s Advance Organizer Model is more effective than conventional method of teaching.

Bruner’s Concept Attainment Model and Ausubel’s Advance Organizer Model were new to the students as compared to conventional method of teaching. Students were fascinated by those two models and took interest in learning concepts through these models.

(iii) Bruner’s Concept Attainment Model is more effective than Ausubel’s Advance Organizer Model in teaching Economics.

The above result of the present study is an agreement with the conclusions drawn by Chaudhari and Vaidya (1990), Kaur (1990), Sood (1990), Gupta (1995) and Kaur (2000) who reported that Concept Attainment Model was more effective than Advance Organizer Model. The experimental study conducted on student-teachers of B.Ed. by Chaudhari and Vaidya (1990) also revealed that Concept Attainment Model produced significantly better effect than Advance Organizer Model. Kaur (1990) concluded that Concept Attainment Model was more effective than Advance Organizer Model for learning of concepts in economics. Sood (1990) concluded that Concept Attainment Model was more effective than Advance Organizer Model in teaching of concepts in Hindi. Gupta (1995) found that Concept Attainment Model was superior to Advance Organizer Model for teaching of concepts in science. Kaur (2000) found significant difference in the efficacies of Bruner’s Concept Attainment Model and Ausubel’s Advance Organizer Model for
learning of concepts in chemistry. Concept Attainment Model was more effective than Advance Organizer Model.

The above result of the study is not in agreement with those of Chitrive (1983), Jaimini (1991), Agarwal (1997) and Perminder Singh (2004). They reported that two models have equally influenced the learning of concepts.

Chitrive (1983) investigated the effectiveness of Ausubel and Bruner Models for acquisition of concepts of mathematics. Jamini (1991) investigated these two models for learning and retention of chemistry concepts. The result of the study revealed that both models were equally effective in fostering concept learning. Aggarwal (1997) studied these two models for concept learning and retention of concepts in commerce and reported that both models were found equally effective in fostering concept learning. Perminder Singh (2004) also found that the two models are equally effective in learning concept in physics.

In the light of the analysis and interpretation of sample data collected, it is concluded that there is a significant difference in the efficacy of Bruner’s Concept Attainment Model and Ausubel’s Advance Organizer Model as far as students achievement in Economics is concerned. CAM is more effective than AOM.