# CHAPTER – V

## ANALYSIS AND INTERPRETATION

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CHAPTER -- V

## ANALYSIS AND INTERPRETATION

### V.1 INTRODUCTION

The last chapter was devoted to the procedure of the research.

In this chapter the analysis of the scores of the experimental and control group is given as well as the meaning of this analysis is stated.

Analysis is a very important step in research,

Good, Barr and Scates write "Analysis is a process which enters into research in one form or another from the very beginning. It may be fair to say that research consists in general of two larger steps, the gathering of the data and the analysis of the data."

Martz points out that bare facts never determine anything. Facts are interpreted and it is related to the purpose of the facts.

The data does not serve any purpose unless it is carefully edited, systematically classified and tabulated, scientifically analysed, intelligently interpreted and rationally concluded.

Analysis of data means studying the tabulated material to determine inherent meaning.

Therefore organization of data is necessary so classification and tabulation is a must in analysis.

Interpretation is the process of stating what the results show, what do they mean what is their significance and what is answer to the original problem.

Analysis is of two types –

1) Descriptive data analysis

2) Inferential data analysis

In the experimental studies the inferential analysis is used and statistical significance is tested.

A mere quantitative superiority of the experimental group mean scores over the control group mean score is not conclusive proof of its superiority. To be statistically significant the difference must be greater than that reasonably attributed to sampling error. The test of the significance of the difference between two means is known as a t test.

So 't' test was applied and the comparison was done on that base to accept or reject null hypothesis.

The following formula was used for that

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{\Sigma d_1^2 + \Sigma d_2^2}{N_1 + N_2 - 2}\right)\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

The significance of difference between two percentage is tested by the following formula

$$t = \frac{(P_1 - P_2)}{\sqrt{PQ\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}} \qquad \frac{D\%}{\Sigma D\%}$$

The analysis of two groups, t tests, C.R. and its result whether it is significant or not has been described further.

## V.2   ANALYSIS OF THE SCORES OF PRE-TEST AND POST-TEST

According to the hypotheses put forth the researcher had to compare.

1)    The difference between the means of pre-test of experimental and control group.

2)    The difference between the means of pre-test and post-test of experimental group.

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NOTATIONS :

$X_1$ -  Mean Score of Experimental Group.

$X_2$ -  Mean Score of Control Group.

$\Sigma d_1^2$ -  Sum  of Deviations$^2$ of Experimental Group.

$\Sigma d_2^2$ -  Sum  of Deviations$^2$ of Control Group.

$N_1$ -  No. of Teacher-trainees of Experimental Group.

$N_2$ -  No. of Teacher-trainees of Control Group.

P is percentage of correct response.  Q is 1 - P

$N_1$ + $N_2$ are the number of teacher-trainees from Experimental group and Control group.
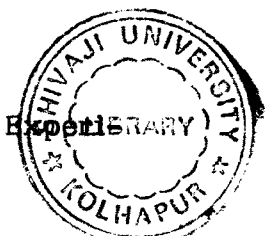
3)      The difference between the means of pre-test and post-test
        of control group.

4)      The difference between the means of post-test of control
        group and experimental group.

5)      The difference between the percentage of correct responses
        to every statement by both groups after post-test.

        Out of above mentioned five, the fifth one is analysed sepa-
rately.

        The following tables give the individual score, means,
S.D. and t test to analyse pre-tests and post-tests of each group
and both groups.

        The comparative study tells whether the difference is signi-
ficant or not.

TABLE V.1

## EXPERIMENTAL GROUP

## SCORES & MEAN

| Sr.No. | Pre-test Scores | Post-test scores |
|--------|-----------------|------------------|
| 1 | 26 | 45 |
| 2 | 09 | 23 |
| 3 | 08 | 28 |
| 4 | 13 | 28 |
| 5 | 17 | 45 |
| 6 | 10 | 25 |
| 7 | 06 | 16 |
| 8 | 27 | 39 |
| 9 | 14 | 29 |
| 10 | 25 | 50 |
| 11 | 32 | 46 |
| 12 | 17 | 30 |
| 13 | 24 | 46 |
| 14 | 16 | 37 |
| 15 | 07 | 36 |
| 16 | 10 | 37 |
| Total | 261 | 560 |
| Mean | 16.31 | 35 |

## TABLE V.2

## CONTROL GROUP

## SCORES & MEAN

| Sr.No. | Pre-test scores | Post-test scores |
|--------|-----------------|------------------|
| 1 | 08 | 16 |
| 2 | 15 | 18 |
| 3 | 13 | 19 |
| 4 | 15 | 08 |
| 5 | 24 | 41 |
| 6 | 25 | 39 |
| 7 | 17 | 36 |
| 8 | 12 | 18 |
| 9 | 11 | 14 |
| 10 | 18 | 08 |
| 11 | 17 | 20 |
| 12 | 10 | 11 |
| 13 | 12 | 16 |
| 14 | 15 | 15 |
| 15 | 29 | 37 |
| 16 | 09 | 11 |
| Total | 250 | 327 |
| Mean | 15.63 | 20.44 |

TABLE V.3

PRE-TEST DATA

| Sr. | Experimental Group | | | Control Group | | |
|---|---|---|---|---|---|---|
| | Scores | Deviation | Deviation$^2$ | Scores | Deviation | Deviation$^2$ |
| | $X_1$ | $X_1 - \overline{X_1}$ $d_1$ | $d_1{}^2$ | $X_2$ | $X_2 - \overline{X_2}$ $d_2$ | $d_2{}^2$ |
| 1 | 26 | + 9.69 | 93.90 | 08 | − 7.63 | 58.22 |
| 2 | 09 | − 7.31 | 53.44 | 15 | − 0.63 | 0.40 |
| 3 | 08 | − 8.31 | 69.06 | 13 | − 2.63 | 6.92 |
| 4 | 13 | − 3.31 | 10.96 | 15 | − 0.63 | 0.40 |
| 5 | 17 | + 0.69 | 0.48 | 24 | + 8.37 | 70.05 |
| 6 | 10 | − 6.31 | 39.82 | 25 | + 9.37 | 87.80 |
| 7 | 06 | − 10.31 | 106.30 | 17 | + 1.37 | 1.88 |
| 8 | 27 | + 10.69 | 114.28 | 12 | − 3.63 | 13.18 |
| 9 | 14 | − 2.31 | 5.34 | 11 | − 4.63 | 21.43 |
| 10 | 25 | + 8.69 | 75.52 | 18 | + 2.37 | 5.62 |
| 11 | 32 | + 15.69 | 246.18 | 17 | + 1.37 | 1.88 |
| 12 | 17 | + 0.69 | 0.48 | 10 | − 5.63 | 31.69 |
| 13 | 24 | + 7.69 | 59.14 | 12 | − 3.63 | 13.18 |
| 14 | 16 | − 0.31 | 0.10 | 15 | − 0.63 | 0.40 |
| 15 | 07 | − 9.31 | 86.68 | 29 | + 13.37 | 178.76 |
| 16 | 10 | − 6.31 | 39.82 | 09 | − 6.63 | 43.95 |
| Total | 261 | | 1001.50 | 250 | | 535.38 |
| Mean | 16.31 | | | 15.63 | | |
| S.D. | 7.91 | | | 5.78 | | |
| t | 0.27 | | | 0.27 | | |

## TABLE V.4

### POST-TEST DATA

| Sr. No. | Experimental Group | | | Control Group | | |
|---|---|---|---|---|---|---|
| | Scores $X_1$ | Deviation $X_1-\overline{X}_1$ $d_1$ | Deviation$^2$ $d_1^2$ | Scores $X_2$ | Deviation $X_2-\overline{X}_2$ $d_2$ | Deviation$^2$ $d_2^2$ |
| 1 | 45 | + 10 | 100 | 16 | − 4.44 | 19.71 |
| 2 | 23 | − 12 | 144 | 18 | − 2.44 | 5.95 |
| 3 | 28 | − 7 | 49 | 19 | − 1.44 | 2.07 |
| 4 | 28 | − 7 | 49 | 08 | − 12.44 | 154.75 |
| 5 | 45 | + 10 | 100 | 41 | + 20.56 | 423.54 |
| 6 | 25 | − 10 | 100 | 39 | + 18.56 | 344.47 |
| 7 | 16 | − 19 | 361 | 36 | + 15.56 | 242.11 |
| 8 | 39 | + 4 | 16 | 18 | − 2.44 | 5.95 |
| 9 | 29 | − 6 | 36 | 14 | − 6.44 | 41.47 |
| 10 | 50 | + 15 | 225 | 08 | − 12.44 | 154.75 |
| 11 | 46 | + 11 | 121 | 20 | − 0.44 | 0.19 |
| 12 | 30 | − 5 | 25 | 11 | − 9.44 | 89.11 |
| 13 | 46 | + 11 | 121 | 16 | − 4.44 | 19.71 |
| 14 | 37 | + 2 | 4 | 15 | − 5.44 | 29.59 |
| 15 | 36 | + 1 | 1 | 37 | + 16.56 | 274.23 |
| 16 | 37 | + 2 | 4 | 11 | − 9.44 | 89.11 |
| Total | 560 | | 1456 | 327 | | 1896.71 |
| Mean | 35 | | | 20.44 | | |
| S.D. | 9.54 | | | 10.89 | | |
| t | 3.90 | | | 3.90 | | |

TABLE V.5

COMPARATIVE STUDY OF PRE-TEST

| Name of Group | Number of Students | Mean Score | S.D. | t Value |
|---|---|---|---|---|
| Experimental Group | 16 | 16.31 | 7.91 | |
| | | | | 0.27 |
| Control Group | 16 | 15.63 | 5.78 | |

't' critical value at 0.05 level of significance for df 30 is 2.042.

As the 't' value 0.27 is less than 't' critical value 2.042 null hypothesis is accepted i.e. there is no significant difference between the mean scores of Experimental and Control group.

It means that both the groups are equal.

TABLE V.6

COMPARATIVE STUDY OF PRE-TEST AND POST-TEST
OF EXPERIMENTAL GROUP

| Experimental Group | Number of Students | Mean Score | S.D. | t Value |
|---|---|---|---|---|
| Pre-test | 16 | 16.31 | 7.91 | |
| | | | | 5.84 |
| Post-test | 16 | 35 | 9.54 | |

The 't' value 5.84 is more than the 't' critical value 2.042. Hence null hypothesis is rejected. There is significant difference between mean scores of pre-test and post-test of Experimental Group.

This difference is due to the experimental treatment given to the Experimental Group.

## TABLE V.7

### COMPARATIVE STUDY OF PRE-TEST AND POST-TEST
### OF CONTROL GROUP

| Control Group | Number of Students | Mean Score | S.D. | t Value |
|---------------|--------------------|-----------|------|---------|
| Pre-test | 16 | 15.63 | 5.78 | |
| | | | | 1.51 |
| Post-test | 16 | 20.44 | 10.89 | |

The 't' value 1.51 is less than the 't' critical value 2.042 at 0.05 level of significance with df 30. Hence null hypothesis is accepted. There is no significant difference between the mean scores of pre-test and post-test of the control group.

## TABLE V.8

### COMPARATIVE STUDY OF POST-TEST

| Name of Group | Number of Students | Mean Score | S.D. | t Value |
|---|---|---|---|---|
| Experimental Group | 16 | 35 | 9.54 | |
| | | | | 3.90 |
| Control Group | 16 | 20.44 | 10.89 | |

't' critical value at 0.05 level of significance for df 30 is 2.042.

As the 't' value 3.90 is more than 't' critical value 2.042 null hypothesis is rejected i.e. the difference between the mean scores of experimental and control group is significant after post-test.

It implies that the significant change in the mean scores is due to the treatment given to experimental group.

## V.3 ANALYSIS OF THE PERCENTAGE OF CORRECT RESPONSES TO EVERY STATEMENT ·········

The fifth hypothesis was related to the correct responses to every statement by both groups. The researcher had to find the difference between the percentage of correct responses to every statement by both groups after post-test.

The correct responses of the students given to each statement were converted into percentage. The difference between the percentage of control group and experimental group was tested at the 0.05 level of significance. The following formula was used for that

$$t = \frac{D\%}{\Sigma D\%}$$

$$\Sigma D\% = \sqrt{PQ\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}$$

$$t = \frac{(P_1 - P_2)}{\sqrt{PQ\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

Here P is percentage of correct response

Q is 1 - P

$N_1 + N_2$ are the number of students from Experimental Group and Control Group.

The critical ratio is named as CR and it is compared with the 't' value 2.036 at 0.05 level of **significance.**

Analysis is made questionwise and statementwise. The following tables describe the correct responses, percentage and the difference of each statement.

## TABLE V.9

### DIFFERENCE BETWEEN THE PERCENTAGES OF CORRECT RESPONSES BY CONTROL GROUP AND EXPERIMENTAL GROUP

| Q.No.1 Statement No. | Control Group | | | | Experimental Group | | | | CR t Value |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-test | | Post-test | | Pre-test | | Post-test | | |
| | Correct Responses | % | Correct Responses | % | Correct Responses | % | Correct Responses | % | |
| 1 | 5 | 31.25 | 7 | 43.75 | 4 | 25 | 12 | 75 | 1.80 |
| 2 | 8 | 50 | 9 | 56.25 | 15 | 93.75 | 13 | 81.25 | 1.54 |
| 3 | 2 | 12.5 | 5 | 31.25 | 4 | 25 | 11 | 68.75 | 2.12* |
| 4 | 8 | 50 | 7 | 43.75 | 4 | 25 | 12 | 75 | 1.80 |
| 5 | 16 | 100 | 14 | 87.50 | 15 | 93.75 | 16 | 100 | 1.46 |
| 6 | 1 | 6.25 | 3 | 18.75 | 2 | 12.50 | 5 | 31.25 | 0.08 |
| 7 | 5 | 31.25 | 5 | 31.25 | 2 | 12.50 | 7 | 43.75 | 0.73 |
| 8 | 0 | 0 | 1 | 6.25 | 0 | 0 | 1 | 6.25 | 0.00 |
| 9 | 3 | 18.75 | 3 | 18.75 | 6 | 37.50 | 9 | 56.25 | 2.19* |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 62.50 | 3.81* |

* Shows that the difference is significant as C.R. exceeds 2.036 at 0.05 level of significance.

TABLE V.10

DIFFERENCE BETWEEN THE PERCENTAGES OF CORRECT RESPONSES
BY CONTROL GROUP AND EXPERIMENTAL GROUP

Q.No.1

| Statement No. | Control Group | | | | Experimental Group | | | | CR |
| | Pre-test | | Post-test | | Pre-test | | Post-test | | t Value |
| | Correct Responses | % | Correct Responses | % | Correct Responses | % | Correct Responses | % | |
|---|---|---|---|---|---|---|---|---|---|
| 11 | 3 | 18.75 | 4 | 25 | 3 | 18.75 | 11 | 68.75 | 2.48* |
| 12 | 0 | 0 | 4 | 25 | 0 | 0 | 11 | 68.75 | 2.48* |
| 13 | 1 | 6.25 | 1 | 6.25 | 0 | 0 | 10 | 62.50 | 3.35* |
| 14 | 1 | 6.25 | 6 | 37.50 | 3 | 18.75 | 7 | 43.75 | 0.36 |
| 15 | 7 | 43.75 | 7 | 43.75 | 5 | 31.25 | 13 | 81.25 | 2.19* |
| 16 | 6 | 37.50 | 7 | 43.75 | 5 | 31.25 | 11 | 68.75 | 1.42 |
| 17 | 4 | 25 | 4 | 25 | 4 | 25 | 12 | 75 | 2.82* |
| 18 | 1 | 6.25 | 1 | 6.25 | 0 | 0 | 9 | 56.25 | 3.05* |
| 19 | 1 | 6.25 | 5 | 31.25 | 1 | 6.25 | 12 | 75 | 2.41* |
| 20 | 0 | 0 | 0 | 0 | 1 | 6.25 | 7 | 43.75 | 2.99* |

* Shows that the difference is significant as C.R. exceeds 2.036 at 0.05 level of significance.

TABLE V.11

DIFFERENCE BETWEEN THE PERCENTAGES OF CORRECT RESPONSES
BY CONTROL GROUP AND EXPERIMENTAL GROUP

| Q.No.1 Statement No. | Control Group | | | | Experimental Group | | | | CR t Value |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-test | | Post-test | | Pre-test | | Post-test | | |
| | Correct Responses | % | Correct Responses | % | Correct Responses | % | Correct Responses | % | |
| 21 | 2 | 12.50 | 4 | 25 | 1 | 6.25 | 11 | 68.75 | 2.48* |
| 22 | 3 | 18.75 | 6 | 37.50 | 7 | 43.75 | 11 | 68.75 | 1.77 |
| 23 | 5 | 31.25 | 7 | 43.75 | 1 | 6.25 | 10 | 62.50 | 1.78 |
| 24 | 0 | 0 | 5 | 31.25 | 0 | 0 | 7 | 43.75 | 0.73 |
| 25 | 5 | 31.25 | 7 | 43.75 | 6 | 37.50 | 12 | 75 | 1.80 |
| 26 | 4 | 25 | 7 | 43.75 | 3 | 18.75 | 11 | 68.75 | 1.42 |
| 27 | 14 | 87.50 | 9 | 56.25 | 16 | 100 | 16 | 100 | 2.99* |
| 28 | 1 | 6.25 | 5 | 31.25 | 3 | 18.75 | 10 | 62.50 | 1.77 |
| 29 | 15 | 93.75 | 13 | 81.25 | 16 | 100 | 16 | 100 | 1.82 |
| 30 | 0 | 0 | 0 | 0 | 4 | 25 | 14 | 87.50 | 4.99* |

* Shows that the difference is significant as C.R. exceeds 2.036 at 0.05 level of significance.

TABLE V.12

DIFFERENCE BETWEEN THE PERCENTAGES OF CORRECT RESPONSES
BY CONTROL GROUP AND EXPERIMENTAL GROUP

| Q.No.2 | Control Group | | | | Experimental Group | | | | CR |
| Statement No. | Pre-test | | Post-test | | Pre-test | | Post-test | | t Value |
| | Correct Responses | % | Correct Responses | % | Correct Responses | % | Correct Responses | % | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 31.25 | 9 | 56.25 | 10 | 62.50 | 13 | 81.25 | 1.53 |
| 2 | 4 | 25 | 6 | 37.50 | 9 | 56.25 | 10 | 62.50 | 1.44 |
| 3 | 6 | 37.50 | 8 | 50 | 13 | 81.25 | 9 | 56.25 | 0.354 |
| 4 | 1 | 6.25 | 3 | 18.75 | 2 | 12.50 | 9 | 56.25 | 2.19* |
| 5 | 4 | 25 | 13 | 81.25 | 11 | 68.75 | 14 | 87.50 | 0.486 |
| 6 | 6 | 37.5 | 11 | 68.75 | 15 | 93.75 | 14 | 87.50 | 1.42 |
| 7 | 4 | 25 | 11 | 68.75 | 13 | 81.25 | 14 | 87.50 | 1.42 |
| 8 | 5 | 31.25 | 10 | 62.50 | 16 | 100 | 13 | 87.50 | 1.63 |

* Shows that the difference is significant as C.R. exceeds 2.036 at 0.05 level of significance.

## TABLE V.13

### DIFFERENCE BETWEEN THE PERCENTAGES OF CORRECT RESPONSES BY CONTROL GROUP AND EXPERIMENTAL GROUP

| Q.No.3 | Control Group | | | | Experimental Group | | | | CR |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State-ment No. | Pre-test | | Post-test | | Pre-test | | Post-test | | t |
| | Correct Responses | % | Correct Responses | % | Correct Responses | % | Correct Responses | % | Value |
| 1 | 3 | 18.75 | 8 | 50 | 1 | 6.25 | 12 | 75 | 1.46 |
| 2 | 14 | 87.50 | 11 | 68.75 | 13 | 81.25 | 15 | 93.75 | 1.81 |
| 3 | 1 | 6.25 | 8 | 50 | 4 | 25 | 8 | 50 | 0 |
| 4 | 11 | 68.75 | 13 | 81.25 | 13 | 81.25 | 14 | 87.50 | 0.486 |
| 5 | 8 | 50 | 9 | 56.25 | 3 | 18.75 | 12 | 75 | 1.11 |

* Shows that the difference is significant as C.R. exceeds 2.036 at 0.05 level of significance.

## TABLE V.14

### DIFFERENCE BETWEEN THE PERCENTAGES OF CORRECT RESPONSES BY CONTROL GROUP AND EXPERIMENTAL GROUP

| Q.No.4 | Control Group | | | | Experimental Group | | | | CR |
|---|---|---|---|---|---|---|---|---|---|
| State- | Pre-test | | Post-test | | Pre-test | | Post-test | | t |
| ment No. | Correct Responses | % | Correct Responses | % | Correct Responses | % | Correct Responses | % | Value |
| 1-Who | 13 | 81.25 | 8 | 50 | 12 | 75 | 8 | 50 | 0 |
| 2-Which | 10 | 62.5 | 4 | 25 | 9 | 56.25 | 8 | 50 | 1.46 |
| 3-What | 3 | 18.75 | 5 | 31.25 | 4 | 25 | 9 | 56.25 | 1.42 |
| 4-Where | 8 | 50 | 5 | 31.25 | 4 | 25 | 9 | 56.25 | 1.42 |
| 5-How | 2 | 12.50 | 3 | 18.75 | 3 | 18.75 | 10 | 62.50 | 2.52 |
| 6-How many | 13 | 81.25 | 6 | 37.50 | 8 | 50 | 9 | 56.25 | 1.07 |
| 7-Whom | 3 | 18.75 | 2 | 12.50 | 3 | 18.75 | 7 | 43.75 | 1.97 |

* Shows that the difference is significant as C.R. exceeds 2.036 at 0.05 level of significance.

## V.4 CONCLUDING REMARKS

This chapter was devoted to analysis and interpretation based on the scores, means and t values gained in the pre-test and post-test.

It also analysed the percentage of correct responses to each statement in the question papers for pre-test and post-test.

The conclusions based on this analysis and interpretation are given in the next chapter. Along with the conclusions, some recommendations for betterment and some problems for further studies are suggested.