CHAPTER – 4
DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter of the dissertation concentrates on the statistical analysis and interpretation of the data collected. The focus is on the statistical parameters working in data processing. A detailed account of various statistical measurements of central tendency, Rank correlation coefficient, standard deviation and coefficient of variation were adopted. Moreover, the t-test was used for verifying statistical significant mean difference between scores of pre-test and post-test.

The analysis was viewed objectively, along with the statistical analysis of the data collected from pre-test and post-test. Simultaneously, qualitative analysis was also observed in terms of students' response and their active participation in the classroom.

4.2 Importance of Statistics in Research

Statistics is a body of mathematical techniques or processes for gathering, organizing, analyzing, and interpreting numerical data. Because most research yields such quantitative data, statistics is a basic tool of measurement and research.

The word statistics is sometimes used to describe the numerical data that are gathered. Statistical data describe group behavior or group characteristics abstracted from a number of individual observations that are combined to make generalizations possible.

The research worker who uses statistics is concerned with more than the manipulation of data. The statistical method serves for the fundamental purposes of description and analysis, and its proper application involves answering the following questions:

1) What facts need to be gathered to provide the information necessary to answer the question or to test the hypothesis?
2) How are these data to be selected, gathered, organized, and analyzed?
3) What assumptions underlie the statistical methodology to be employed?

4) What conclusions can be validly drawn from the analysis of the data?

Research consists of systematic observation and description of the characteristics or properties of objects or events for the purpose of discovering relationships between variables. The ultimate purpose is to develop generalizations that may be used to explain phenomena and to predict future occurrences. To conduct research, researcher must establish principles so that the observation and description have a commonly understood meaning. Measurement is the most precise and universally accepted process of description, assigning quantitative values to the properties of objects and events.

Statistics is a measure based on observations of the characteristics of a sample. A statistic computed from a sample may be used to estimate a parameter, the corresponding value in the population from which the sample is selected. Statistics are usually represented by letters of Roman alphabet such as X, S, and r. parameters, on the other hand, are usually represented by letters of the Greek alphabet such as μ, and σ.

Before any assumptions can be made, it is essential that the individuals selected be chosen in such a way that the small group, or sample, approximates the larger group, or population. Within a margin of error, which is always present, and by the use of appropriate statistical techniques, this approximation can be assumed, making possible the estimation of population characteristics by an analysis of the characteristics of the sample.

4.3 Data

Data for this research study were collected through implementation of a CAL package prepared by the researcher. The package contained materials focusing on two major items in English Grammar where most teachers of English also make errors. These items were Voice (Active-Passive Voice) and Degrees of Comparison (Comparative and Superlative degrees).

All the 15 Pre-service teachers attended the sessions regularly. The pre-test and post-test were prepared in the form of worksheets based on the two grammar points: Voice and Degrees. Individual marking was accomplished on the basis of questions asked to the Pre-service teacher which were based on the treatment given to

them. Subsequently, the scores of the pre-test and post-test were compared and interpreted to measure the impact of treatment on the experimental group and the differences were tabulated thereby validating the hypothesis that CAL material has a significant impact on learning teaching English grammar. A statistical analysis too was carried out on the data.

4.4 Results of the Pre-test and the Post-test

No	*Pre test*	*Post test*	*Difference*
1	15	25	10
2	11	25	14
3	15	20	05
4	10	19	09
5	12	20	08
6	14	25	11
7	12	25	13
8	15	22	07
9	17	25	08
10	18	26	08
11	10	18	08
12	15	22	07
13	15	20	05
14	13	22	09
15	17	26	09
Total	209	340	

Table 4.1 indicating scores of pre-test and post-test

4.5 Highlights of the Analysis

- The average scores made by the Pre-service teacher in the pre-test are 13.93 and post-test 22.67.
- There is a difference of 8.74 between the pre-test score and post-test score which is positive.
- There is a high standard deviation (2.77) in post-test score compared with low standard deviation 2.52 in pre-test score.

On the basis of the obtained data statistical analysis was done. For the analysis following notions were used.

N_1 - Total number of students in the first test

N_2 - Total number of students in the second test

X_1 – Average marks obtained in the first test. (Mean of the first test)

X_2 – Average marks obtained in the second test. (Mean of the second test)

❖ **Central Tendency**

1) Mean:

The most commonly used measure of central tendency is the mean. To compute the mean, all the numbers are added up and divided by how many numbers there are. It is not the average nor a halfway point, but a kind of center that balances high numbers with low numbers. For this reason, it is most often reported along with some simple measure of dispersion, such as the range, which is expressed as the lowest and highest number**.** In formula form:

$$\text{Mean} = \frac{\sum X}{N}$$

The mean is probably the most useful of all statistical measures, for, in addition to the information that it provides, it is the base from which many other important measures are computed. The researcher for the sake of analysis has taken 'Mean' to be his starting point in variance analysis.

Mean of the Pre test: $\frac{\sum X_1}{N_1}$ = 209/15 =**13.93**

Mean of the Post test: $\frac{\sum X_2}{N_2}$ = 340/15 =**22.6**

2) Standard Deviation

SD of marks obtained in the Pre test

$$SD_1 = \sqrt{\frac{\sum {X_1}^2}{N_1 - 1}}$$

= 2.52

SD of marks obtained in the Post test

$$SD_2 = \sqrt{\frac{\sum {X_2}^2}{N_2 - 1}}$$

= 2.77

3) Rank correlation coefficient

$$r = \frac{\sum xy}{\sqrt{\sum x^2} \times \sqrt{\sum y^2}}$$

$$= 0.93$$

Having collected the data through various measures, analysis of the same was undertaken. With a view to presenting the data in a compact form, the bar chart representation was preferred. (See figure 4.1 and figure 4.2 is standard deviation of Pre-test and post-test). These figures indicate the marks obtained by students in the pre-test and post-test.

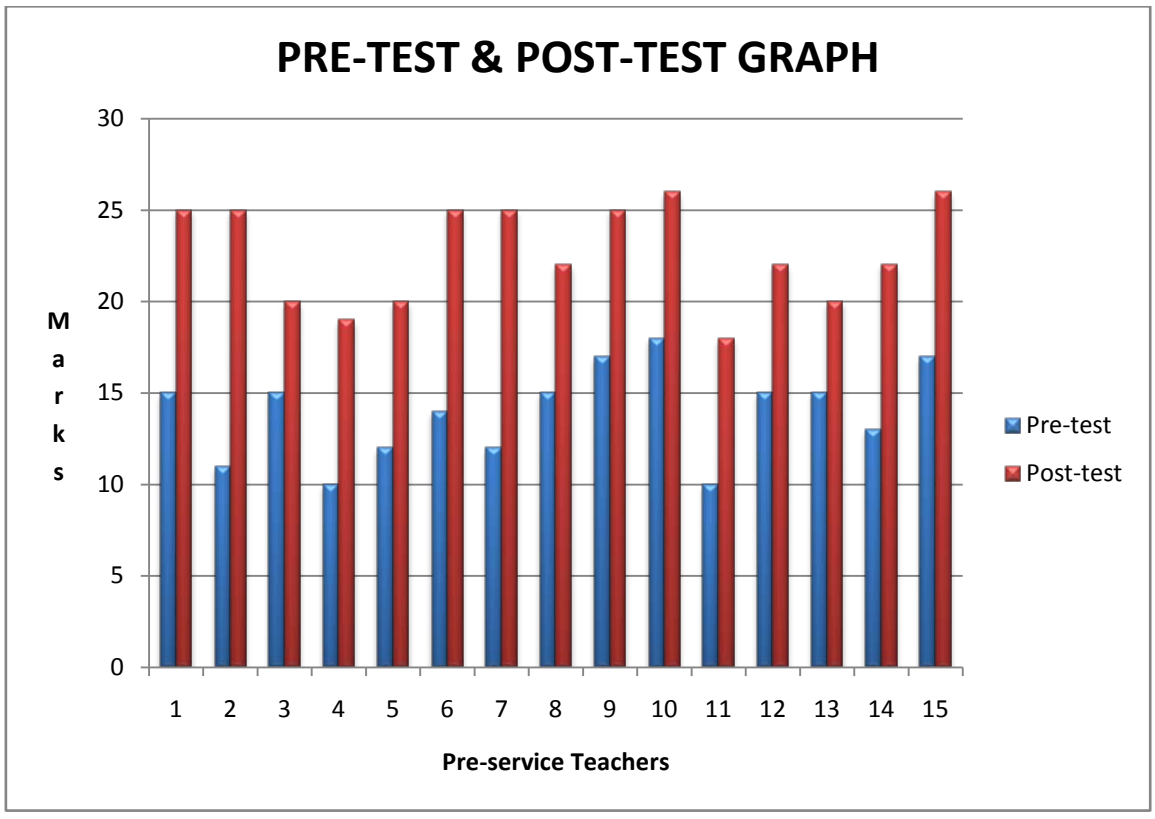

Figure 4.1 Results of the Pre-test and the Post-test

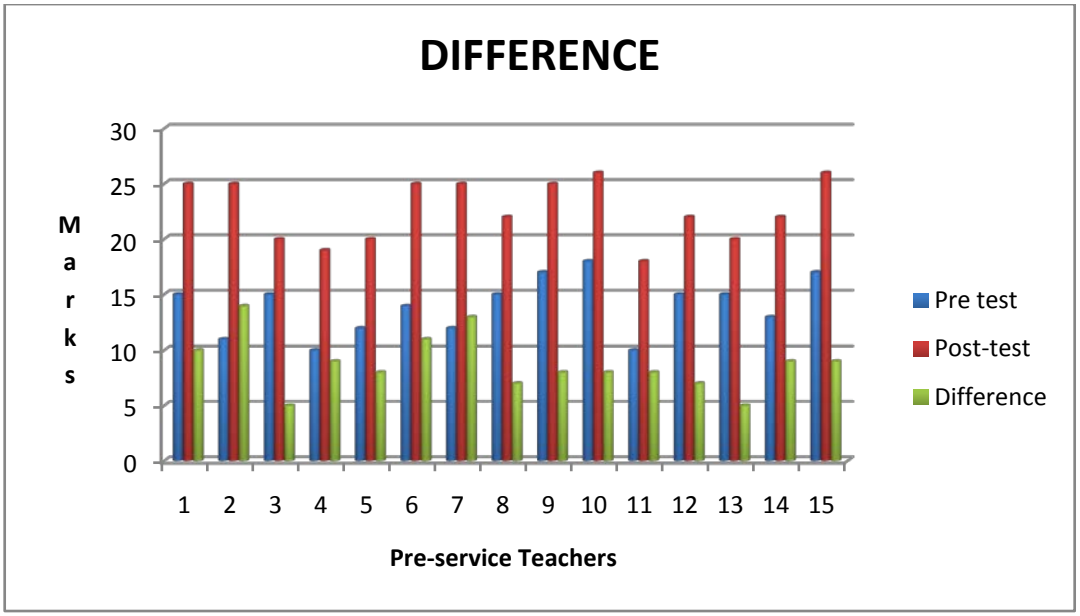

Figure 4.2 Difference between Pre-test and Post-test

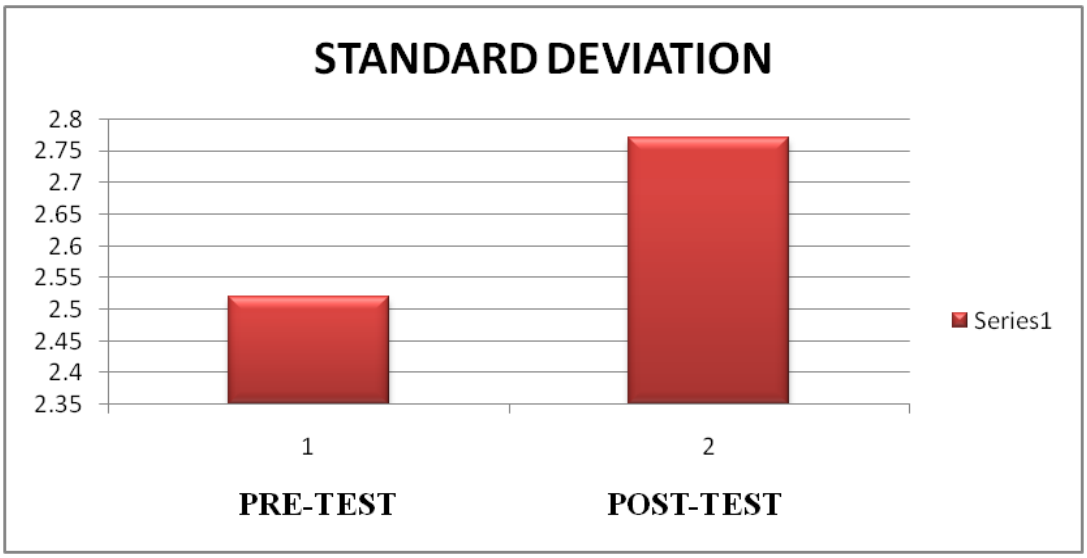

Figure 4.3 Standard Deviation of the Pre-test and the Post-test

	No. of Pre-service Teacher	Mean	S.D	SEm1	SEm2	r	df	t
Pre-test	15	13.93	2.52	0.65	0.42			
Post-test	15	22.67	2.77	0.72	0.52	0.93	14	33.61

Table 4.2Mean, SD, SEm, r, and t-value of Pre test and Post test

4.6 Interpretation of the Data

- Figure 4.1 indicates the marks scored by the sample group in the pre-test and post-test respectively. Variation could be seen in the marks of the pre-test and post-test.
- Figure 4.2 indicates the difference between the Pre-test and the Post-test scores.
- In Figure 4.3 the difference in the standard deviation of pre test and post test can be seen, which is 2.52 and 2.77 respectively.
- Correlation between Pre-test and post-test scores=0.93
- Standard error of pre-test score (SEm1) 0.42
- Standard error of post-test score (SEm2) 0.52
- Value of correlated t=33.61
- Degree of freedom (df) = 14
- Looking up the t-table for df=14 we find that the value of t=2.98 at 0.01 level and t=2.14 at 0.05 level.
- The computed t value of 33.61 is higher than the table t=value of 2.98 at 0.01 level and 2.14 at 0.05 level. So, the null hypothesis that *there will be no significant difference between pre-test and post-test mean* is rejected.

From the figures one could say that there is a definite effect of the CAL materials on the sample group. According to the above mentioned figures the mean difference, positive increase of mode, the comparison of SD values provide evidence to the fact that the Pre-service teacher have performed better after being used the CAL materials in enhance English Language Proficiency.

4.7 Feedback

For the precise detailed and comprehensive assessment of the given pre-service teachers. They were given feedback forms for the purpose. This form had four Questions regarding the awareness of CAL package.

Statements-1 Did you like the program given to you through the CAL package? If yes, why? If no, why?

- 100% Pre-service teachers liked the CAL package because, the program was easy to understand and learning was better and long-lasting.
- Through the learning of CAL package, classroom atmosphere becomes more lively and closer to real life situations.

- Technology can hold the students' interest in learning process.

Statements-2 Do you think technology can help teachers to teach English better? Why?

Obviously with today's lifestyle technology in the classroom is inevitable.

- Can make their teaching effective and interesting.
- With its attractive modes of presentation, technology can create good impact of the teachers' work.
- Can help to have a longer attention span.
- Can develop better interpersonal relations with the students.

Statements-3 What preparation is required for teachers to use technology in the classroom?

In this question the researcher has found that teachers have a sound knowledge of technology about the use of some applications, and have a good command over the English language and creative idea of methods.

Statements-4 Would you like to use technology in your teaching? Are you reedy from next program?

- 100% Pre-service teachers said that they would like to use technology in their teaching.
- They were ready for the next program.

4.8 Conclusion

The outcome of the experiment obtained through data analysis shows the productivity of the materials tried out on the sample group. The scores were presented in the form of tables. The outcome of the experiment obtained through data analysis shows the positive impact of the CAL materials. To learn enhance English Language Proficiency in a better way, the pre-service teacher will learn better through CAL materials rather than learning through traditional method. The researcher also used the feedback form in the form of questions. The next chapter deals with the findings and suggestions collected during the treatment.