Chapter IV

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CHAPTER IV
ANALYSIS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

Analysis as a process enters the research in one form or the other in the verybeginning of the selection of problem, in the determination of methods and ininterpreting and drawingconclusions from the data gathered. According to Prof.Wilkinson and Bhandarkar," *Analysis ofdata involves a number of closely relatedoperations that are performed with the purpose of summarizing the collected data andorganising these in such a manner that they will yield answer to the research questionsor suggest hypotheses or questions if no such questions or hypotheses had initiated thestudy".*

Interpretation is an important step in the total procedure of research. Theprocess of interpretation is essentially one of stating what is the answer to the originalproblem? Interpretation is thus by no means a mechanical process. It calls for acritical examination of the results of one's analysis in the light of all the limitation of data gathering. The researcher cannot achieve his or her objective without the interpretation of the data collected with the help of tools used for the study. In the previous chapter a complete account of the approach to collect therequired data for the present study was presented. The present chapter is devoted tothe analysis and interpretation of the collected data to achieve objectives and to testthe hypotheses presented in the previous chapter. The major concern of the present study was the development of **Vedic Mathematical Techniques** (VMT) to study its effectiveness. The hypotheseshave been tested through statistical techniques and the pertinent results were analyzed and interpreted as needed.

In the present study, the researcher studied the effect of independent variable.As an independent variable, the teaching techniques have two categories: **VedicMathematical Techniques** and **Conventional Mathematical Techniques.** As dependent variable, academicachievement in Mathematics was covered. It was to be examined, "by using Vedic Mathematical Techniques, whether the academic achievement in Mathematics of the students could be affected or not. This study constitutes the analysis and interpretation of data collected from one school of Bhadrak. The analysis of data was done by applying the following statistical techniques mean, standard deviation, t-test, Correlational t-test were done as to the understanding of phenomenon under study.

4.2 Methods of Data Analysis

The **ResearcherMadeTest (RMT)** was administered as pre-test and post-test. The data was collected as per the scoring. Raw scores obtained from post-test were presented intabular form for the purpose of interpretation. Mean, SD, t – test and paired t-test counted for each group. **Significant** of difference between the mean scores of twogroups were tested at**0.05** level and found out applying t – test. For thispurpose students of two groups were divided into half of the total number . Students' achievement score was taken group wise. The details of the achievement score is presented in **Appendix-C, Appendix-D** and the data of the finally **selectedsubjects** are given in the table 3.3.

4.3 Experiments conducted

In the present study **Quasi - Experimental research design** was selectedIndependent variable was teaching methodology which had two levels:

(1) Teaching through Vedic Mathematical Techniques

(2) Teaching through Conventional Mathematical Techniques

Academic achievement in Mathematics was dependent variable. Measurementof academicachievement of the students was done with the help of researcher made post-testwhich covered 4topics of Arithmetic and Algebra portion of Mathematics subject. In post-test very short answer type and short answer type were included. Limitation of the marks was zero to thirty. Time duration was of 30 minutes . The students of only experimental group were taught through VMT.

4.4 Analysis of data

In the present study, scores obtained in the pre-test and post-test were collected by the researcher and were saved in data file prepared in MS Excel 2007.These scores were analyzed with the help of MS Excel and **SPSS (Statistical package for the Social Sciences)** computerProgramme.

4.4.1 Calculation of descriptive statistical measures

Descriptive statistics is used to describe the basic features of the data in astudy. **Mean, standard deviation** were calculated.

4.4.2 Analysis of post-test scores

In the present study, after completion of treatment, post-test was administeredon the students of both the group and answer sheets were evaluated according tomaking scheme. After evaluation, obtained scores were saved in data file and wereutilized for knowing statistical features of scores of both the groups.

4.5 Testing of Hypotheses

In order to study the effectiveness of VMT the researcher has formulated **nullhypotheses**, which was presented in **chapter-1.** The data collected by the researcher, from the results of post-test were utilized for testing the hypotheses. Researcher has calculated correlation and t-value with the help of statistical techniques and SPSS. Results obtained through the use of statistical techniques have been presentedin the form of table in this chapter.The researcher now tested the hypotheses on the basis of analysis of post-test and practical significance of statistical results.

OBJECTIVE : 1

To compare mean scores of students' Achievement in Mathematics of control group and experimental group on pre-test.

NULL HYPOTHESIS: 1

There is no significant difference between mean scores of Students' Achievement in Mathematics of control group and experimental group on pre-test.

For testing the hypothesis, **Correlated t-test** should be used and the data can be analyzed using **Statistical Package for the Social Science (SPSS)** . The outputs of SPSS are as given Tables 4.1, 4.2 and 4.3.

Critical value of t = ±2. 045 for all the table at df=29, CI= 95%,

Table 4.1

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	cont_pretest	5.37	30	3.837	.701
	exp_pretest	5.37	30	3.316	.605

Table 4.2

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	cont_pretest&exp_pretest	30	.864	.000

Table 4.3

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	cont_pretest - exp_pretest	.000	1.930	.352	-.721	.721	.000	29	1.000

Interpretation of results :

From above table 4.3 , it can be seen that the calculated t-value is 0.000 which is **not significant** as it is less than the critical t-value (2.045) at **95%** confidence level with 29 degree of freedom. Looking at **p- value ,** is 1.000 > 0.05.Hence the difference is not significant at 0.05 (95%) level. It indicates that mean scores of achievement in mathematics of experimental group(Students taught by Vedic mathematical techniques)students on pre-test is not differed significantly from students of control group(Students taught by traditional method). Thus, the **null hypothesis** that there is no significant difference between mean scores of Students' Achievement in Mathematics of control group and experimental group on pre-test is **accepted.**

OBJECTIVE : 2

To compare mean scores of students' Achievement in Mathematics of control group and experimental group on post-test

NULL HYPOTHESIS : 2

There is no significant difference between mean scores of Students' Achievement in Mathematics of control group and experimental group on post-test.

For testing the hypothesis, **Correlated t-test** should be used and the data can be analyzed using **Statistical Package for the Social Science (SPSS)** . The outputs of SPSS are as given Tables 4.4, 4.5 and 4.6.

Table 4.4
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	cont_post test	5.50	30	3.937	.719
	exp_posttest	16.60	30	3.460	.632

Table 4.5

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	cont_posttest&exp_posttest	30	.772	.000

Table 4.6

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	cont_posttest - exp_posttest	-11.100	2.537	.463	-12.047	-10.153	-23.961	29	.000

Interpretation of results :

From above table 4.6, it can be seen that the calculated t-value is 23.961 which is **significantly** greater than the critical t-value (2.045) at **95**% confidence level with 29 degree of freedom. Looking at **p- value ,** is 0.000 < 0.05.Hence the difference is **significant** at 0.05 (95%) level. It indicates that mean scores of achievement in mathematics of group students taught by vedic mathematical techniques at post-test stage is differed significantly from students of group students taught by traditional method. Thus, the **null hypothesis** that there is no significant difference between mean scores of Students' Achievement in Mathematics of control group and experimental group on post-test is **rejected.**

OBJECTIVE : 3

To compare mean scores of Achievement in Mathematics at pre-test and post-test stages of control group students.

NULL HYPOTHESIS: 3

There is no significant difference in mean scores of Achievement in Mathematics at pre-test and post-test stages of control group Students.

For testing the hypothesis, **Correlated t-test** should be used and the data can be analyzed using **Stastical Package for the Social Science (SPSS)** . The outputs of SPSS are as given Tables 4.7, 4.8 and 4.9.

Table 4.7

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	cont_pretest	5.37	30	3.837	.701
	cont_posttest	5.50	30	3.937	.719

Table 4.8

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	cont_pretest&cont_posttest	30	.960	.000

Table 4.9

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	cont_pretest - cont_posttest	-.133	1.106	.202	-.546	.280	-.660	29	.514

Interpretation of results :

From above table 4.9, it can be seen that the calculated t-value is 0.660 which is **not significant** as it is less than the critical t-value (2.045) at **95%** confidence level with 29 degree of freedom. Looking at **p- value ,** is 0.514 > 0.05. Hence the difference is **not significant** at 0.05 (95%) level. It indicates that mean scores of achievement in mathematics at pre-test stage of control group students is not differed significantly from achievement in mathematics at post-test stages of the same group. Thus, the **null hypothesis** that there is no significant difference in mean scores of Achievement in Mathematics at pre-test and post-test stages of control group Students is **accepted.**

OBJECTIVE : 4

To compare mean scores of Achievement in Mathematics at pre-test and post-test stages of experimental group students.

NULL HYPOTHESIS : 4

There is no significant difference in mean scores of Achievement in Mathematics at pre-test and post-test stages of experimental group Students.

Table 4.10

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	exp_pretest	5.37	30	3.316	.605
	exp_posttest	16.60	30	3.460	.632

Table 4.11

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	exp_pretest&exp_posttest	30	.740	.000

Table 4.12

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	exp_pretest - exp_posttest	-11.233	2.445	.446	-12.146	-10.320	-25.164	29	.000

Interpretation of results :

From above table 4.11, it can be seen that the calculated t-value is **25.164** which is **significantly** greater than the critical t-value (2.045) at **95%** confidence level with 29 degree of freedom. Looking at **p- value ,** is 0.000 < 0.05.Hence the difference is **significant** at 0.05 (95%) level. It indicates that there is **significant difference** in mean scores of Achievement in mathematics at pre-test and post-test stages of group taught Mathematics with using vedic mathematical techniques. Thus, the **null hypothesis** that there is no significant difference in mean scores of Achievement in Mathematics at pre-test and post-test stages of experimental group Students is **rejected.**therefore, be said that Achievement in Mathematics of students improved significantly when taught through ***Vedic Mathematical Techniques.***