CHAPTER - VI

ANALYSIS AND INTERPRETATION OF DATA RELATED TO ACHIEVEMENT OF STUDENTS

6.0 INTRODUCTION

The present chapter is aimed at analysis and interpretation of data related to achievement of students in Computer Education to realize the objective seven of the study i.e. *'to study the effectiveness of the developed teacher training programme in terms of students' achievement in Computer Education'*. The data were collected by administering the pre-test and post-test achievement test on theory and practical to both experimental and control group students. The achievement of 82 (35 English medium and 47 Gujarati medium) students of experimental group and 115 (48 English medium and 67 Gujarati medium) students of control group in theory and practical were collected.

6.1 ANALYSIS AND INTERPRETATION OF DATA RELATED TO CHIEVEMENT OF STUDENTS

The present study is an experimental study; the data analysis for the above mentioned objective was done quantitatively with the help of descriptive and inferential statistics. As pre-test and post-test control group design was followed in the present study, the descriptive statistical techniques like, mean and standard deviation, and the inferential statistics like t-test and Analysis of Co-variance (ANCOVA) were used during the process of data analysis. The analyzed data are presented in the forms of tables which are followed by detailed description and interpretation.

Table 6.1: Table of Summary of ANCOVA for Overall (Theory + Practical) Computer Education Achievement taking Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedoms, Standard Deviations and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	81126	18.5	1224.0	4955.7	4955.7		
WITHIN	194	14648	30184	9478.5	20451	124.0	11.1	40.0*
TOTAL	195	95774	30203	10702	29007			

***Significant at 0.01 level**

From the table 6.1, it was observed that the degree of freedom (df) for among and within group was found to be 1 and 194 respectively. The Sum of the Square of pre-test (SSX) among and within the groups was found to be 81126 and 14648 respectively. The Sum of the Squares of dependent variable (SSY) was found to be 18.5 and 30184 respectively for among and within groups. The Sum of the Squares for the combined effect of XY (SSxy) was found to be 1224.0 and 9478.5 respectively. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 4955.7 and 20541 respectively. The Adjusted Mean Sum of the Squares of Y (MSSy.x) for among and within groups was found to be 4955.7 and 124.0 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 11.1 and the F-value for adjusted Y was found to be 40.0. The calculated F-value 40.0 was found to be significant at 0.01 level with df 1/194 as the calculated F-value was found to be greater than the table value i.e. 6.81 with respective df and level of significance which leads to reject the null hypothesis i.e. *'there will be no significant difference between the mean Computer Education overall achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate '* Hence, there is a significant difference between the overall Computer Education mean achievement score of control and experimental group which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6 2 is given as follow to know the mean achievement of control and experimental group in overall Computer Education which will help the investigator to go for further analysis.

Table 6.2: Table of Summary of ANCOVA for Overall (Theory + Practical) Computer Education Achievement in terms of Means and Standard Deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with Adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	SDy	Myx	SDyx	t-value	Df
Control	115	51.7	9.7	64.5	12.6	51.2	11.1	16.2*	195
Experimental	82	10.5	6.9	63.9	12.0	77.2	11.1		

***Significant at 0.01 level**

From the table 6.1, the F-value was found to be sigmficant at 0.01 level rejecting the null hypothesis. For further analysis referrmg to table 6.2, it was found that the total number of sample in the control and experimental group was 115 and 82 respectively. The mean achievement in overall (Theory + Practical) Computer Education and standard deviation of pre-test of the control group was found to be 51 7 and 9.7 respectively, and the same for the experimental group was found to be 10.5 and 6.9 respectively. The high pre-test achievement of the control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in overall Computer Education in post-test was found to be 64.5 and 63.9 respectıvely and the standard devıations for the same means was found to be 12.6 and 12.0 for control group and experimental group respectively. The adjusted mean achievement in overall Computer Education of post-test for control and experimental group was found to be 51.2 and 77.2 respectıvely with standard deviation of 11.1. The t-value was found to be 16.2. The difference of 26 in the adjusted mean overall Computer Education score was found to be significant at 0.01 level with df of 195 as the table value of 2.6 with respective df and significant level was found to be lower than the calculated t-value of 16.2. It leads to strengthen the findings of the previous table i.e table 6.1 and it can be further said that the null hypothesis i.e. '*'There will be no significant difference between the mean Computer Education overall achievement scores of students' taught by the teachers with and without trainıng programme while taking the pre-test score of the students as co-variate.'* ıs rejected and the difference in the adjusted achievement score is due to the impact of training programme (intervention) provided to the Computer Education teachers. The achievement was found to be significantly more for experimental group due to the teaching of teacher trained through the training programme prepared by the researcher. Hence, it can be said that the impact of the training programme was found to be effective in enhancing the overall achievement of the experimental group students in comparison to their counter part (control group) where the teachers were not trained.

Table No. 6.3: Table of Summary of ANCOVA for Theory Computer Education Achievement taking Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	1707 8	959.4	-1280	631.6	631.6	7.7	10.7*
WITHIN	194	5381.0	11494	-277.2	11480	59.2		
TOTAL	195	7088.8	12454	-1557	12111			

***Significant at 0.01 level**

From the table 6.3, it was observed that the degree of freedoms (df) for among and within group was found to be 1 and 194 respectively. The Sum of the Squares of pre-test (SSX) among and within groups was found to be 1707.8 and 5381.0 respectively. The Sum of the Squares of dependent variable (SSY) was found to be 959.4 and 11494 respectively for among and within groups. The Sum of the Squares for the combined effect of XY was found to be -1280 and -277.2 respectively for among and within groups. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 631.6and 11480 respectively. The Adjusted Mean Sum of the Squares of Y (MSSy.x) for among and within group was found to be 631.6 and 59 2 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 7.7 and the F-value for adjusted Y was found to be 10.7. The calculated F-value of 10.7 was found to be significant at 0.01 level with df 1/194 as the F-value found to be greater than the table value i.e. 6.81 with respective df and level of significance which leads to reject the null hypothesis i.e. *'There will be no significant difference between the mean Computer Education theory achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate'*. Hence, there is a significant difference in the theory Computer Education mean achievement score of control and experimental group which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6.4 is given as follow to know the mean achievement of control and experimental group in theory Computer Education which will help the investigator to go for further analysis.

Table 6.4: Table of Summary of ANCOVA for Theory Computer Education Achievement in terms of Means and Standard deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	SDy	Myx	SDyx	t-value	df
Control	115	14.5	5.8	21.7	7.2	21 9	7.7	3.7*	195
Experimental	82	8.5	4.3	26.2	8.3	26.1	7.7		

***Significant at 0.01 level**

From the table 6.3, the F-value was found to be significant at 0.01 level rejecting the null hypothesis. For further analysis referring to table 6.4, it was found that the total number of sample in the control and experimental group was 115 and 82 respectively. The mean achievement in theory Computer Education and standard deviation of pre-test of the control group was found to be 14.5 and 5.8 respectively, and the same for the experimental group was found to be 8.5 and 4.3 respectively. The high pre-test achievement of the control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in theory Computer Education in post-test was found to be 21.7 and 26.2 respectively and the standard deviations for the same means was found to be 7.2 and 8.3 respectively for control group and experimental group The Adjusted Mean achievement in theory Computer Education of post-test for control and experimental group was found to be 21.9 and 26.1 respectively with standard deviation of 7.7. The difference of 4.2 in the adjusted mean theory Computer Education score was found to be significant at 0 01 level with df of 195 as the table value of 2.6 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i.e. table 6.3 and it can be further said that the null hypothesis i e. '*'There will be no significant difference between the mean Computer Education theory achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate.'* is rejected and the difference in the adjusted achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. The achievement was found to be significantly more for experimental group due to the teaching of teachers trained through the training programme prepared by the researcher. Hence, it can be said that the impact of the training programme was found to be effective in enhancing the theory achievement in Computer Education of the experimental group students in comparison to the same of their counter part (control group) where the teachers were not trained.

Table 6.5: Table of Summary of ANCOVA for Practical Computer Education Achievement taking Pre-test (X) as Co-variate and Post-test (y) as Dependent Variable showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	59293	1244.1	8588.6	3466.7	3466.7	8.3	50.0*
WITHIN	194	19304	21180	12215	13415	69.3		
TOTAL	195	78597	22424	20803	16917			

***Significant at 0.01 level**

From the table 6.5, it was observed that the degree of freedom (df) for among and within group was found to be 1 and 194 respectively. The Sum of the Squares of pre-test (SSX) was found to be 59293 and 19304 respectively for among and within group. The Sum of the Squares of dependent variable (SSY) was found to be 1244.1 and 21180 respectively for among and within group. The Sum of the Squares for the combined effect of XY was found to be 8588.6 and 12215 respectively for among and within group. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 3466.7 and 13415 respectively. The Adjusted Mean Sum of the Squares of Y (MSSy.x) for among and within group was found to be 3466.7 and 69.3 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 8.3 and the F-value for adjusted Y was found to be 50.0. The calculated F-value of 50.0 was found to be significant at 0.01 level with df 1/194 as the F-value found to be greater than the table value i.e. 6.81 with respective df and significant level which leads to reject the null hypothesis i.e. '*There will be no significant difference between the mean Computer Education practical achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate'.* Hence, there is a significant difference in the practical Computer Education mean achievement score of control and experimental group which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6.6 is given as follow to know the achievement of control and experimental group in practical Computer Education which will help the investigator to go for further analysis.

Table 6.6: Table of Summary of ANCOVA for Practical Computer Education Achievement in terms of Means and Standard Deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	SDy	Myx	Sdyx	t-value	df
Control	115	37.2	12.6	42.8	9 9	31.6	8.3	14.3*	195
Experimental	82	2.0	3.5	37.7	11.0	48.8	8.3		

***Significant at 0.01 level**

From the table 6.5, the F-value was found to be significant at 0.01 level rejecting the null hypothesis. For further analysis referring to table 6.6, it was found that the total number of sample in the control and experimental groups was 115 and 82 respectively. The mean achievement in practical Computer Education and standard deviation of pre-test of the control group was found to be 37.2 and 12.6 respectively, and the same for the experimental group was found to be 2.0 and 3.5 respectively. The high pre-test achievement of the control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in practical Computer Education in post-test was found to be 42.8 and 37.7 respectively and the standard deviations for the same means was found to be 9.9 and 11.0 respectively for control group and experimental group. The Adjusted Mean achievement in practical Computer Education of post-test for control and experimental groups was found to be 31.6 and 48.8 respectively with standard deviation of 8 3. The difference of 17.2 in the adjusted mean practical Computer Education score was found to be significant at 0.01 level with df of 195 as the table value of 2.6 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i.e. table 6.5 and it can be further said that the null hypothesis i.e. '*There will be no significant difference between the mean Computer Education practical achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate'*, is rejected and the difference in the adjusted achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. The achievement was found to be significantly more for experimental group due to the teaching of teachers trained through the training programme prepared by the researcher. Hence, it can be said that the impact of the training programme was found to be effective in enhancing the practical achievement of the experimental group students in comparison to their counter part (control group) where the teachers were not trained.

Table 6.7: Table of Summary of ANCOVA for Overall (Theory + Practical) Computer Education Achievement of English Medium Students taking Pre-test (X) as Co-variate and Post-test (y) as Dependent Variable Showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	13897	1971.0	-5234	865.6	865.6	11.4	6.7*
WITHIN	80	3215.9	10454	640.5	10326	129.1		
TOTAL	81	17113	12425	-4593	11192			

***significant at 0.05 level**

From the table 6.7, it was observed that the degree of freedom (df) for among and within group was found to be 1 and 80 respectively. The Sum of the Squares of pre-test (SSX) was found to be 13897 and 3215.9 respectively for among and within groups. The Sum of the Squares of dependent variable (SSY) was found to be 1971.0 and 10454 respectively for among and within groups. The Sum of the Squares for the combined effect of xy was found to be -5234 and 640.5 respectively for among and within groups. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 865.6 and 10326 respectively. The Adjusted Mean for Sum of the Squares of Y (MSSy.x) for among and within group was found to be 865.6 and 129.1 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 11.4 and the F-value for adjusted Y was found to be 6.7. The calculated F-value of 6.7 was found to be significant at 0.05 level with df 1/80 as the F-value was found to be greater than the table value with respective df and significant level which leads to reject the null hypothesis i.e. *'There will be no significant difference between the mean Computer Education overall achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate.'* Hence, there is a significant difference in the overall Computer Education mean achievement score of English medium control and experimental group students which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6.8 is given as follow to know the achievement of English medium control and experimental group in overall Computer Education which will help the investigator to go for further analysis.

Table 6.8: Table of Summary of ANCOVA for Overall (Theory + Practical) Computer Education Achievement of English Medium Students in terms of Means and Standard deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	SDy	Myx	SDyx	t-value	df
Control	48	42.1	5.8	55.9	11.2	53.3	11.4	6.0*	81
Experimental	35	15.9	6.7	65.7	11.2	68.4	11.4		

***Significant at 0.01 level**

From the table 6.7, the F-value was found to be significant at 0.05 level rejecting the null hypothesis. For further analysis referring to table 6.8, it was found that the total number of sample in the control and experimental group was 48 and 35 respectively. The mean achievement in overall (Theory + Practical) Computer Education and standard deviation of pre-test of the control group was found to be 42.1 and 5.8 respectively, and the same for the experimental group was found to be 15.9 and 6.7 respectively The high pre-test achievement of the control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in Computer Education in post-test was found to be 55.9 and 65.7 respectively and the standard deviations for the same means was found to be 11.2 and 11.2 respectively for control group and experimental group. The Adjusted Mean achievement in overall Computer Education of post-test for control and experimental group was found to be 53.3 and 68.4 respectively with standard deviation of 11.4. The difference of 15.1 in the adjusted mean overall Computer Education score of English medium was found to be significant at 0.01 level with df of 81 as the table value of 2.64 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i.e. table 6.7 and it can be further said that the null hypothesis i.e. '*'There will be no significant difference between the mean Computer Education overall achievement scores of English medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate* ' is rejected and the difference in the adjusted achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. The achievement was found to be significantly more for experimental group due to the teaching of teacher trained through the training programme prepared by the researcher. Hence, it can be said that the impact of the training programme was found to be effective in enhancing the overall achievement of the English medium students of the experimental group in comparison to their counter part (students of control group) where the teachers were not trained.

Table 6.9: Table of Summary of ANCOVA for Theory Computer Education Achievement of English Medium students taking their Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	1212.9	27.8	183.5	5.5	5.5	6.9	0.1*
WITHIN	80	1606.9	3799.0	99.4	37928.8	47.4		
TOTAL	81	2819.8	3826.8	283.0	3798.3			

*** Not significant at 0.05 level**

From the table 6.9, it was observed that the degree of freedom (df) for among and within groups was found to be 1 and 80 respectively. The Sum of the Squares of pre-test (SSX) was found to be 1212.9 and 1606.9 respectively for among and within groups. The Sum of the Squares of dependent variable (SSY) was found to be 27 8 and 3799.0 respectively for among and within groups. The Sum of the Squares for the combined effect of XY was found to be 183.5 and 99.4 respectively for among and within groups. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 5.5 and 37928.8 respectively. The Adjusted Mean Sum of the Squares of Y (MSSy.x) for among and within group was found to be 5.5 and 47.4 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 6.9 and the F-value for adjusted Y was found to be 0.1. The calculated F-value of 0.1 was found to be not significant at 0.05 level with df 1/80 as the F-value found to be less than the table value i.e. 3.96 at 0.05 level with respective df and significant level which leads to retain the null hypothesis i.e. *'There will be no significant difference between the mean Computer Education overall achievement scores of students' taught by the teachers with and without training programme while taking the pre-test score* *of the students as co-variate.'* Hence, there is no significant difference in the theory Computer Education mean achievement score of English medium control and experimental groups even though the students of English medium experimental group were taught by the teachers trained through the training programme done by the researcher. It may be said that the training programme provided to the teachers was found not effective in terms of theory achievement in Computer Education of English medium students.

Table 6.10: Table of Summary of ANCOVA for Practical Computer Education Achievement of English Medium Students taking their Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable Showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	6899 0	2466.7	-4125	335.0	335.0	8.3	4.9*
WITHIN	80	1204.8	5510.0	-31.9	5509.1	68.9		
TOTAL	81	8103.8	7976.7	-4157	5544.1			

***significant at 0.05 level**

From the table 6.10, it was observed that the degree of freedom (df) for among and within groups was found to be 1 and 80 respectively. The Sum of the Squares of pre-test (SSX) was found to be 6899.0 and 1204 8 respectively for among and within groups. The Sum of the Squares of dependent variable (SSY) was found to be 2466.7 and 5510.0 respectively for among and within groups. The Sum of the Squares for the combined effect of XY was found to be -4125 and -31.9 respectively for among and within group. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 335.0 and 5509.1 respectively. The Adjusted Mean Sums of the Squares of Y (MSSy.x) for among and within group was found to be 335.0 and 68.9 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 8.3 and the F-value for adjusted Y was found to be 4.9. The calculated F-value of 4.9 was found to be significant at 0.05 level with df 1/80 as the F-value was found to be greater than the table value i.e. 3.96 with respective df and significant level which leads to reject the null hypothesis i.e. *'There will be no significant difference between the mean Computer Education practical achievement scores of English medium* *students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate.'* Hence, there is a significant difference at the 0.05 level in the practical Computer Education mean achievement score of the students of English medium control and experimental group which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6.11 is given as follow to know the achievement of English medium control and experimental groups in practical Computer Education which will help the investigator to go for further analysis.

Table 6.11: Table of Summary of ANCOVA for Practical Computer Education Achievement of English Medium Students in terms of Means and Standard deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	SDy	Myx	SDyx	t-value	df
Control	48	22.5	3.6	33.9	7.0	34.1	8.3	5.7*	81
Experimental	35	4.4	4.0	44.9	9.5	44.7	8.3		

***Significant at 0.05 level**

From the table 6.10, the F-value was found to be significant at 0.05 level rejecting the null hypothesis. For further analysis referring to table 6.11, it was found that the total number of sample in the English medium control and experimental group were 48 and 35 respectively. The mean achievement of English medium students in practical Computer Education and standard deviation of pre-test of the control group was found to be 22.5 and 3.6 respectively, and the same for the experimental group was found to be 4.4 and 4.0 respectively. The high pre-test achievement of the English medium control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement of the English medium students of control and experimental groups in practical Computer Education in post-test was found to be 33 9 and 44.9 respectively and the standard deviations for the same means was found to be 7.0 and 9.5 respectively for control group and experimental group. The Adjusted Mean achievement of English medium students in practical Computer Education of post-test for control and experimental group was found to be 34.1 and 44.7 respectively with standard deviation of 8.3. The difference of 10.6 in the adjusted mean practical Computer Education score of English medium students was found to be significant at 0.05 level with df of 81 as the table value of 3.96 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i.e. table 6.10 and it can be further said that the null hypothesis i.e. '*'There will be no significant difference between the mean Computer Education practical achievement scores of English medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate.'* is rejected at 0.05 level and the difference in the adjusted achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. The achievement was found to be significantly more for English medium experimental group due to the teaching of teachers trained through the training programme prepared by the researcher. Hence, it can be said that the impact of the training programme was found to be effective in enhancing the practical achievement of the English medium experimental group students in comparison to their counter part (control group) where the teachers were not trained.

Table 6.12: Table of Summary of ANCOVA for Overall (Theory + Practical) Computer Education Achievement of Gujarati Medium Students taking their Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable Showing Sum of the Squaress (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	74812	1852.2	11771	557.8	557.8		
WITHIN	111	2120.3	13405	1436.5	12432	112	10.6	5.0*
TOTAL	112	76932	15257	13208	12989			

***Significant at 0.01 level**

From the table 6.12, it was observed that the degree of freedom (df) for among and within groups was found to be 1 and 111 respectively. The Sum of the Squares of pre-test (SSX) was found to be 74812 and 2120.3 respectively for among and within groups. The Sum of the Squares of dependent variable (SSY) was found to be 1852.2 and 13405 respectively for among and within group. The Sum of the Squares for the combined effect of XY was found to be 11771 and 1436.5 respectively for among and within groups. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 557.8 and 12432 respectively. The Adjusted Mean Sum of the Squares of Y (MSSy.x) for among and within group was found to be 557.8 and 112 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 10.6 and the F-value for adjusted Y was found to be 5.0. The calculated F-value of 5 0 was found to be significant at 0.01 level with df 1/111 as the F-value was found to be greater than the table value i.e. 2.63 with respective df and significant level which leads to reject the null hypothesis i.e. '*There will be no significant difference between the mean Computer Education overall achievement scores of Gujarati medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate'*. Hence, there is a significant difference in the overall Computer Education mean achievement score of Gujarati medium control and experimental group which may be due to the training effect given to the Computer Education teachers of the Gujarati medium experimental group. Table 6.13 is given as follow to know the achievement of Gujarati medium control and experimental groups in overall Computer Education which will help the investigator to go for further analysis.

Table 6.13: Table of Summary of ANCOVA for Overall (Theory+Practical) Computer Education Achievement of Gujarati Medium Students in terms of Means and Standard deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	SDy	Myx	SDyx	t-value	Df
Control	67	58.6	5.0	70.7	9.6	53.0	10 6	13.4*	112
Experimental	47	6.5	3.2	62 5	12.4	80.1	10.6		

***Significant at 0.01 level**

From the table 6.12, the F-value was found to be significant at 0.01 level rejecting the null hypothesis. For further analysis referring to table 6.13, it was found that the total number of sample in the Gujarati medium control and experimental group was 67 and 47 respectively. The mean achievement in overall Computer Education and standard deviation of pre-test of the Gujarati medium control group was found to be 58.6 and 5.0 respectively, and the same for the experimental group was found to be 6.5 and 3.2 respectively. The high pre-test achievement of the Gujarati medium control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in Computer Education in post-test was found to be 70.7 and 62.5 respectively and the standard deviation for the same means was found to be 9.6 and 12.4 respectively for Gujarati medium control group and experimental group. The Adjusted Mean achievement in overall Computer Education of post-test for Gujarati medium control and experimental groups was found to be 53.0 and 80.1 respectively with standard deviation of 10.6. The difference of 27.1 in the adjusted mean overall Computer Education score of Gujarati medium students were found to be significant at 0.01 level with df of 112 as the table value of 2.6 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i.e. table 6.12 and it can be further said that the null hypothesis i.e. *'There will be no significant difference between the mean Computer Education overall achievement scores of Gujarati medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate',* is rejected and the difference in the adjusted achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. The achievement was found to be significantly more for Gujarati medium experimental group due to the teaching of teacher trained through the training programme prepared by the researcher Hence, it can be said that the impact of the training programme was found to be effective in enhancing the overall achievement of the Gujarati medium experimental group students in comparison to their counter part (control group) where the teachers were not trained.

Table 6.14: Table of Summary of ANCOVA for Theory Computer Education Achievement of Gujarati Medium Students taking their Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable Showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	634.2	2079.0	-1148	2067.1	2067.1	7.2	40.1*
WITHIN	111	1325.3	5922.5	509.8	5726.4	51.6		
TOTAL	112	1959.5	8001.5	-638.5	7793.5			

***Significant at 0.01 level**

From the table 6.14, it was observed that the degree of freedom (df) for among and within groups was found to be 1 and 111 respectively. The Sum of the Squares of pre-test (SSX) was found to be 634.2 and 1325.3 respectively for among and within groups. The Sum of the Squares of dependent variable (SSY) was found to be 2079.0 and 5922.5 respectively for among and within groups. The Sum of the Squares for the combined effect of XY was found to be -1148 and 509.8 respectively for among and within groups. The Adjusted Sum of the Squares of Y (SSy.x) for among and within groups was found to be 2067.1 and 5726.4 respectively. The Adjusted Mean Sum of the Squares of Y (MSSy.x) for among and within groups was found to be 2067.1 and 51.6 respectively. The Standard Deviation of Adjusted Y (SDy.x) was found to be 7.2 and the F-value for adjusted Y was found to be 40.1. The calculated F-value of 40.1 was found to be significant at 0.01 level with df 1/111 as this F-value was found to be greater than the table value i.e. 2.63 with respective df and significant level which leads to reject the null hypothesis i.e. '*There will be no significant difference between the mean Computer Education theory achievement scores of Gujarati medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate'.* Hence, there is a significant difference in the theory Computer Education mean achievement score of Gujarati medium control and experimental group which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6.15 is given as follow to know the achievement of control and experimental Gujarati medium groups in theory Computer Education which will help the investigator to go for further analysis.

Table 6.15: Table of Summary of ANCOVA for Theory Computer Education Achievement of Gujarati Medium Students in terms of Means and Standard deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	Sdy	Myx	SDyx	t-value	df
Control	67	11.1	3.7	21.5	6.6	20.6	7.2	7.7*	112
Experimental	47	6.3	2.9	30 2	8.0	31.2	7 2		

***Significant at 0.01 level**

From the table 6.14, the F-value was found to be significant at 0.01 level rejecting the null hypothesis. For further analysis referring to table 6.15, it was found that the total number of sample in the Gujarati medium control and experimental group was 67 and 47 respectively The mean achievement in theory Computer Education and standard deviation of pre-test of the Gujarati medium control group was found to be 11.1and 3.7 respectively, and the same for the Gujarati medium experimental group was found to be 6 3 and 2 9 respectively The greater pre-test achievement of the Gujarati medium control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in theory Computer Education in post-test of Gujarati medium group was found to be 21.5 and 30.2 respectively and the standard deviations for the same means was found to be 6.6 and 8.0 respectively for control group and experimental group. The adjusted mean achievement in theory Computer Education of post-test for Gujarati medium control and experimental groups was found to be 20.6 and 31 2 respectively with standard deviation of 7.2. The difference of 10 4 in the adjusted mean theory Computer Education score of Gujarati medium was found to be significant at 0.01 level with df of 112 as the table value of 2 6 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i e. table 6 14 and it can be further said that the null hypothesis i e. '*There will be no significant difference between the mean Computer Education theory achievement scores of Gujarati medium students' taught* *by the teachers with and without training programme while taking the pre-test score of the students as co-variate',* is rejected and the difference in the adjusted theory achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. The achievement in theory Computer Education was found to be significantly more for Gujarati medium experimental group due to the teaching of teachers trained through the training programme prepared by the researcher. Hence, it can be said that the impact of the training programme was found to be effective in enhancing the theory Computer Education achievement of the Gujarati medium experimental group students in comparison to their counter part (control group) where the teachers were not trained.

Table 6.16: Table of Summary of ANCOVA for Practical Computer Education Achievement of Gujarati Medium Students taking their Pre-test (X) as Co-variate and Post-test (Y) as Dependent Variable Showing Sum of the Squares (SS) for X and Y, Mean Sum of the Squares (MSS), Degree of Freedom, Standard Deviation and F-value.

Variance Sources	df	SSX	SSY	SSxy	SSy.x	MSSy.x	SDy.x	Fy.x Value
AMONG	1	61669	7855 9	22011	209 8	209 8		
WITHIN	111	788.5	5956.0	690.7	5350.9	48.2	6 9	4 4*
TOTAL	112	62458	13812	22701	5560.7			

***Significant at 0.01 level**

From the table 6.16, it was observed that the degree of freedom (df) for among and within groups was found to be 1 and 111 respectively. The Sum of the Squares of pre-test (SSX) was found to be 61669 and 788.5 respectively for among and within groups. The Sum of the Squares of dependent variable (SSY) was found to be 7855.9 and 5956.0 respectively for among and within group. The Sum of the Squares for the combined effect of XY was found to be 22011 and 690.7 respectively for among and within groups. The Adjusted Sum of the Squares of Y (SSy.x) for among and within group was found to be 209 8 and 5350.9 respectively The Adjusted Mean Sums of the Squares of Y (MSSy.x) for among and within groups was found to be 209 8 and 48.2 respectively The Standard Deviation of Adjusted Y (SDy.x) was found to be 6.9 and the F-value for adjusted Y was found to be 4.4. The calculated F-value 4.4 was found to be significant at 0.01 level with df 1/111 as the F-value was found to be greater than the table value i e. 2.63 with respective df and significant level which leads to reject the null hypothesis i.e. '*There will be no significant difference between the mean Computer Education practical achievement scores of Gujarati medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate'.* Hence, there is a significant difference in the theory Computer Education mean achievement score of Gujarati medium control and experimental group which may be due to the training effect given to the Computer Education teachers of the experimental group. Table 6.17 is given as follow to know the achievement of Gujarati medium control and experimental groups in practical overall Computer Education which will help the investigator to go for further analysis.

Table 6.17: Table of Summary of ANCOVA for Practical Computer Education Achievement of Gujarati Medium Students in terms of Means and Standard deviations of Pre-test (Co-variate), Post-test (Dependent Variable), Adjusted Post-test for Control and Experimental groups along with adjusted t-value and Degree of Freedom.

Groups	N	Mx	SDx	My	Sdy	Myx	SDyx	t-value	df
Control	67	47.5	3.2	49.1	5 9	28.4	6.9	18.6*	112
Experimental	47	0.2	1.4	32.3	8.8	53 0	6.9		

***Significant at 0.01 level**

From the table 6.16, the F-value was found to be significant at 0.01 level rejecting the null hypothesis For further analysis referring to table 6 17, it was found that the total number of sample in the Gujarati medium control and experimental group was 67 and 47 respectively. The mean achievement in practical Computer Education and standard deviation of pre-test of the Gujarati medium control group was found to be 47.5 and 3 2 respectively, and the same for the Gujarati medium experimental group was found to be 0.2 and 1.4 respectively. The high pre-test achievement of the Gujarati medium control group was found to be due to their exposure to Computer Education in the pervious class. However, the mean achievement in practical Computer Education in post-test was found to be 49 1 and

32 3 respectively and the standard deviations for the same means was found to be 5 9 and 8.8 respectively for the Gujarati medium control group and experimental group students. The Adjusted Mean achievement in practical Computer Education of post-test for control and experimental Gujarati medium groups was found to be 28.4 and 53.0 respectively with standard deviation of 6.9. The difference of 24.6 in the adjusted mean practical Computer Education score of Gujarati medium was found to be significant at 0 01 level with df of 112 as the table value of 2.63 with respective df and significant level was found to be lower than the calculated t-value. It leads to strengthen the findings of the previous table i.e. table no. 6.16 and it can be further said that the null hypothesis i.e. '*There will be no significant difference between the mean Computer Education practical achievement scores of Gujarati medium students' taught by the teachers with and without training programme while taking the pre-test score of the students as co-variate*', is rejected and the difference in the adjusted practical Computer Education achievement score is due to the impact of training programme (intervention) of the Computer Education teachers. This achievement was found to be significantly more for experimental group due to the teaching of teacher trained through the training programme prepared by the researcher Hence, it can be said that the impact of the training programme was found to be effective in enhancing the practical Computer Education achievement of the Gujarati medium experimental group students in comparison to their counter part (control group) where the teachers were not trained.

6.2 CONCLUSION

The quality of classroom teaching is reflected from the students' performance in the concerned subject. Students' achievement in any subject is the best indicator of their teachers' performance in teaching learning process Any change in teachers' behaviour due to training programme affects teaching learning performance of the teachers and subsequently it affects the achievement of the students. In the present study, the change in teachers' teaching behaviour due the given Computer Education training programme was found significant to enhance the Computer Education achievement in overall, theory and practical of both English medium and Gujarati medium students. The training programme was not found effective to enhance the theory achievement in Computer Education of English medium students, where as, it was found effective in all other cases. Though in the case of pre-test overall, theory and practical Computer Education achievement of control group students were found to be higher than the same of the experimental group students may be due to any reason, the experimental group students did significantly well in the post-test overall, theory and practical Computer Education achievement in comparison to their control group counterpart which indicates the significant impact of the training programme because the students of the experimental group were taught by the Computer Education teachers trained through the training programme. So it can be concluded that the training programme had the impact in changing the behaviour of the Computer Education teachers in the positive direction which can bring change among the students to enhance their overall, theory and practical Computer Education achievement.