CHAPTER – V

ANALYSIS AND INTERPRETATION OF DATA
CHAPTER V

Analysis and Interpretation of Data

5.0. Introduction

This chapter deals with the analysis and interpretation of the data collected during the study. These analysis and interpretations inform by means of its results the significance of the study, and provide an answer to the objective of the problem. The purpose of this study is to see the effectiveness of multimedia, as a tool to enable the learners enhance the level of comprehension. In addition, it determines the attitudes of the experimental group towards Multimedia CD Assisted Instructional Package. The primary data were used to examine the level of comprehension before and after the treatment.

In the present investigation, the researcher uses descriptive statistics and differential statistics to determine the effectiveness of the multimedia CD assisted instructional package.

5.1. Descriptive Analysis

The descriptive analysis involves the measures of central tendency and measures of variability. These two measures are useful to study the nature of the distribution of any variable. The computed values of mean, standard deviation, and gain score as well as the mean difference are used to describe the properties of the particular sample. Descriptive statistics also serve as inputs for further inferential analysis.
5. 2. Differential Analysis

Differential analysis involves the most important process by which the researcher is able to infer the statistical significant difference between the groups with reference to selected variables.

In the present study the researcher has applied the

(i) Wilcoxon Signed Rank Test to test the significant difference between the scores of the control group and between the scores of the experimental group.

(ii) Mann-Whitney U-Test to test the significant difference between the scores of the control group and the experimental group.

5.2.1. Wilcoxon Signed Rank Test

It is used to test the difference between two related sets of rankable scores, the two observations being made either on the same or the matched subjects (Louis and Michael 1979). The following steps are used in the Wilcoxon Signed Rank Test.

a. For each pair of subjects determine the differences in scores (d).

b. Rank these differences ignoring the plus or minus signed and differences of ‘0’ (Zero).

When ranks are tied assign the average of the tied ranks.

c. Assign each rank the ‘+’ or ‘-’ sign of difference it represents.

d. Mark the ranks with less frequent sign.

e. Total (T) the ranks with less frequent sign.

f. If the estimated ‘Z’ value is more than 1.96 in the table, it shows that there is a significant difference between the sets of scores at 5% level of significance.
The researcher used the software ‘SPSS-13.00’ standard version to find out the value of Wilcoxon Signed Rank Test.

5.2.2. Mann Whitney U-Test

It is a useful non-parametric alternative to the ‘t-test’ for uncorrelated data when the assumptions of the ‘t-test’ are not met. The following procedure is used when the Mann Whitney U-Test is applied.

a. Rank all the scores as though they are in one group, giving rank ‘1’ to the test which are tied, assign the average of the tied ranks.

b. Sum up the ranks for each group.

c. Compute U from the formulae.

\[ U = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1 \quad \text{(Formula A)} \]

\[ U = n_1 n_2 + \frac{n_1 (n_2 + 1)}{2} - R_2 \quad \text{(Formula B)} \]

\[ |Z| = \frac{|T - n(n+1)|}{\sqrt{n (n+1) (2n+1)}} \sim \text{SNV} \text{ (Standard normal variate)} \]
Where $R_1 = \text{sum of ranks for the control group with } n_1 \text{ subjects}$

$R_2 = \text{sum of ranks for experimental group with } n_2 \text{ subjects}$

If the calculated value of ‘Z’ is larger than the tabulated value, there is a significant difference between the sets of scores at 5% level of significance.

5.3. Classification and Tabulation of Data

In the present investigation, the scores obtained by both the control group and the experimental group in their pre-test and post-test are tabulated. Moreover, the attitude scores of the experimental group are also tabulated for analysis and interpretation. The results of these interpretations will display the utility of this study.

5.3.1. Descriptive Analysis

Computation of Achievement of Control and Experimental Groups in the Pre-test of Reading Comprehension

Table No: 5.1 shows the descriptive analysis of achievement of the control and the experimental groups in the pre-test of reading comprehension.

Table 5.1. Descriptive Analysis of Achievement of both the Control Group and the Experimental Group in the Pre-test of Reading Comprehension.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Max Score</th>
<th>Min Score</th>
<th>Mid Value</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>19</td>
<td>13.63</td>
<td>4.37</td>
<td>50</td>
<td>0</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>19</td>
<td>14.84</td>
<td>4.77</td>
<td>50</td>
<td>0</td>
<td>25</td>
<td>1.21</td>
</tr>
</tbody>
</table>
The reading comprehension scores of the control and the experimental groups in the pre-test were analyzed using descriptive statistics. The mean and standard deviation of the reading comprehension scores in the pre-test of the control group is found to be 13.63 and 4.37 respectively for N =19. The mean and standard deviation of the experimental group for the same pre-test is found to be 14.84 and 4.77 respectively for the sample of N =19. It is found that the mean scores of both the control and the experimental groups are below the mid value for the pre-test. Next, the researcher is interested in finding out the mean difference in the scores of reading comprehension between the control and the experimental groups. The mean difference of the experimental and control group was found to be 1.21 for the sample of 19 each. This shows that both the control and experimental groups are nearly equal in their achievement. Therefore, it is concluded that both the experimental and the control groups are from the identical population. Figure 5.1 shows mean and standard deviation values of the control and experimental groups in the pre-test of reading comprehension.
Fig 5.1 Mean and Standard Deviation Difference in the Pre-test of Experimental and Control Groups
Computation of Achievement of Control and Experimental Groups in the Post-test of Reading Comprehension.

Table No: 5.2 shows the descriptive analysis of the achievement of both the control group and the experimental group in the post-test of reading comprehension.

Table 5.2. Descriptive Analysis of the Achievement of both the Control Group and the Experimental group in the Post-test of Reading Comprehension.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Max Score</th>
<th>Min Score</th>
<th>Mid Value</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>19</td>
<td>29.16</td>
<td>6.97</td>
<td>50</td>
<td>0</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>19</td>
<td>37.53</td>
<td>6.99</td>
<td>50</td>
<td>0</td>
<td>25</td>
<td>8.37</td>
</tr>
</tbody>
</table>

The reading comprehension scores of the control group post-test and the experimental group post-test were analysed using descriptive analysis. The mean and standard deviation of the control group post-test is 29.16 and 6.97, whereas for the experimental group, it is 37.53 and 6.99 for N =19. This shows that the mean scores of the experimental group are above the mid-value. The researcher is then interested in finding the mean difference between the post-test mean score of the control group and the post test mean score of the experimental group. It is obtained as 8.37 for the sample of N =19. This indicates that the experimental group has scored higher than the control group in the post-
test. Therefore, the study shows that the Multimedia CD assisted instructional package has improved the reading comprehension of the experimental group. Figure 5.2 shows mean, standard deviation values of the control group post-test and experimental group post-test of reading comprehension.

**Fig 5.2 Mean and Standard Deviation Values of the Control Group Post-test and Experimental Group Post-test of Reading Comprehension.**
Computation of Attitude of Experimental Group towards the Multimedia CD Assisted Instructional Package Before and After the Treatment.

Table No: 5.3 shows the descriptive analysis of attitude of the experimental group towards the Multimedia CD assisted instruction.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Max Score</th>
<th>Min Score</th>
<th>Mid Value</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Treatment</td>
<td>19</td>
<td>133.63</td>
<td>7.14</td>
<td>185</td>
<td>37</td>
<td>92.5</td>
<td>22.10</td>
</tr>
<tr>
<td>Post Treatment</td>
<td>19</td>
<td>155.73</td>
<td>12.36</td>
<td>185</td>
<td>37</td>
<td>92.5</td>
<td></td>
</tr>
</tbody>
</table>

The attitude of the experimental group before and after the treatment was analysed using descriptive statistics. The mean and standard deviation of the attitude scores in the pre and post-treatments are found to be 133.63 and 7.14; and 155.73 and 12.36 for the sample of N=19. This shows that the mean attitude scores of the experimental group are...
above the mid-value for both prior to the treatment and after the treatment. The mean difference in the attitude scores of the experimental group both prior and after the treatment was calculated. It is obtained as 22.10 for the sample of N=19. The range fixed for the attitude scale (i.e.) from 37-185, indicates that 22.10 is a good index of gain. Therefore, it is concluded that the attitude of the experimental group has improved in the after treatment comparing its score to the pre-treatment, thereby revealing that the Multimedia CD assisted instruction has made attitudinal changes in the experimental group. Figure 5.3 shows attitude towards Multimedia CD assisted instruction of pre-treatment and post-treatment of the experimental group.
5.3.2. Differential Analysis

The comparison between the pre-test and post-test mean scores of the control group and the pre-test, post-test mean scores of the experimental group were found by applying the Wilcoxon Signed Rank Test.
Wilcoxon Signed Rank Test

Comparison between the Pre-test scores and the Post-test scores of the Control Group.

Table No: 5.4 shows the significant difference in the scores of the reading comprehension of the control group.

Table 5.4. Significant Difference in the Scores of Reading Comprehension of the Control Group.

<table>
<thead>
<tr>
<th>Rank</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
<th>Z score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test and Post test</td>
<td>Rank</td>
<td>N</td>
<td>Mean Rank</td>
<td>Sum of Ranks</td>
</tr>
<tr>
<td>Negative Ranks</td>
<td>0</td>
<td>.00</td>
<td>.00</td>
<td></td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>19</td>
<td>10.00</td>
<td>190.00</td>
<td>3.826 *</td>
</tr>
<tr>
<td>Ties</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level

Post-test< Pre-test=0
Post-test> Pre-test=19
Post-test= Pre-test=0

The researcher calculated the ‘Z’ score using the Wilcoxon Signed Rank Test, so as to determine the level of significance for the achievement of the control group using the pre-test and post-test scores. The calculated value of ‘Z’ is 3.826 at 5% level of
significance. This is seen to be above the value of 1.96 in the table. Therefore statistical analysis concludes that there is a significant difference between the pre-test scores and the post-test scores of the control group.

Comparison between the Pre-test score and the Post-test score of the Experimental Group in Reading Comprehension

Table No:5.5 shows significant difference between the pre-test score and the post-test score of the experimental group in reading comprehension.

Table 5.5. Significant Difference in the Scores of Reading Comprehension of the Experimental Group.

<table>
<thead>
<tr>
<th>Rank</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
<th>Z score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Ranks</td>
<td>0</td>
<td>.00</td>
<td>.00</td>
<td></td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>19</td>
<td>10.00</td>
<td>190.00</td>
<td>3.830 *</td>
</tr>
<tr>
<td>Ties</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level

Post-test< Pre-test=0

Post-test> Pre-test=19

Post-test= Pre-test=0
The researcher calculated the ‘Z’ score using the Wilcoxon Signed Rank Test, so as to determine the level of significance for the achievement of the experimental group using the pre-test and post-test scores. The calculated value of ‘Z’ is 3.830 at 5% level of significance, and is more than the value of 1.96 in the table. Hence, it indicates that there is a significant difference between the achievement scores of the pre-test and the post-test of the experimental group in reading comprehension. Statistical analysis concludes that there is a significant difference between the scores of the pre-test and the post-test of the experimental group in reading comprehension.

Mann-Whitney U-Test.

The comparison between the pre-test mean score of both the control and experimental groups, and the post-test mean scores of both the control and experimental groups were found by applying Mann-Whitney U-Test.

Comparison between the Pre-test Mean Scores of both the Control Group and the Experimental Group

Table No: 5.6 shows the significant difference in the pre-test scores of reading comprehension of both the control and the experimental groups.
Table 5.6. Significant Difference in the Pre-test of both the Control and the Experimental Groups with Reference to Reading Comprehension using Mann-Whitney U-test.

<table>
<thead>
<tr>
<th>Size of the Group</th>
<th>N</th>
<th>Rank</th>
<th>Sum of Ranks</th>
<th>Mean Rank</th>
<th>U1</th>
<th>U2</th>
<th>Region of Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>19</td>
<td>R₁</td>
<td>344.5</td>
<td>18.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>19</td>
<td>R₂</td>
<td>396.5</td>
<td>20.87</td>
<td>206.5</td>
<td>154.5</td>
<td></td>
</tr>
</tbody>
</table>

Thus the test statistics is

\[ Z = \frac{|U - \mu_u|}{\sigma_u} \]

\[ Z = 0.76 \]

The researcher applied the Mann Whitney U-Test for finding the significant difference in the pre-test scores of reading comprehension of both the control group and the experimental groups.

The calculated value of U₁ is 206.5 and the calculated value of U₂ is 154.5. These two values fall between the region of acceptance-i.e. between 113.37 and 247.63. As they fall between the regions of acceptance, it is concluded that the control group and the experimental group do not differ significantly in their pre-test achievement. The calculated value of ‘Z’ for the pre-test of the control group and the experimental group is 0.76. Since, the calculated value of ‘Z’ is lesser than the tabulated value of ‘Z’ at 5% level of
significance, the data concludes that there is no difference between the pre-test of both the control group and the experimental group. Hence, it indicates that the control group and the experimental group are from the identical population.

Comparison between the Post-test Mean Scores of both the Control Group and the Experimental Group in Reading Comprehension

Table No: 5.7 shows the significant mean difference between the post-test mean scores of both the control and the experimental groups.

Table 5.7. Significant Difference in the Post-test Mean Scores of both the Control and the Experimental Groups in Reading Comprehension

<table>
<thead>
<tr>
<th>Size of the Group</th>
<th>N</th>
<th>Rank</th>
<th>Sum of ranks</th>
<th>Mean Rank</th>
<th>U1</th>
<th>U2</th>
<th>Region of Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>19</td>
<td>R₁</td>
<td>263.5</td>
<td>13.87</td>
<td></td>
<td></td>
<td>Lower 113.37</td>
</tr>
<tr>
<td>Experimental</td>
<td>19</td>
<td>R₂</td>
<td>477.5</td>
<td>25.13</td>
<td>287.5</td>
<td>73.5</td>
<td>Upper 247.63</td>
</tr>
</tbody>
</table>

Thus the test statistics is

\[
Z = \frac{|U - U|}{\sigma U}
\]

\[
Z = 3.12
\]

The researcher applied Mann-Whitney U-test for finding the significant difference in the achievement of the post-test mean scores of the control group and the experimental
group. The calculated value of \( U_1 \) is 287.5 and the calculated value for \( U_2 \) is 73.5. These two values do not fall between the region of acceptance i.e. between 113.37 and 247.63. As they do not fall between the regions of acceptance, it indicates that there is a significant difference in the reading comprehension of the post-test mean scores of the control group and the experimental group. The calculated value of ‘Z’ for the post-test of the control group and the experimental group is 3.12. Since the calculated value of ‘Z’ is greater than the tabulated value of ‘Z’ at 5% level of significance, the hypothesis is accepted and concluded that there is significant difference between the post-test of both the control group and the experimental group. Therefore, statistical analysis concludes that there is a significant difference in the post-test of the control group and the experimental group.

5.4. Results of Hypotheses Testing

In the present study, five hypotheses are formulated. The sub-sections deal with the outcomes of the hypotheses testing.

Hypothesis-1 There exist no significant difference between the pre-test means of the control group and the experimental group.

According to the descriptive analysis of the study, the mean difference between the control and the experimental groups is found to be 1.21. This shows that both the control and experimental groups are nearly equal in their achievement. Therefore, statistical analysis shows that both the experimental and the control groups are from the identical population.

Hypothesis-2 The difference between the means of the pre-test and post-test of the control group is significant
According to the differential analysis of the study, the researcher used the Wilcoxon Signed Rank Test to find the difference in achievement within the group. The calculated value of ‘Z’ score is 3.826 at 5% level of significance. Therefore, there is a significant difference between the reading comprehension scores of the pre-test and the post-test of the control group. Statistical analysis shows there is a significant difference between the reading comprehension scores of the pre-test and the post-test of the control group.

**Hypothesis-3** There exist significant difference between the means of the pre-test and post-test of the experimental group.

According to the differential analysis of the study, the researcher used the Wilcoxon Signed Rank Test to find the difference in reading comprehension scores within the group. The calculated value of ‘Z’ score is 3.830 at 5% level of significance. It indicates that there is a significant difference between the mean scores of the pre-test and the post-test of the experimental group. Therefore, statistical analysis shows that there is a significant difference between the mean scores of the pre-test and the post-test of the experimental group in reading comprehension.

**Hypothesis-4** The difference between the post-test means of the control group and the experimental group is significant.

The reading comprehension scores of the control group post-test and the experimental group post-test were analysed using descriptive Analysis. The mean and standard deviation of control group post-test are 29.16 and 6.97, whereas for the experimental group they are 37.53 and 6.99 for N =19 in post-test. The mean difference between the post-test mean score of the control group and the post-test mean score of the
experimental group is obtained as 8.37 for the sample of N=19. This indicates that the experimental group has scored higher in the post-test than the control group.

The researcher also applied Mann-Whitney U-test for finding the significant difference in the post-test scores of the control group and the experimental group in reading comprehension. The calculated value of U1 and U2 are 287.5 and 73.5 respectively. They do not fall between the regions of acceptance that lies between 113.37 and 247.63. The calculated value of ‘Z’ for the post-test of the control group and the experimental group is 3.12. Since the calculated value of ‘Z’ is greater than the tabulated value of ‘Z’ at 5% level of significance, the hypothesis is accepted and concluded that there is significant difference between the post-test of both the control group and the experimental group. It also reveals that the multimedia CD assisted instructional package has improved the reading comprehension of the experimental group.

**Hypothesis-5** There is a significant difference between the pre-test mean attitude score and post-test mean attitude score of the experimental group.

The attitude of the experimental group before and after the treatment was analysed using descriptive statistics. The mean and standard deviation of the attitude scores in the pre and post-treatments are found to be 133.63 and 7.14; and 155.73 and 12.36 for the sample of N=19. This shows that the mean attitude scores of the experimental group are above the mid-value for both prior to the treatment and after the treatment. The mean difference in the attitude scores of the experimental group is 22.10. The value indicates that 22.10 is a good index of gain. Hence, it is concluded that the attitude of the experimental group has improved in the after treatment than its score on the pre-treatment, thereby
revealing that the multimedia CD assisted instructional package has made attitudinal changes in the experimental group.

5.5. Discussion

The main aim of this study is to develop a Multimedia CD assisted instructional package for enhancing reading comprehension in the play of Shakespeare-Othello at college level and to study the effectiveness of the package. The statistical data reveals that the experimental group gained significant achievement in reading comprehension after the treatment, and proved the effectiveness of the multimedia CD assisted instructional package. The pre-test mean score of the experimental and the control groups do not differ significantly revealing that they belong to homogenous groups. A comparison of the post-test scores in reading comprehension of the two groups showed that the two groups differ significantly, which indicates the effectiveness of the multimedia CD assisted instructional package.

ROM story books in classroom instruction to provide maximum support for reading comprehension. Further, Hsu (2008) used ‘Audioblogs’ to assist language learning experience. Thus, the above studies have found that the software enabled the learners to increase the vocabulary learning, reading comprehension and literacy instruction. This is consistent with the obtained results. In the present study, the multimedia CD assisted instructional package helped the learners to comprehend the text better through the play. The multimedia instruction provided the learners with the relevant knowledge to fill in the gaps in the message, and enhanced the reading comprehension of the learners towards the text.

In this context, the researchers like Yip and Kwan (2006) used online vocabulary games to improve the vocabulary, whereas, Clarfield and Stoner (2005); Irausquin et al., (2005) and Kim et al., (2006) used multimedia with learners of reading disabilities and poor readers, and were effective in reducing the reading problems of the learners. In the present study, the use of multimedia with pictorial information provided a basis for interpreting the words and phrases in the passage, and enabled poor readers to guess the meaning of a particular word. The visual context helped to use world knowledge to understand unfamiliar words or structures in the print, and arrive at a better comprehension of the play, thus reducing the reading problem of the learners.

In this setting, some studies and researchers have also analysed the quality of learning and comprehension through multimedia in India. Indian scholars like Kalimuthu (1991); Karpagakumararvel (1994) Suganthan (2005); Bansal and Agarwal (1997) and Mohanty (1990) have used multimedia packages, and have shown that multimedia is effective, and has improved the language learning expression and comprehension.
simultaneously. The present study also recommends the use of multimedia packages to enable the teachers to choose an alternative strategy or modify a new one to fit the learner’s comprehension process. Multimedia instructional package has provided the learners not only the skill of word recognition but also comprehension. This skill of comprehension enabled the learners to appreciate, enjoy the text and improved the language learning and comprehension simultaneously and consequently enhanced the independence in the language.

In the present study another important finding is that the learner’s attitude towards the multimedia CD assisted instruction became more favourable. Scholars like Cartwright and Kolano (1978); Jom and Duin (1989); Zachariah (1995); Volk et al., (2003); Johnson and Howell (2005); Kadijevich (2006); Liaw et al., (2007); Pierce et al., (2007); Akbulut (2008) and Sagin (2008) have indicated that multimedia instruction has brought positive effects in learner’s attitudes towards e-Learning and technology.

Some scholars like AbuSeileek (2007) and Akbulut (2008) reported positive attitudes towards Computer Assisted Language Learning (CALL), and recommended that CALL be integrated in the curriculum. While, Kadijevich and Haapasalo (2008) informed in their research that teachers’ interest to achieve educational technology standard is also significant. The effectiveness of multimedia programmed material with reference to attitude experimented by Indian research scholars like Kalia et al., (2000); Narayanasamy (2000); Kumaran and Selvaraju (2001); Helen Joy and Manickam (2002); Epsy Bai et al., (2002); Gnanadevan (2006) indicate that the data revealed the positive attitude of teachers towards computers. Whereas, Rajasekar (2002); Barbhuiya (2008) and Jagannath (2008) have informed that CALL and CAI package have resulted in a significant gain in attitude
among the learners. In the present context, the researcher found the effectiveness of multimedia instruction which has brought positive attitude towards the package among the learners.

On realising the significance of computers and interactive multimedia in the school curriculum, Arulsamy (2005) and Benjamin (2007) opined that there is a need to try out new experiments, and develop appropriate strategies to pave the way for multimedia instruction. In this context, the present study has applied the Multimedia CD assisted instructional package to enhance the skill of reading comprehension.

5.6. Conclusion

This chapter has examined the tabulated material in order to determine the inherent facts or meanings, and to present the results in an organised and meaningful form. This is followed with the testing of the hypothesis which displayed an answer to the problem of the study. It is then concluded by a discussion on the various researchers, whose findings with the effectiveness of multimedia on reading comprehension and attitude provided insight into the significance of the data, and is consistent with the results of the present study.

The implications of this study from a language learning and teaching perspective are provided in the next chapter along with the suggestions for further research.