

CHAPTER IV
DATA ANALYSIS & RESULTS
INTERPRETATION

4.1.0 INTRODUCTION:

The present chapter constitutes one of the most significant components of the research study as it deals with the statistical analysis along with the explanation of the findings of the study. It is devoted to the purpose of highlighting the various statistical techniques that helped to analyse the collected data systematically. Simultaneously it also focuses on presenting the results to be interpreted by the researcher. So, this chapter is about an analytical and interpretative study of research data to draw conclusion on the basis of obtained research findings. Since the present research is purely quantitative one; to be specific, an experimental study, the researcher mainly relied on the usage of statistical methods in order to analyse and interpret the data on the basis of treatment effects. For the purpose of data organisation, data management and data analysis, Statistical Package for the Social Sciences (SPSS) was utilised by the researcher. Noticeably, this chapter consists of two different sections. Section I includes the descriptive analysis whereas Section II includes the Inferential analysis.

4.2.0 ANALYSIS AND INTERPRETATION OF DATA

In this investigation the gathered data were analysed as well as interpreted on the basis of the points provided below:

1. Study of the effect of CAM over TLM on the enhancement of overall Twenty first century learning skills in English subject with regard to the pre-test and post-test scores.
2. Study of the effect of CAM over TLM on the enhancement of component wise Twenty first century learning skills in English subject with regard to the pre-test and post-test scores
3. Study of the effect of Group, Gender and their interaction on overall Twenty first century learning skills by considering the pre-test as covariate
4. Study of the effect of Group, Gender and their interaction on component wise Twenty first century learning skills by considering their representative components at pre-test level as covariates
5. Study of the effect of Group, Locale of Schools and their interaction on overall Twenty first century learning skills by considering pre-test as covariate
6. Study of the effect of Group, Locale of Schools and their interaction on component wise Twenty first century learning skills by considering their representative components at pre-test level as covariates

4.3.0 SECTION-I

(DESCRIPTIVE ANALYSIS)

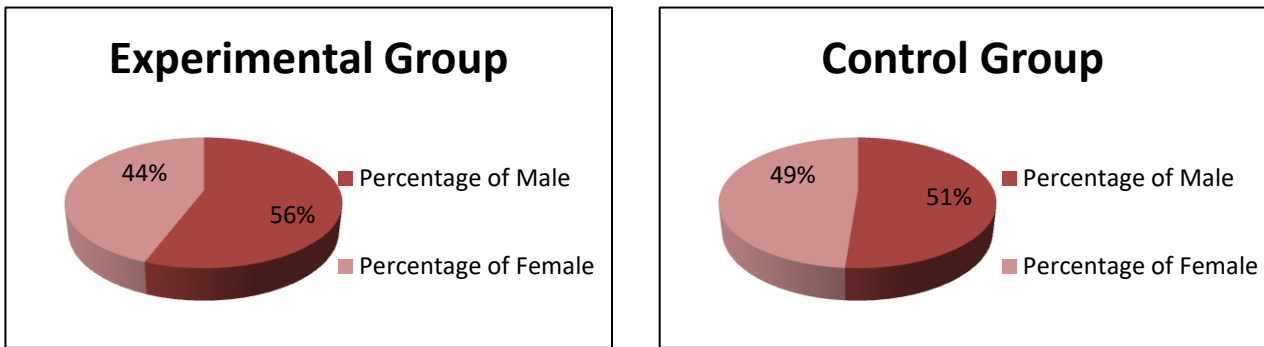
This section is concerned with presenting the descriptive statistical results with the help of tabulation and graphical representation of data. The meaning of the entire data is explicated in understandable way by dint of descriptive statistics application. The descriptive analysis offers important information concerning the characteristics of a certain set of people under study. Tabulation refers to the method of presenting the classified data via tabular form. Noticeably, a table is the systematic arrangement of the numerical data in rows and columns. The tabular presentation helps to simplify the data for making a comparison. Graphical representation is visual display of data with the help of graphs, plots, and charts. It also accelerates understanding of the data. It uses a graphic to show the relationship between the data, ideas, information, and concepts. It provides visual summarization of the data in terms of descriptive statistical analysis like central tendency, and variability, percentage of distribution, frequency distribution of the relevant variables under investigation. Graphical representation can be carried out in different ways like bar graph, line graphs, histograms, circle graph/pie chart, line plot, scatter plot and so on. In comparison to placing the data into tabular form, this type of representation is more useful for comprehension and comparison. The first section of this chapter focuses on demonstrating the summary of the data set with the help of tables and graphs. Such visual representation of data aids preventing confusion and information overlap.

4.3.1 Percentage Distribution of Samples/Participants under Study

TABLE 4.1					
a) Percentage Distribution of Sample in terms of Gender and Group:					
Gender Group	Male	Percentage of Male (%)	Female	Percentage of Female (%)	Total
Experimental	48	56	38	44	86
Control	42	51	40	49	82
Total	90		78		168

FIGURE 4.1

Percentage Distribution of Sample Pie-chart based on Gender and Group:



From the above table 4.1 and pie chart 4.1, it can be observed that the total sample size of 168 was separated into two distinct groups- experimental one consisting of 86 students & control one consisting of 82 students. These figures also show that in the case of experimental group 44% of students were female and 56% of students were male. On the other hand, in the case of control group it was found that 49% of students were female and 51% of students were male. Thereby, it can be said that for both the groups the percentage number of male students were more than the percentage number of the female students.

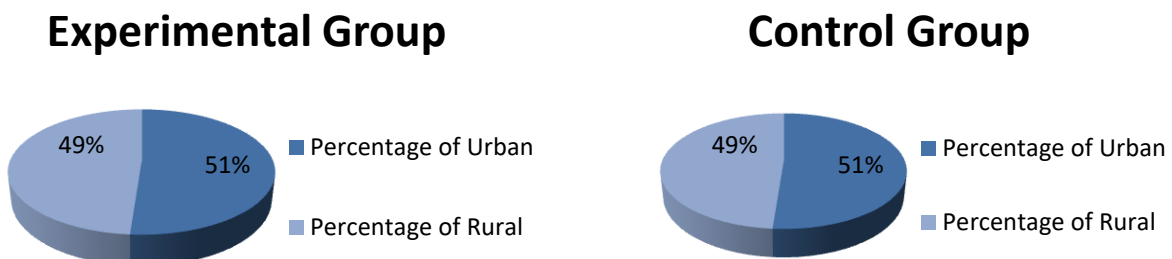
TABLE 4.2

b) Percentage Distribution of Sample based on Locale and Group:

Group \ Locale	Urban	Percentage of Urban (%)	Rural	Percentage of Rural (%)	Total
Experimental	44	51	42	49	86
Control	42	51	40	49	82
Total	86		82		168

FIGURE 4.2

Percentage Distribution of Sample Pie-chart based on Locale and Group:

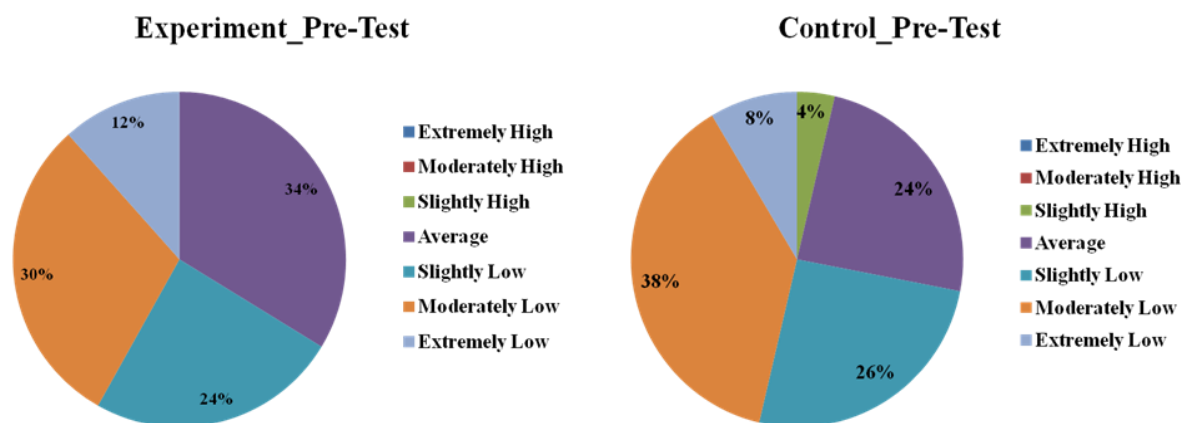


From the above table 4.2 and pie chart 4.2, it can be observed that for both the groups 51% of respondents were students belonging to urban school while 49% of respondents were students belonging to rural school. were male. Thereby, it may be held that the percentage sum of urban schoolchildren & the percentage sum of the rural schoolchildren were same for both the groups.

4.3.2 Frequency Distribution of Scores

Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	00	00	00	00	00	00
Moderately High	00	00	00	00	00	00
Slightly High	00	00	00	03	3.66	3.66
Average	29	33.72	33.72	20	24.39	28.05
Slightly Low	21	24.42	58.14	21	25.61	53.66
Moderately Low	26	30.23	88.37	31	37.80	91.46
Extremely Low	10	11.63	100	07	8.54	100

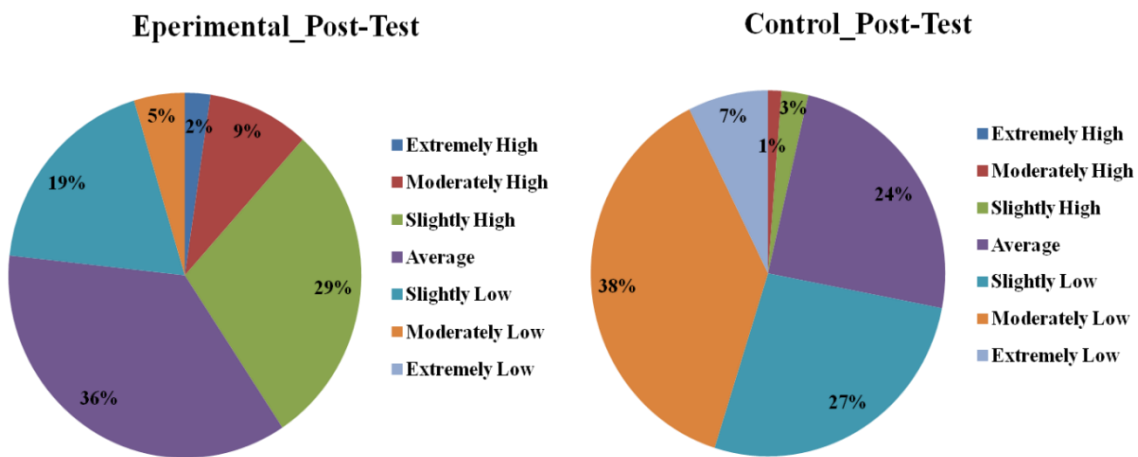
Figure 4.3



From the above table 4.3 and chart 4.3, it was found that in the pre-test results on overall 4Cs, the majority of the learners belonging to experimental group obtained average score while majority of the learners belonging to control group obtained moderately low scores. In experimental group the scores were scattered in the range from extremely low to average whereas in the control group the scores were scattered from extremely low to slightly high. Otherwise, both the figures indicate that the overall distribution of pre-test scores on 4Cs were quite similar in both the groups.

TABLE- 4.4						
Frequency Distribution of scores on Post- 4Cs on the basis of range of scores and groups						
Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	02	2.33	2.33	00	00	00
Moderately High	08	9.30	11.63	01	1.22	1.22
Slightly High	25	29.07	40.7	02	2.44	3.66
Average	31	36.05	76.75	20	24.40	28.06
Slightly Low	16	18.60	95.35	22	26.83	54.89
Moderately Low	04	4.65	100	31	37.80	92.69
Extremely Low	00	00	100	06	7.32	100

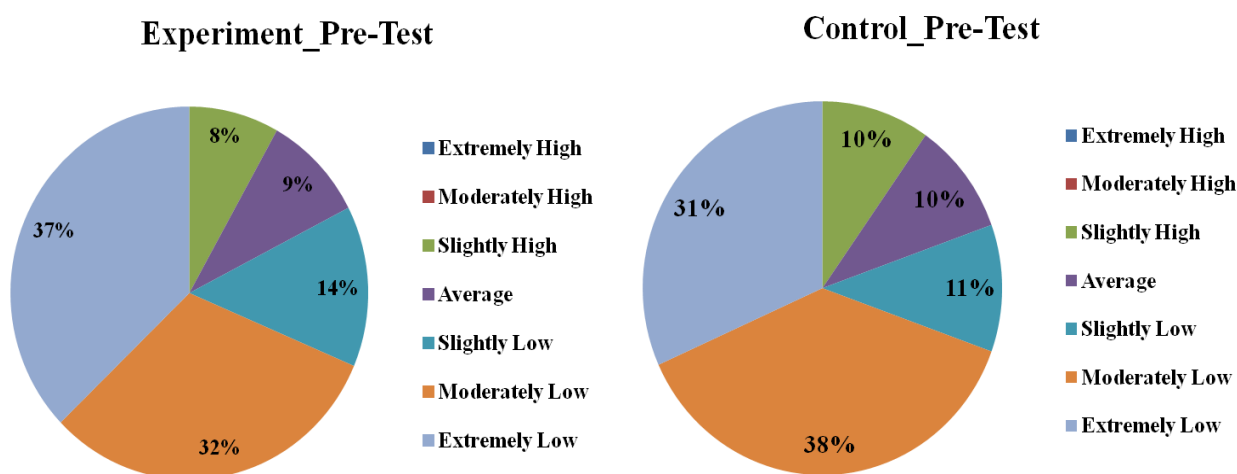
Figure 4.4



From the above table 4.4 and chart 4.4, it was found that in the post-test outcomes on overall 4Cs, the majority of the learners of experimental cohort obtained average score (36%) while majority of the control group learners obtained moderately low scores (38%). In experimental group the scores were scattered in the range from moderately low to extremely high whereas in the control group the scores were scattered from extremely low to moderately high. However, both the figures indicate that schoolchildren allied to the experimental group in comparison with the schoolchildren allied to control group scored remarkably better on 4Cs or overall Twenty first century learning skills.

Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	00	00	00	00	00	00
Moderately High	00	00	00	00	00	00
Slightly High	07	8.14	8.14	08	9.76	9.76
Average	08	9.30	17.44	08	9.76	19.52
Slightly Low	12	13.95	31.39	09	10.98	30.50
Moderately Low	27	31.40	62.79	31	37.80	68.30
Extremely Low	32	37.21	100	26	31.71	100

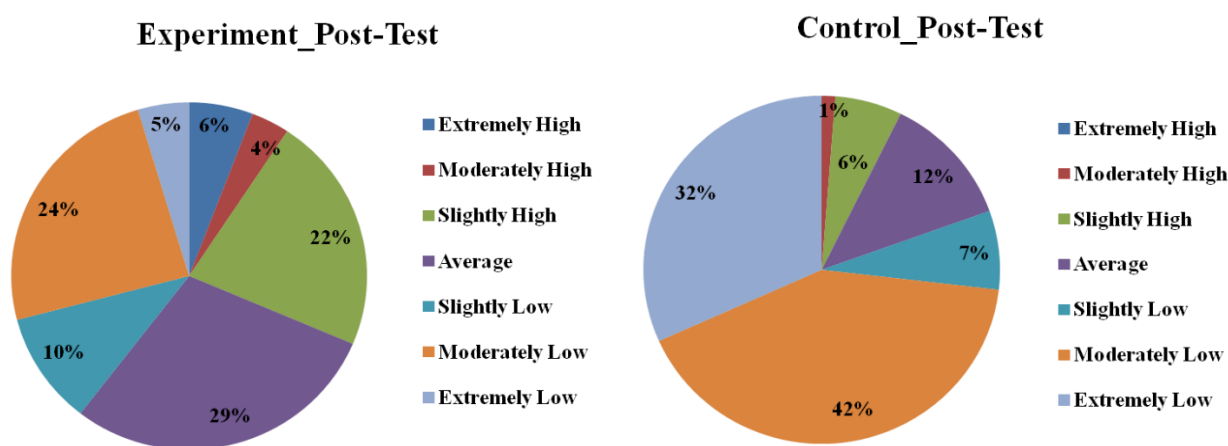
Figure 4.5



From the above table 4.5 and chart 4.5, it was found that in the pre-test results on critical thinking, the majority of the pupils allied to experimental group obtained extremely low score while majority of the pupils allied to control group obtained moderately low scores. Otherwise, both the figures indicate that the overall distribution of pre-test scores were quite similar in both the groups. For both the groups the scores were scattered in the range from extremely low to slightly high.

TABLE- 4.6						
Frequency Distribution of scores on Post-Critical Thinking on the basis of range of scores and groups						
Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	5	5.81	5.81	0	0	0
Moderately High	3	3.49	9.30	1	1.22	1.22
Slightly High	19	22.10	31.40	5	6.10	7.32
Average	25	29.07	60.47	10	12.20	19.51
Slightly Low	9	10.47	70.93	6	7.32	26.83
Moderately Low	21	24.42	95.35	34	41.46	68.29
Extremely Low	4	4.65	100	26	31.71	100

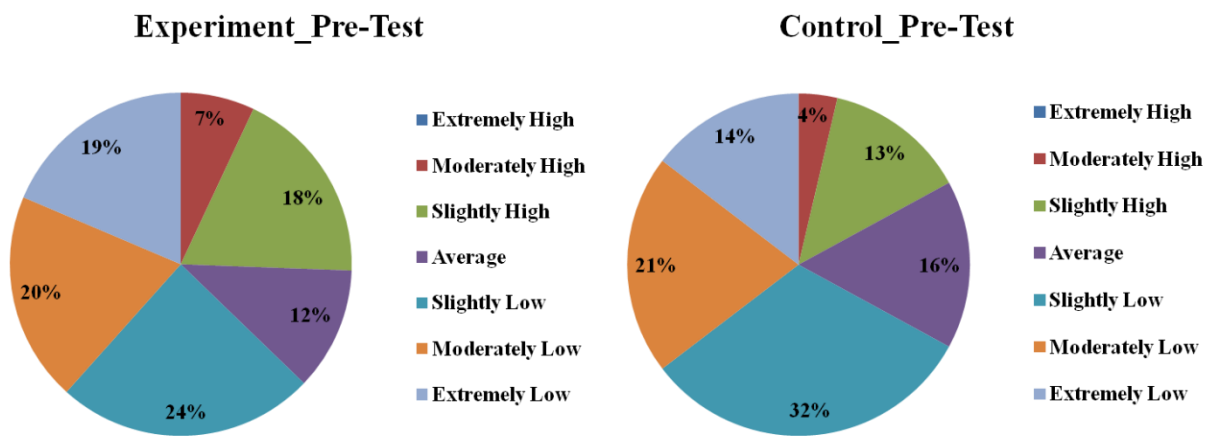
Figure 4.6



From the above table 4.6 and chart 4.6, it was found that in the post-test outcomes on critical thinking, the majority of the pupils allied to experimental group obtained average score (29%) while majority of the pupils allied to control group obtained moderately low scores (42%). In experimental group the scores were scattered in the range from extremely low to extremely high whereas in the control group the scores were scattered from extremely low to moderately high. However, both the figures declare vividly that the treatment group learners in comparison with the non-treatment group learners scored remarkably better on critical thinking skill.

Group \ Levels	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	00	00	00	00	00	00
Moderately High	06	6.98	6.98	03	3.66	3.66
Slightly High	16	18.60	25.58	11	13.41	17.07
Average	10	11.63	37.21	13	15.85	32.92
Slightly Low	21	24.42	61.63	26	31.71	64.63
Moderately Low	17	19.77	81.40	17	20.73	85.36
Extremely Low	16	18.60	100	12	14.63	100

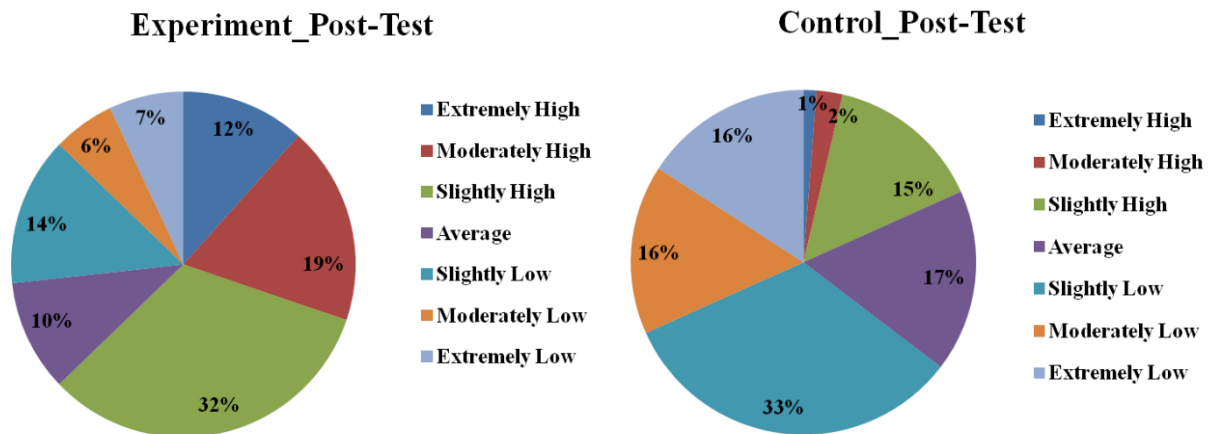
Figure 4.7



From the above table 4.7 and chart 4.7, it was discovered that most schoolchildren in both the experimental & control groups obtained slightly low score in their pre-test results on creativity. Moderately high scores were obtained by a smaller number of students in both the groups. In experimental group & control group the scores on pre-creativity were scattered in the range from extremely low to moderately high.

TABLE- 4.8						
Frequency Distribution of scores on Post-Creativity on the basis of range of scores and groups						
Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	10	11.63	11.63	1	1.22	1.22
Moderately High	16	18.60	30.23	2	2.44	3.66
Slightly High	28	32.56	62.79	12	14.63	18.29
Average	9	10.47	73.26	14	17.07	35.37
Slightly Low	12	13.95	87.21	27	32.93	68.29
Moderately Low	5	5.81	93.02	13	15.85	84.15
Extremely Low	6	6.98	100	13	15.85	100

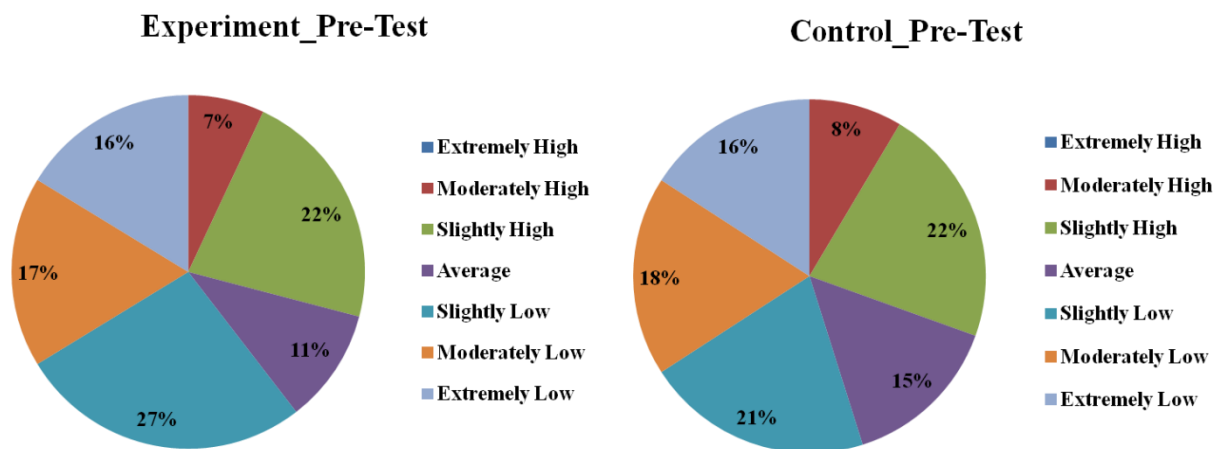
Figure 4.8



From the above table 4.8 and chart 4.8, it was found that in the post-test outcomes on creativity, the majority of the experimental group learners obtained slightly high score (32%) while majority of control group learners obtained slightly low scores (33%). For both the groups the post-creativity scores were scattered in the range from extremely low to extremely high. However, both the figures indicate that pupils allied to experimental group in comparison with the pupils allied to control group scored remarkably better on creativity skill.

TABLE- 4.9						
Frequency Distribution of scores on Pre-Collaboration on the basis of range of scores and groups						
Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0
Moderately High	6	6.98	6.98	7	8.54	8.54
Slightly High	19	22.09	29.07	18	21.95	30.49
Average	9	10.47	39.53	12	14.63	45.12
Slightly Low	23	26.74	66.28	17	20.73	65.85
Moderately Low	15	17.44	83.72	15	18.29	84.15
Extremely Low	14	16.28	100	13	15.85	100

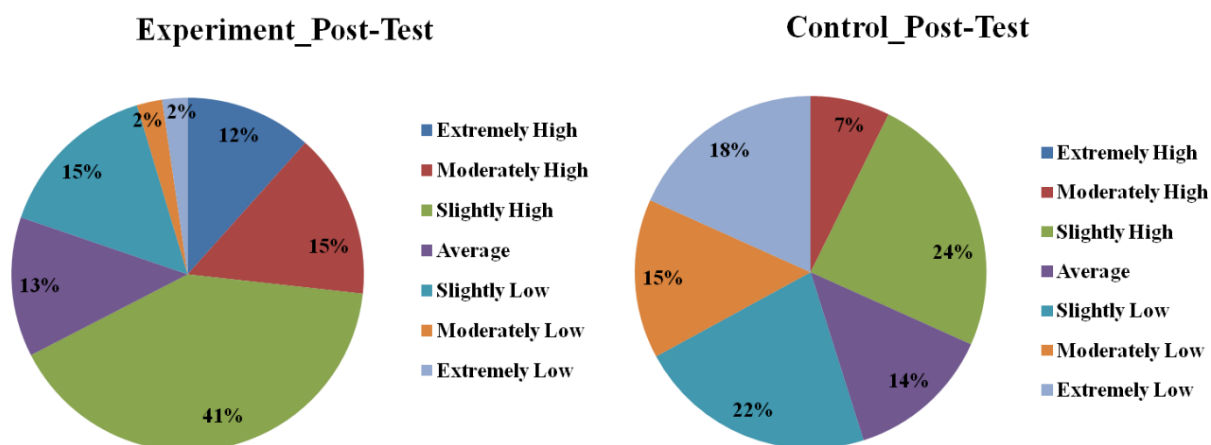
Figure 4.9



From the above table 4.9 and chart 4.9, it was found in pre-test outcomes on collaboration that the majority of the school children allied to experimental cohort obtained slightly low score while majority of the school children allied to control group obtained slightly high scores. For both the groups pre-collaboration scores were scattered in the range from extremely low to moderately high. Otherwise, these figures indicate that the overall distribution of pre-test scores on collaboration were quite similar in both the groups.

Frequency Distribution of scores on Post-Collaboration on the basis of range of scores and groups						
Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	10	11.63	11.63	0	0	0
Moderately High	13	15.12	26.74	6	7.32	7.32
Slightly High	35	40.70	67.44	20	24.39	31.71
Average	11	12.80	80.23	11	13.41	45.12
Slightly Low	13	15.12	95.35	18	21.95	67.07
Moderately Low	2	2.33	97.67	12	14.63	81.71
Extremely Low	2	2.33	100	15	18.29	100

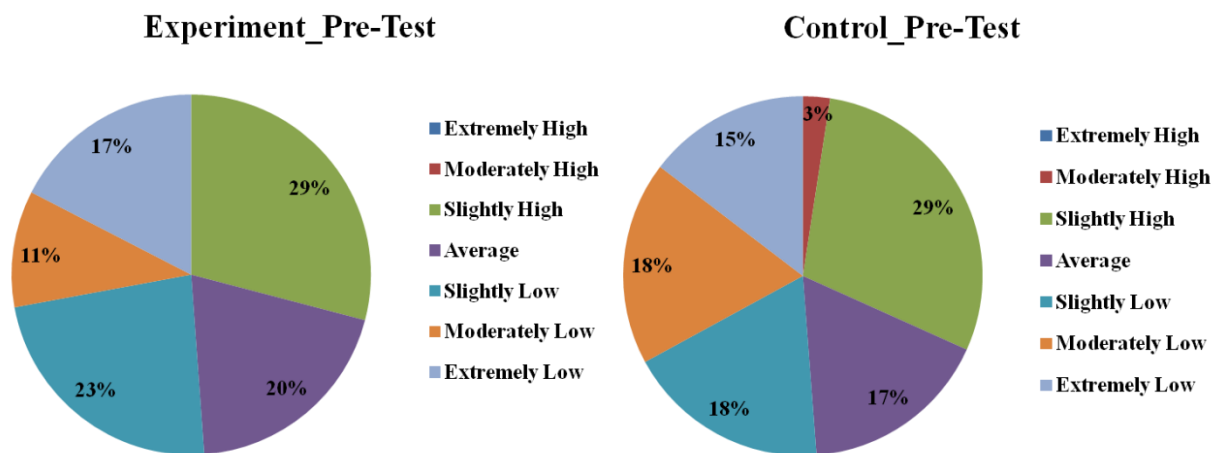
Figure 4.10



From the above table 4.10 and chart 4.10, it was found in the post-test outcomes on collaboration, that most of the school children allied to experimental group obtained slightly high score (41%) and the majority of control group learners also obtained slightly high scores (24%). But it was observed that there was a huge difference in the percentage number of slightly high score. In experimental group the scores were scattered in the range from extremely low to extremely high whereas in the control group the scores were scattered from extremely low to moderately high. However, both the figures indicate that learners belonging to experimental group in comparison with the learners belonging to control group scored remarkably better on collaborative skill.

TABLE- 4.11						
Frequency Distribution of scores on Pre-Communication on the basis of range of scores and groups						
Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0
Moderately High	0	0	0	2	2.44	2.44
Slightly High	25	29.07	29.07	24	29.27	31.71
Average	17	19.77	48.84	14	17.07	48.78
Slightly Low	20	23.26	72.09	15	18.29	67.07
Moderately Low	9	10.47	82.56	15	18.29	85.37
Extremely Low	15	17.44	100	12	14.63	100

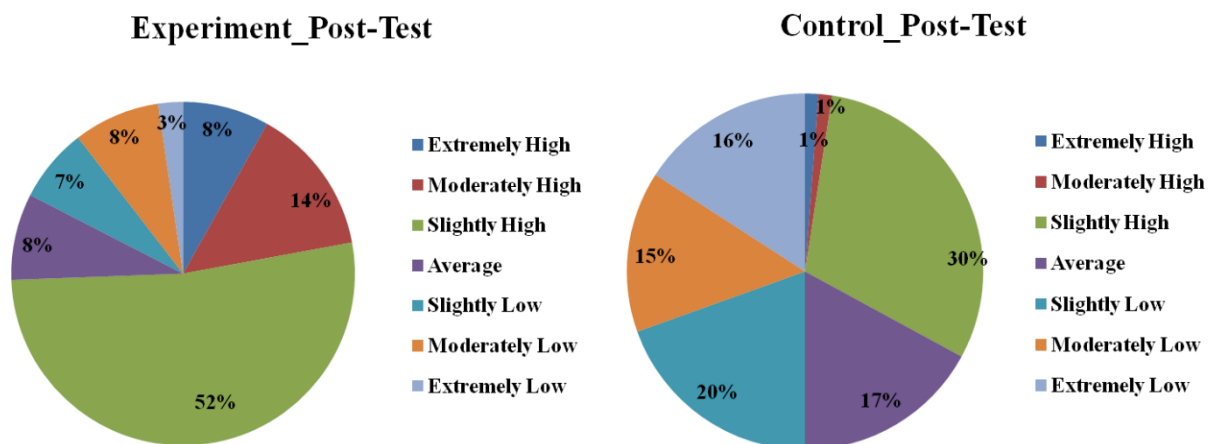
Figure 4.11



From the above table 4.11 and chart 4.11, it was discovered in the pre-test outcomes on communication that majority of the students of experimental group as well as the control group obtained slightly high score. In experimental group the scores were scattered in the range from extremely low to slightly high whereas in the control group the scores were scattered from extremely low to moderately high. Otherwise, both the figures indicate that the overall distribution of pre-communication scores were quite similar in both the groups.

Levels \ Group	Experiment (n= 86)			Control (n= 82)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	7	8.14	8.14	1	1.22	1.22
Moderately High	12	13.95	22.09	1	1.22	2.44
Slightly High	45	52.33	74.42	25	30.49	32.93
Average	7	8.14	82.56	14	17.07	50
Slightly Low	6	6.98	89.53	16	19.51	69.51
Moderately Low	7	8.14	97.67	12	14.63	84.15
Extremely Low	2	2.33	100	13	15.85	100

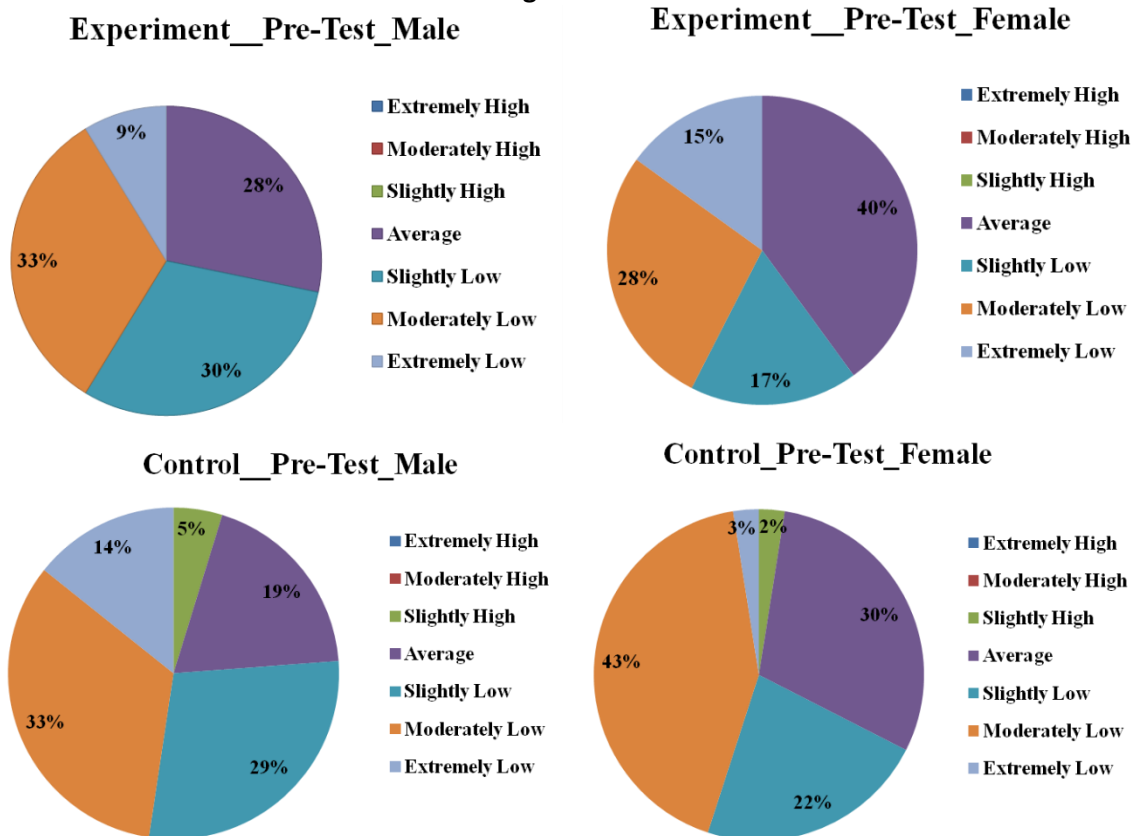
Figure 4.12



From the above table 4.12 and chart 4.12, it was discovered in the post-test outcomes on communication, the majority of the experimental group pupils obtained slightly high score (52%) and the majority of the control group pupils also obtained slightly high scores (30%). But it was observed that there was a huge difference in the percentage number of slightly high score. In both the groups the post-communication scores were scattered in the range from extremely low to extremely high. However, both the figures pointed at the fact that learners of experimental group in comparison with the control group learners scored remarkably better on communication skill.

Group Gender Levels	Experiment						Control					
	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0	0	0	0	0	0
Slightly High	0	0	0	0	0	0	2	4.76	4.76	1	2.5	2.5
Average	13	28.26	28.26	16	40	40	8	19.05	23.81	12	30	32.5
Slightly Low	14	30.43	58.70	7	17.5	57.5	12	28.57	52.38	9	22.5	55
Moderately Low	15	32.61	91.30	11	27.5	85	14	33.33	85.71	17	42.5	97.5
Extremely Low	4	8.70	100	6	15	100	6	14.29	100	1	2.5	100

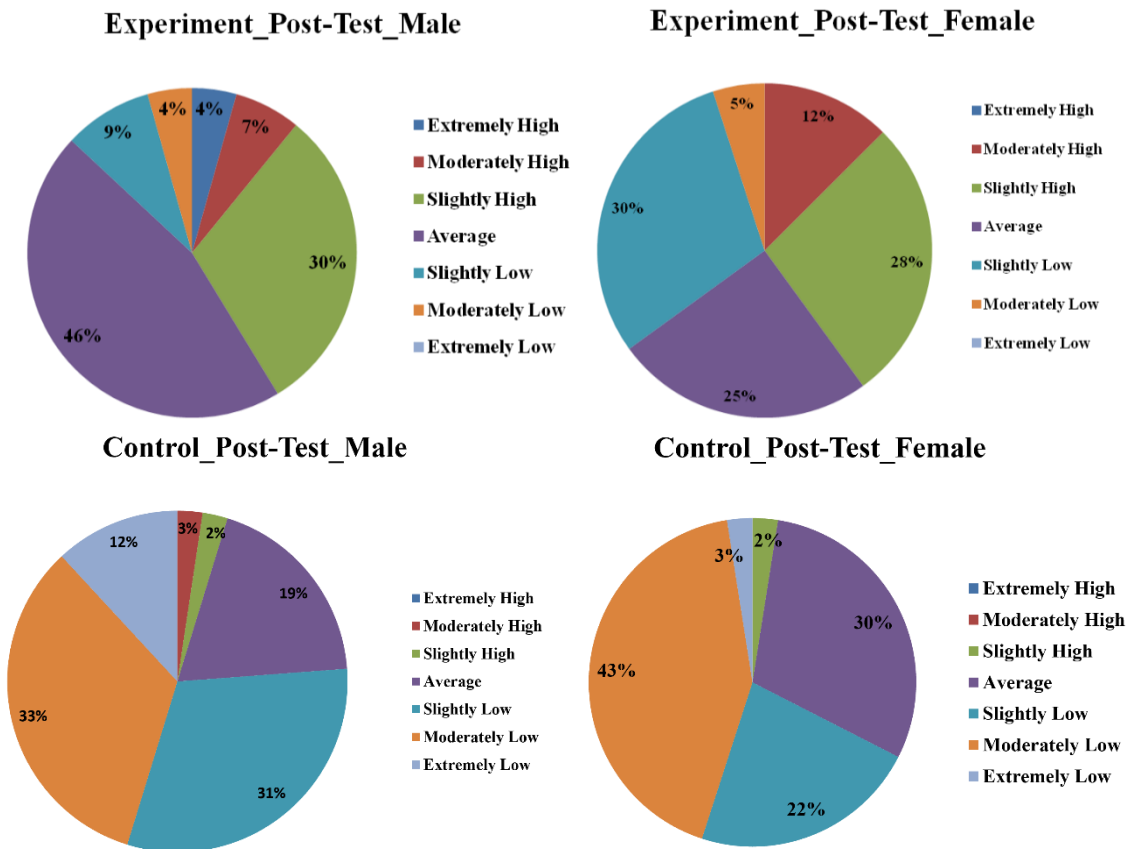
Figure 4.13



From the above table 4.13 and chart of 4.13, it was found that in the pre-4Cs results of boys students between the experimental & the control groups disclosed similar trend in terms of score distribution. Similar trend was also observed in the pre-4Cs results of the female students. Within the experimental & the control groups, gender wise slight difference in frequency percentage of pre-4Cs scores was observed.

Group	Experiment						Control					
	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
Gender	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	2	4.35	4.35	0	0	0	0	0	0	0	0	0
Moderately High	3	6.52	10.87	5	12.5	12.5	1	2.38	2.38	0	0	0
Slightly High	14	30.43	41.30	11	27.5	40	1	2.38	4.76	1	2.5	2.5
Average	21	45.65	86.96	10	25	65	8	19.05	23.81	12	30	32.5
Slightly Low	4	8.70	95.65	12	30	95	13	30.95	54.76	9	22.5	55
Moderately Low	2	4.35	100	2	5	100	14	33.33	88.10	17	42.5	97.5
Extremely Low	0	0	100	0	0	100	5	11.90	100	1	2.5	100

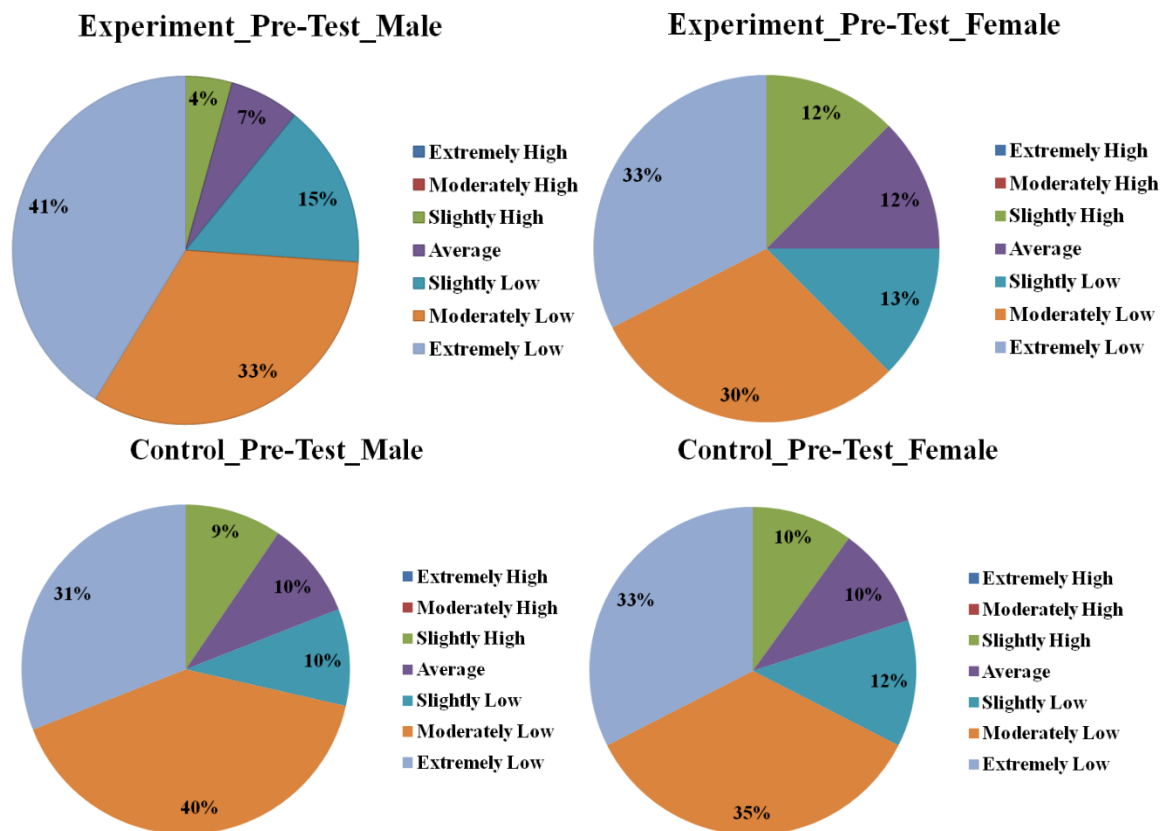
Figure 4.14



From the above table 4.14 and charts of 4.14, it was found that in the post-test outcomes on overall 4Cs, majority of the boys students of experimental group obtained average score (46%) while most of the girls learners of experimental group obtained slightly low scores (30%). In contrast, majority of the male students of control group obtained moderately low score (33%) while the majority of the female learners of control group obtained moderately low scores (43%).

Group Gender Levels	Experiment						Control					
	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0	0	0	0	0	0
Slightly High	2	4.35	4.35	5	12.5	12.5	4	9.52	9.52	4	10	10
Average	3	6.52	10.87	5	12.5	25	4	9.52	19.05	4	10	20
Slightly Low	7	15.22	26.09	5	12.5	37.5	4	9.52	28.57	5	12.5	32.5
Moderately Low	15	32.61	58.70	12	30	67.5	17	40.48	69.05	14	35	67.5
Extremely Low	19	41.30	100	13	32.5	100	13	30.95	100	13	32.5	100

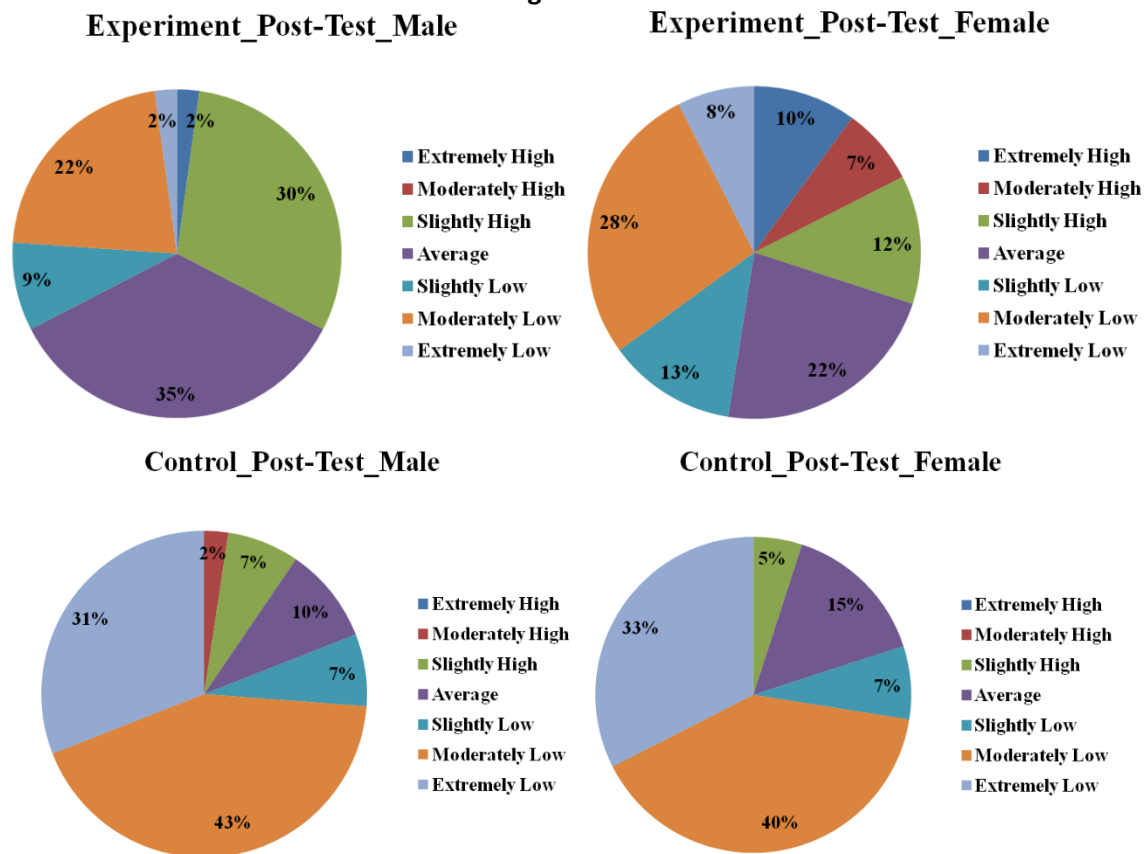
Figure 4.15



From the above table 4.15 and charts of 4.15, it was found that in the pre-critical thinking results of male learners between the experimental & the control group exhibited similar trend in terms of score distribution. Similar trend was also observed in the pre-critical thinking results of the female students. Within the experimental & the control group, gender wise slight difference in frequency percentage of pre-critical thinking scores was observed.

Group	Experiment						Control					
Gender	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	1	2.17	2.17	4	10	10	0	0	0	0	0	0
Moderately High	0	0.00	2.17	3	7.5	17.5	1	2.38	2.38	0	0	0
Slightly High	14	30.43	32.61	5	12.5	30	3	7.14	9.52	2	5	5
Average	16	34.78	67.39	9	22.5	52.5	4	9.52	19.05	6	15	20
Slightly Low	4	8.70	76.09	5	12.5	65	3	7.14	26.19	3	7.5	27.5
Moderately Low	10	21.74	97.83	11	27.5	92.5	18	42.86	69.05	16	40	67.5
Extremely Low	1	2.17	100	3	7.5	100	13	30.95	100	13	32.5	100

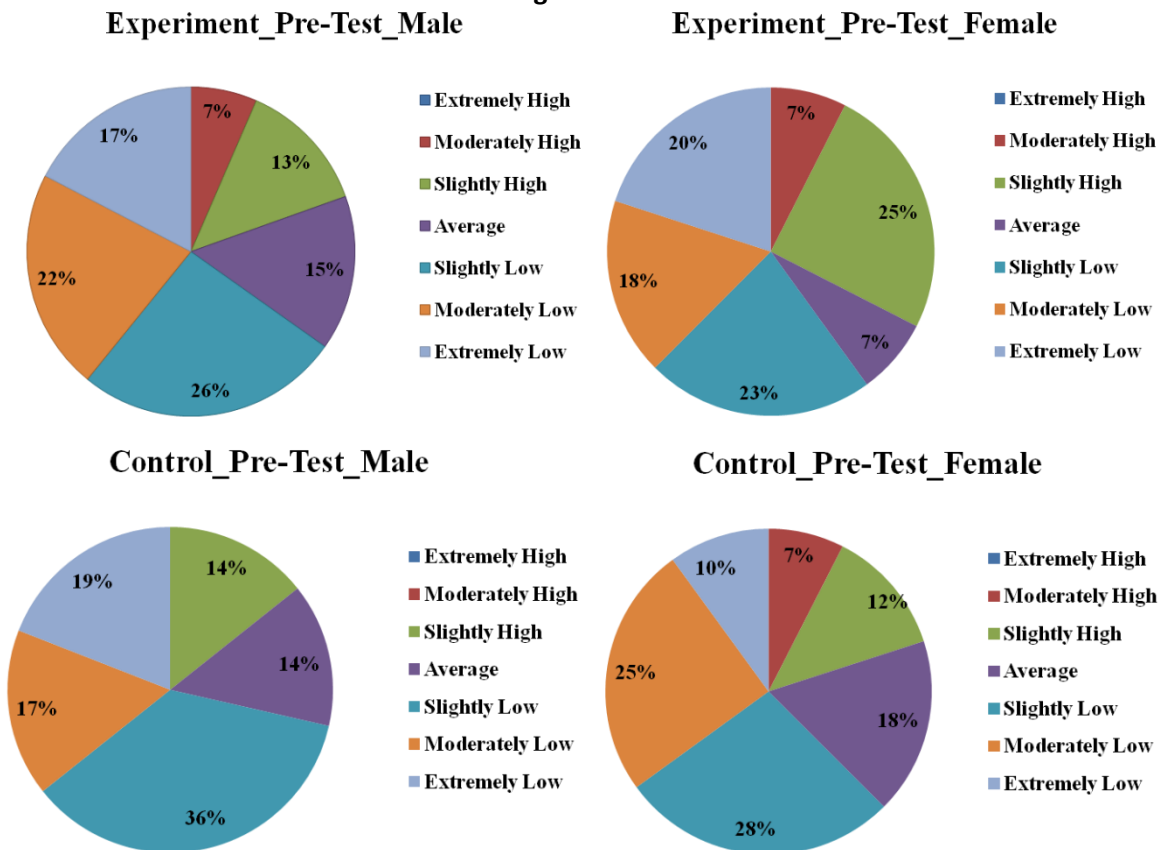
Figure 4.16



From the above table 4.16 and charts of 4.16, it was observed in the post-test outcomes on critical thinking, majority of the male learners of experimental group obtained average score (35%) while most of the female learners of experimental cohort obtained moderately low scores (28%). Then again, majority of the male students of control group obtained moderately low score (43%) and the majority of the female learners of control group also obtained moderately low scores (40%).

Levels	Group		Experiment						Control					
	Gender	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)			
		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	
Extremely High	0	0	0	0	0	0	0	0	0	0	0	0		
Moderately High	3	6.52	6.52	3	7.5	7.5	0	0	0	3	7.5	7.5		
Slightly High	6	13.04	19.57	10	25	32.5	6	14.29	14.29	5	12.5	20		
Average	7	15.22	34.78	3	7.5	40	6	14.29	28.57	7	17.5	37.5		
Slightly Low	12	26.09	60.87	9	22.5	62.5	15	35.71	64.29	11	27.5	65		
Moderately Low	10	21.74	82.61	7	17.5	80	7	16.67	80.95	10	25	90		
Extremely Low	8	17.39	100	8	20	100	8	19.05	100	4	10	100		

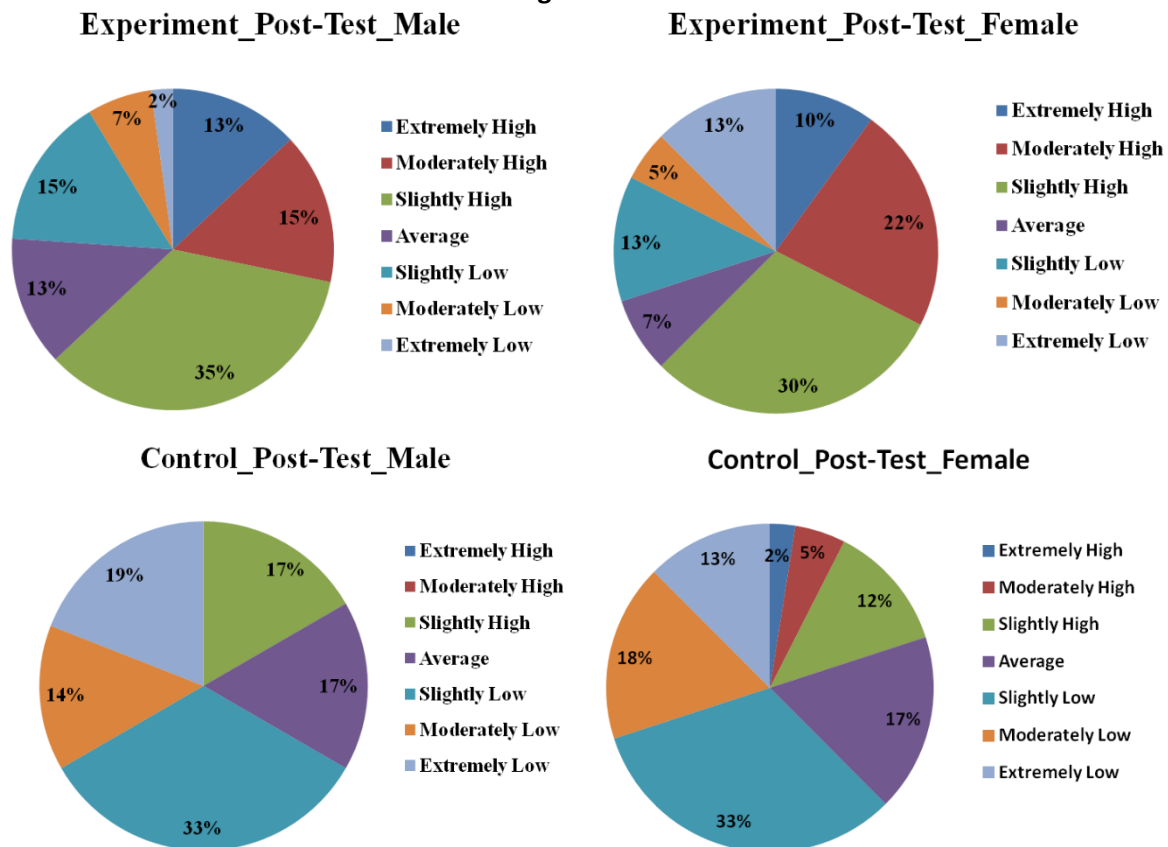
Figure 4.17



From the above table 4.17 and charts of 4.17, it was found that in the pre-creativity results of boys students between the experimental & the control groups demonstrated similar trend in terms of score distribution. Similar trend was also observed in the pre-creativity results of the female students. Within the treatment & non-treatment groups, gender wise slight difference in frequency percentage of pre-creativity scores was observed.

Group	Experiment						Control					
Gender	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	6	13.04	13.04	4	10	10	0	0	0	1	2.5	2.5
Moderately High	7	15.22	28.26	9	22.5	32.5	0	0	0	2	5	7.5
Slightly High	16	34.78	63.04	12	30	62.5	7	16.67	16.67	5	12.5	20
Average	6	13.04	76.09	3	7.5	70	7	16.67	33.33	7	17.5	37.5
Slightly Low	7	15.22	91.30	5	12.5	82.5	14	33.33	66.67	13	32.5	70
Moderately Low	3	6.52	97.83	2	5	87.5	6	14.29	80.95	7	17.5	87.5
Extremely Low	1	2.17	100	5	12.5	100	8	19.05	100	5	12.5	100

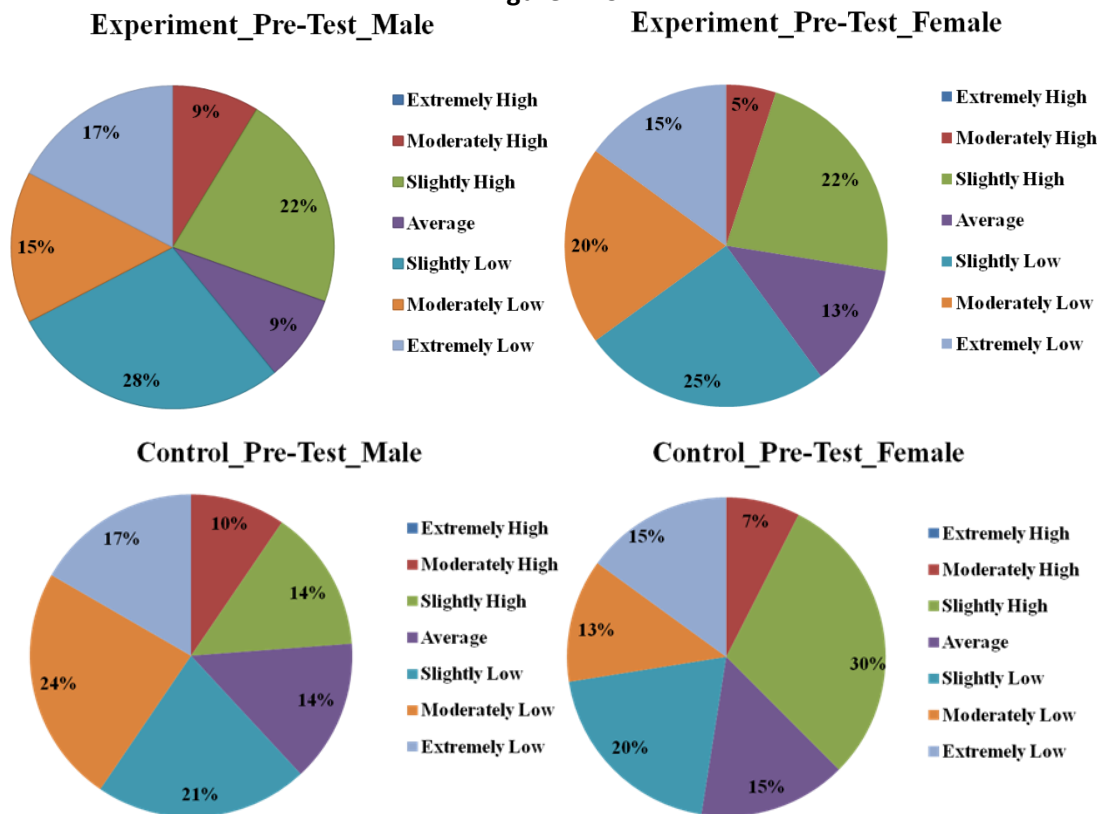
Figure 4.18



From the above table 4.18 and charts of 4.18, it was found in the post-test outcomes on creativity, that majority of the male learners of experimental group obtained slightly high score (35%) and most of the female learners of experimental group also obtained slightly low scores (30%). Then again, majority of the male students of control group obtained slightly low score (33%) while the majority of the female control group students also obtained slightly low scores (33%).

Group	Experiment						Control					
Gender	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
Levels	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0	0	0	0	0	0	0
Moderately High	4	8.70	8.70	2	5	5	4	9.52	9.52	3	7.5	7.5
Slightly High	10	21.74	30.43	9	22.5	27.5	6	14.29	23.81	12	30	37.5
Average	4	8.70	39.13	5	12.5	40	6	14.29	38.10	6	15	52.5
Slightly Low	13	28.26	67.39	10	25	65	9	21.43	59.52	8	20	72.5
Moderately Low	7	15.22	82.61	8	20	85	10	23.81	83.33	5	12.5	85
Extremely Low	8	17.39	100	6	15	100	7	16.67	100	6	15	100

Figure 4.19



From the above table 4.19 and charts of 4.19, it was found that in the pre-collaboration results of boys students between the experimental & control groups demonstrated similar trend in terms of score distribution. Similar trend was also observed in the pre-collaboration results of the female students. Within the experimental & the control groups, gender wise slight difference in frequency percentage of pre-collaboration scores was observed.

Gender	Experiment						Control					
Group	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
Levels	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	7	15.22	15.22	3	7.5	7.5	0	0	0	0	0	0
Moderately High	7	15.22	30.43	6	15	22.5	3	7.14	7.14	3	7.5	7.5
Slightly High	17	36.96	67.39	18	45	67.5	7	16.67	23.81	13	32.5	40
Average	7	15.22	82.61	4	10	77.5	8	19.05	42.86	3	7.5	47.5
Slightly Low	7	15.22	97.83	6	15	92.5	9	21.43	64.29	9	22.5	70
Moderately Low	1	2.17	100	1	2.5	95	7	16.67	80.95	5	12.5	82.5
Extremely Low	0	0	100	2	5	100	8	19.05	100	7	17.5	100

Figure 4.20

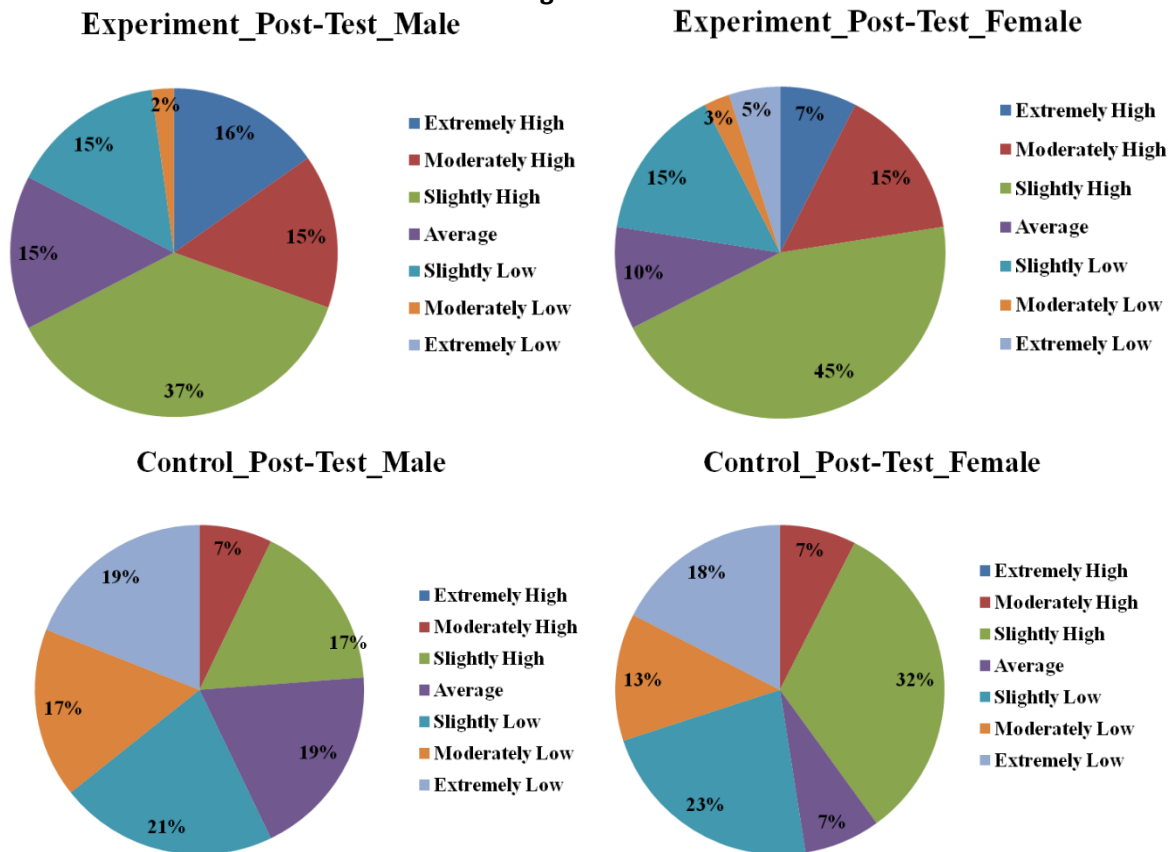
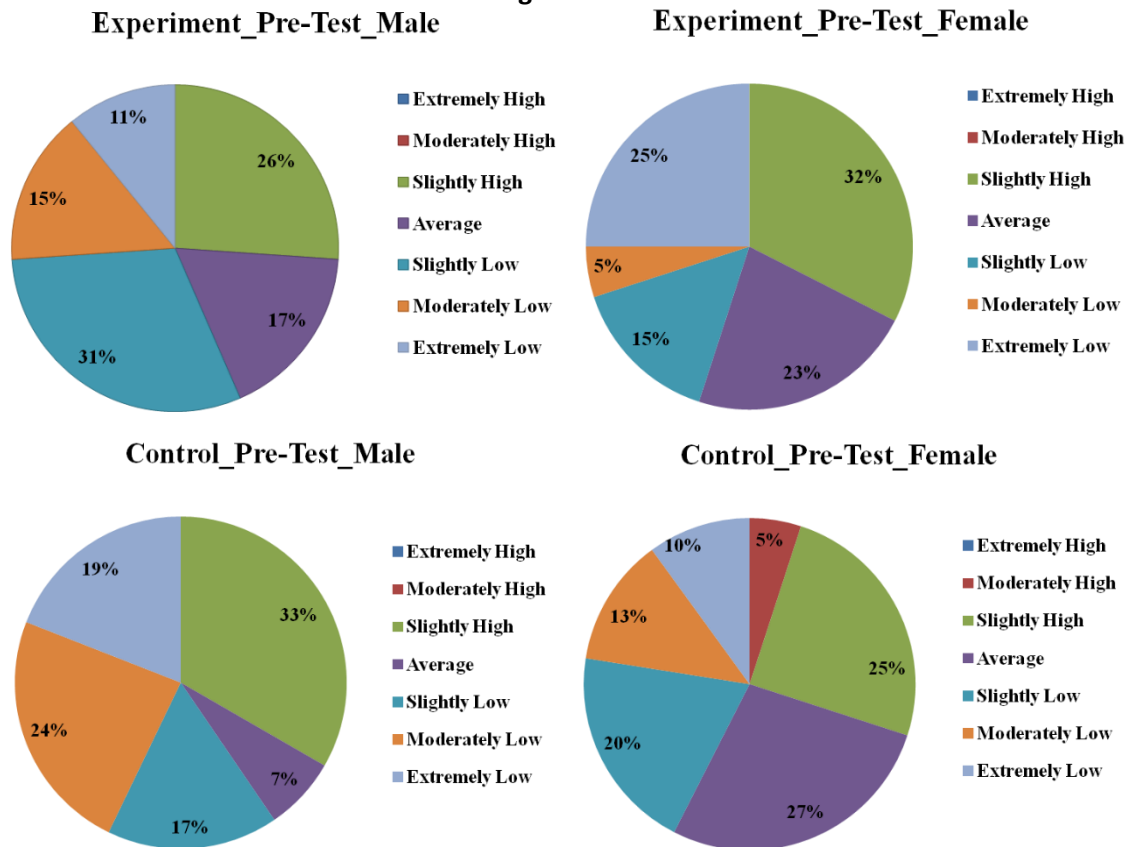


Table 4.20 and charts of 4.20 show that in the post-test outcomes on collaboration, the majority of the male learners of experimental group obtained slightly high score (37%) and most of the female learners of experimental group also obtained slightly high scores (45%). In contrast, majority of the male students of control group obtained slightly low score (21%) while the majority of the female control group students obtained slightly high scores (32%).

Group		Experiment						Control					
Gender		Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Levels													
Extremely High		0	0	0	0	0	0	0	0	0	0	0	0
Moderately High		0	0.00	0.00	0	0	0	0	0.00	0.00	2	5	5
Slightly High		12	26.09	26.09	13	32.5	32.5	14	33.33	33.33	10	25	30
Average		8	17.39	43.48	9	22.5	55	3	7.14	40.48	11	27.5	57.5
Slightly Low		14	30.43	73.91	6	15	70	7	16.67	57.14	8	20	77.5
Moderately Low		7	15.22	89.13	2	5	75	10	23.81	80.95	5	12.5	90
Extremely Low		5	10.87	100	10	25	100	8	19.05	100	4	10	100

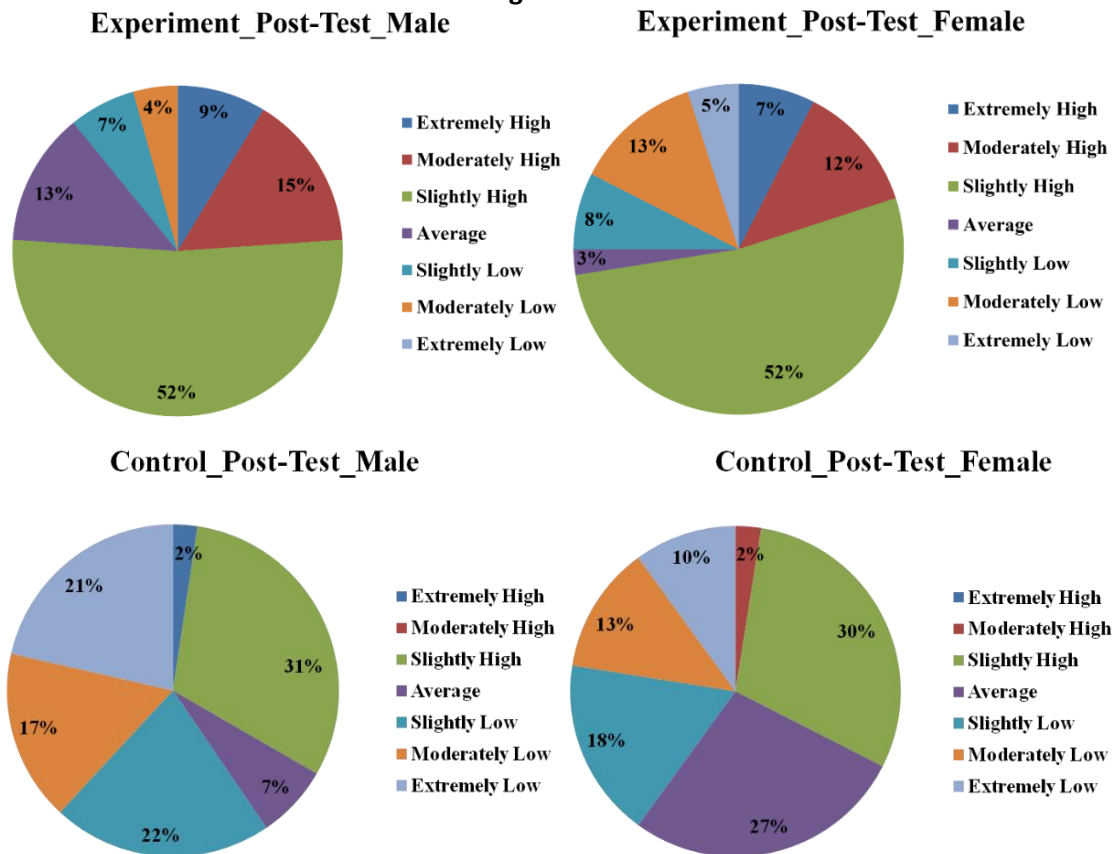
Figure 4.21



From the above table 4.21 and charts of 4.21, it was found that in the pre-communication results of boys learners between the experimental & the control groups exhibited similar trend in terms of score distribution. Similar trend was also observed in the pre-communication results of the female students. Within the experimental & control groups, gender wise slight difference in frequency percentage of pre-communication scores was observed.

Group	Experiment						Control					
Gender	Male (n=46)			Female (n=40)			Male (n=42)			Female (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	4	8.70	8.70	3	7.50	7.5	1	2.38	2.38	0	0	0
Moderately High	7	15.22	23.91	5	12.50	20	0	0.00	2.38	1	2.5	2.5
Slightly High	24	52.17	76.09	21	52.50	72.5	13	30.95	33.33	12	30	32.5
Average	6	13.04	89.13	1	2.50	75	3	7.14	40.48	11	27.5	60
Slightly Low	3	6.52	95.65	3	7.50	82.5	9	21.43	61.90	7	17.5	77.5
Moderately Low	2	4.35	100	5	12.50	95	7	16.67	78.57	5	12.5	90
Extremely Low	0	0	100	2	5.00	100	9	21.43	100	4	10	100

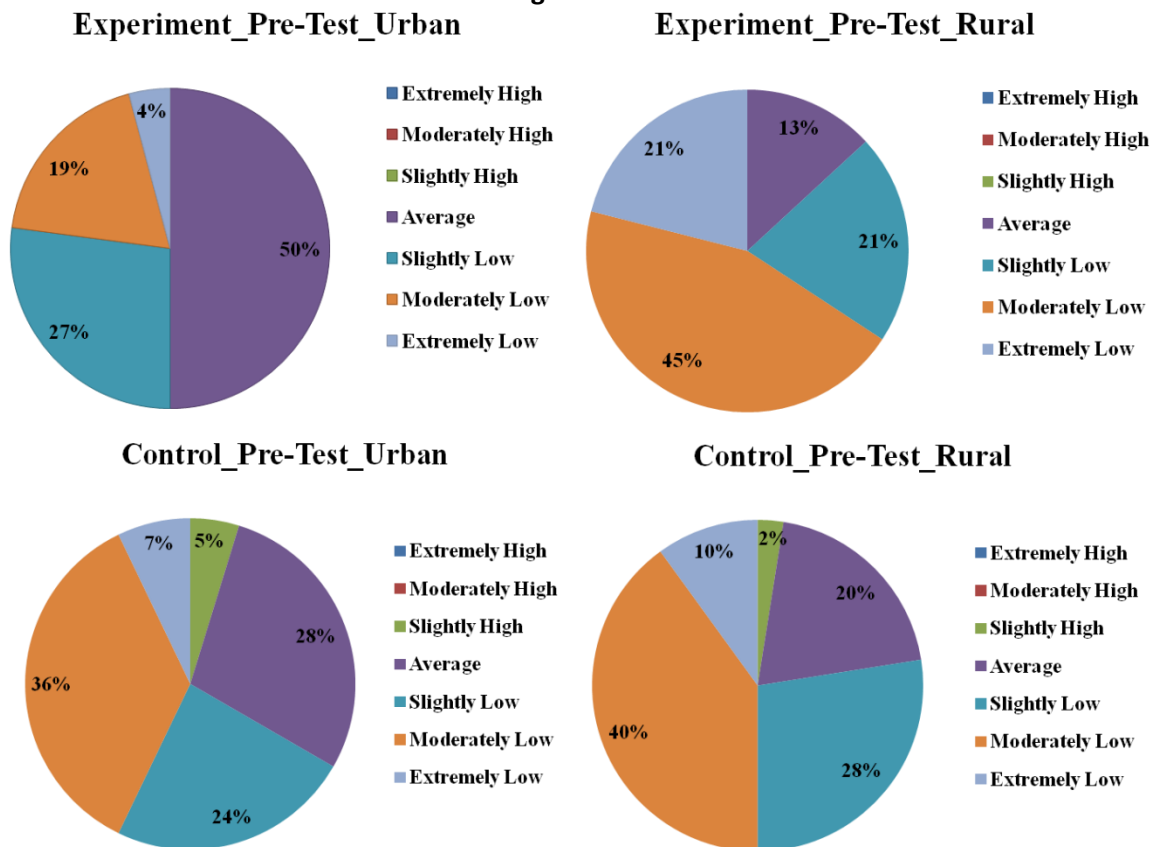
Figure 4.22



From the above table 4.22 and charts of 4.22, it was found that in the post-test outcomes on communication, majority of the male as well as the female students of experimental group obtained slightly high score (52%). On the other hand, majority of both the male & the female students of control group also obtained slightly high score (31%) and (30%), respectively.

Group	Experiment						Control					
Locale	Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0	0	0	0	0	0
Slightly High	0	0	0	0	0	0	2	4.76	4.76	1	2.5	2.5
Average	24	50	50.00	5	13.16	13.16	12	28.57	33.33	8	20	22.5
Slightly Low	13	27.08	77.08	8	21.05	34.21	10	23.81	57.14	11	27.5	50
Moderately Low	9	18.75	95.83	17	44.74	78.95	15	35.71	92.86	16	40	90
Extremely Low	2	4.17	100	8	21.05	100	3	7.14	100	4	10	100

Figure 4.23



From the above table 4.23 and charts of 4.23, it was found that in the pre-4Cs results of urban students between the experimental & the control groups showed similar trend in terms of score distribution. Similar trend was also observed in the pre-4Cs results of the rural students. Within both the groups, locale wise slight difference in frequency percentage of pre-4Cs scores was observed.

Group	Experiment						Control					
Locale	Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	1	2.08	2.08	1	2.63	2.63	0	0	0	0	0	0
Moderately High	6	12.50	14.58	2	5.26	7.89	1	2.38	2.38	0	0	0
Slightly High	21	43.75	58.33	4	10.53	18.42	1	2.38	4.76	1	2.5	2.5
Average	17	35.42	93.75	14	36.84	55.26	12	28.57	33.33	8	20	22.5
Slightly Low	3	6.25	100	13	34.21	89.47	10	23.81	57.14	12	30	52.5
Moderately Low	0	0.00	100	4	10.53	100	16	38.10	95.24	15	37.5	90
Extremely Low	0	0.00	100	0	0.00	100	2	4.76	100	4	10	100

Figure 4.24

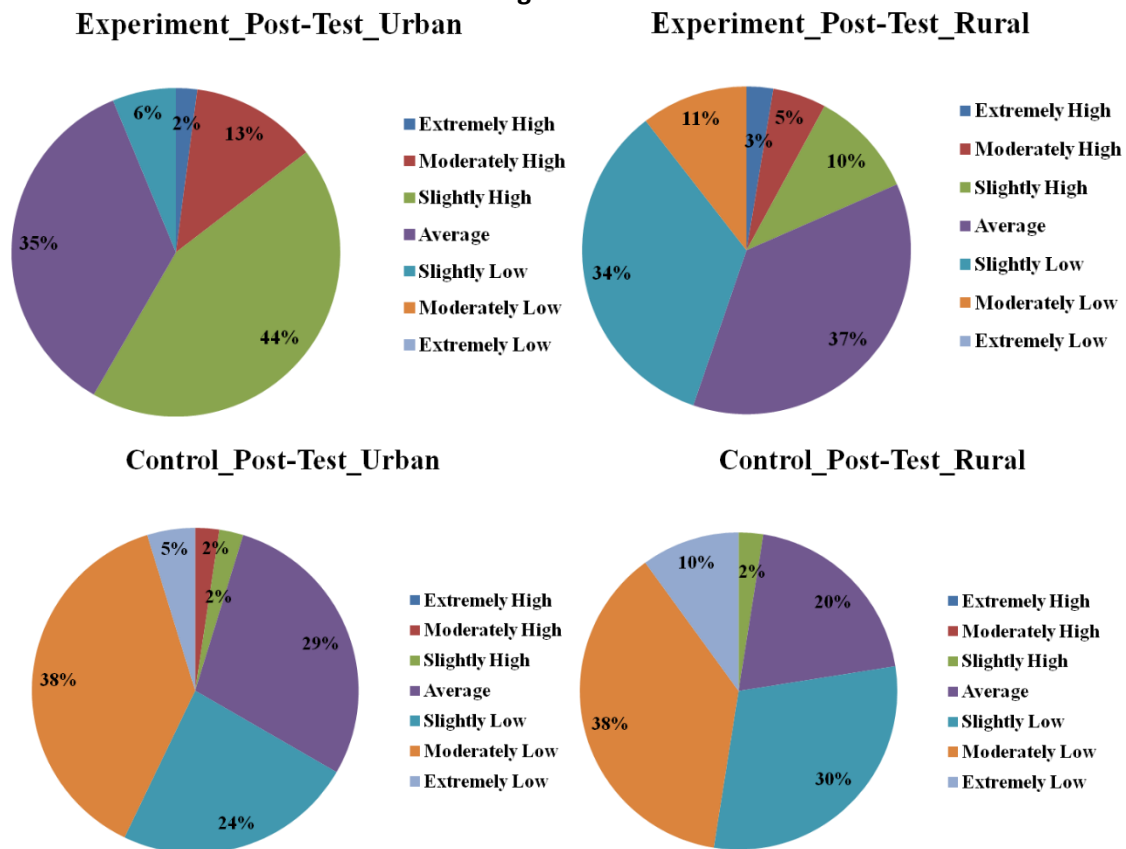
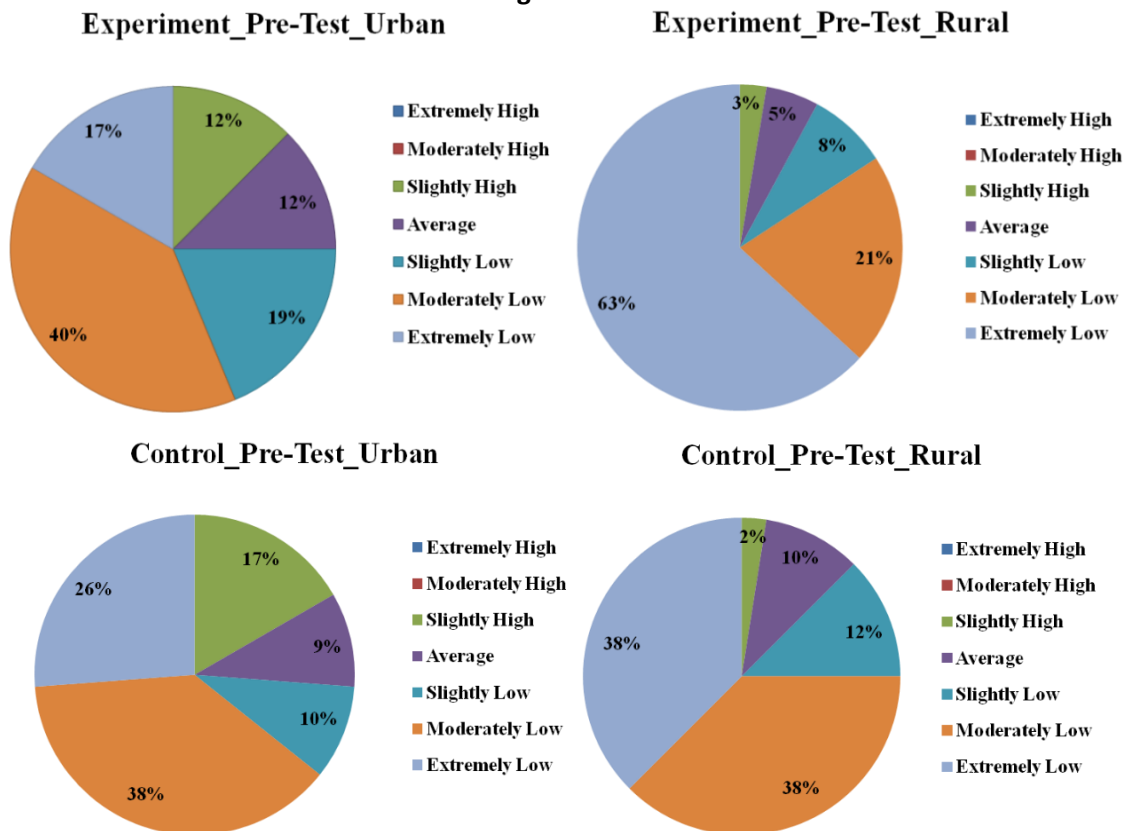


Table 4.24 and figure 4.24 reveal that in the post-test outcomes on overall 4Cs, the majority of the urban learners of experimental group obtained slightly high score (44%) while most of the rural learners of experimental group obtained average score (37%). On the other hand, majority of the urban & rural school children of control group obtained moderately low score (38%). The above figures also indicate the massive development of 4Cs among the urban experimental group students in comparison to the rural students of the experimental group, where no remarkable change was observed between the urban & rural learners of the control group with respect to 4Cs development.

Group		Experiment						Control					
Locale		Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High		0	0	0	0	0	0	0	0	0	0	0	0
Moderately High		0	0	0	0	0	0	0	0	0	0	0	0
Slightly High		6	12.5	12.5	1	2.63	2.63	7	16.67	16.67	1	2.5	2.5
Average		6	12.5	25.00	2	5.26	7.89	4	9.52	26.19	4	10	12.5
Slightly Low		9	18.75	43.75	3	7.89	15.79	4	9.52	35.71	5	12.5	25
Moderately Low		19	39.58	83.33	8	21.05	36.84	16	38.10	73.81	15	37.5	62.5
Extremely Low		8	16.67	100	24	63.16	100	11	26.19	100	15	37.5	100

Figure 4.25



From the above table 4.25 and charts of 4.25, it was found that in the pre-critical thinking results of urban students between the experimental & the control groups show similar trend in reference to score distribution. Similar trend was also observed in the pre-critical thinking results of the rural students. Within the experimental & the control groups, locale wise slight difference in frequency percentage of pre-critical thinking scores was observed. A large number of rural schoolchildren in the treatment group got extremely low score (63%), whereas the frequency percentage of extremely low score of rural learners in the control group the was 38%.

Group	Experiment						Control					
Locale	Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	5	10.42	10.42	0	0	0	0	0	0	0	0	0
Moderately High	2	4.17	14.58	1	2.63	2.63	1	2.38	2.38	0	0	0
Slightly High	11	22.92	37.50	8	21.05	23.68	4	9.52	11.90	1	2.5	2.5
Average	20	41.67	79.17	5	13.16	36.84	6	14.29	26.19	4	10	12.5
Slightly Low	4	8.33	87.50	5	13.16	50.00	3	7.14	33.33	3	7.5	20
Moderately Low	5	10.42	97.92	16	42.11	92.11	17	40.48	73.81	17	42.5	62.5
Extremely Low	1	2.08	100	3	7.89	100	11	26.19	100	15	37.5	100

Figure 4.26

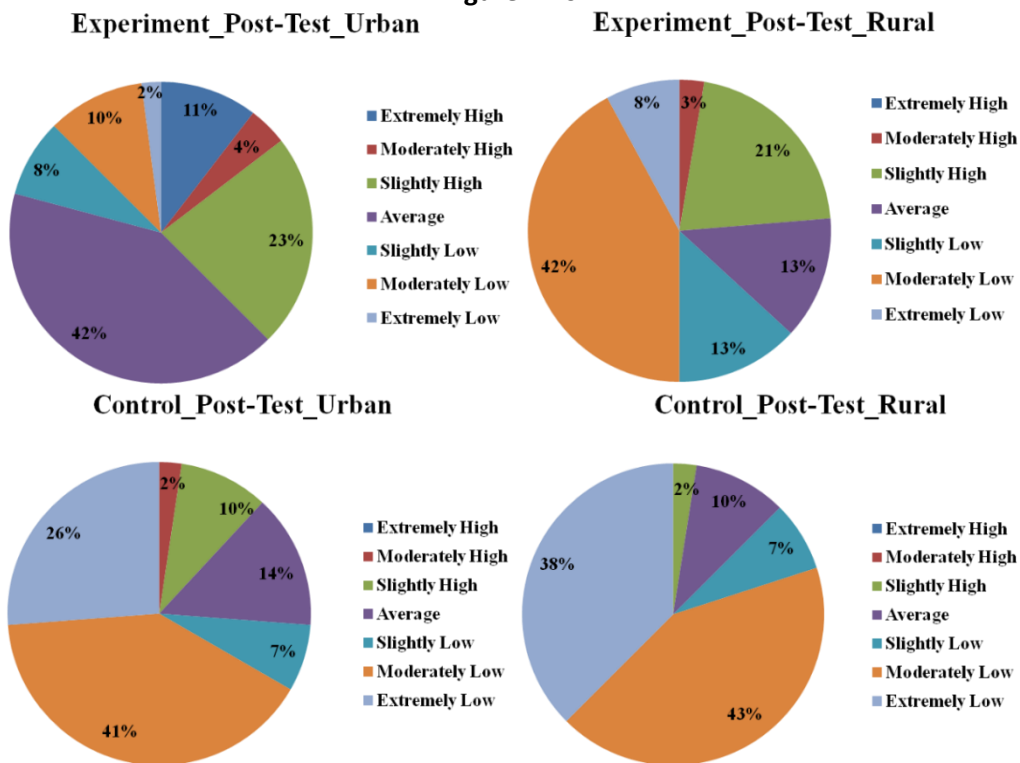
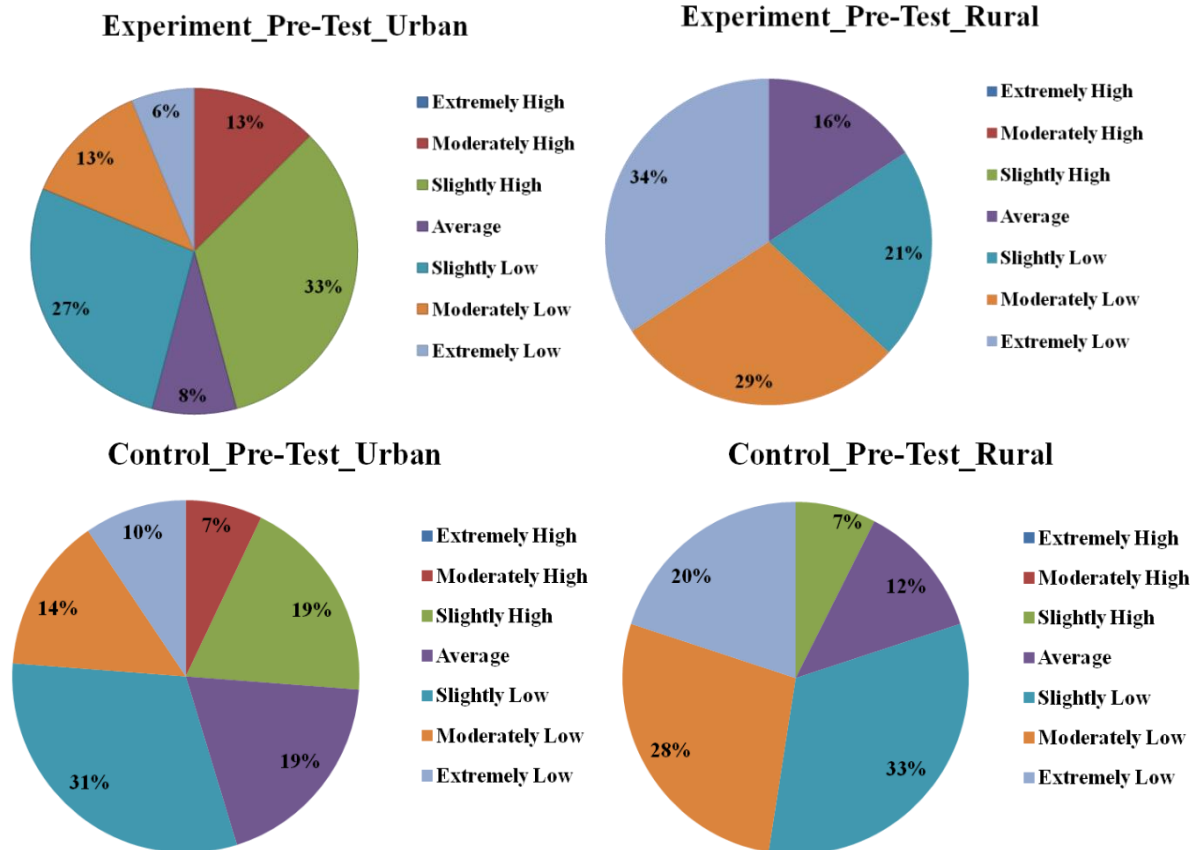


Table 4.26 and figure 4.26 show that in the post-test outcomes on critical thinking, majority of the urban pupils of experimental group obtained average score (42%) and most of the rural learners of experimental group also obtained moderately low scores (42%). On the contrary, majority of the urban students of control group obtained moderately low score (41%) while the majority of the rural students of control group also obtained moderately low scores (43%). The above figures also indicate the slight development of critical thinking among the urban students allied to the experimental group in comparison with the rural experimental group students, where no remarkable change on the basis of locale was observed in the control group with respect to critical thinking development.

Group		Experiment						Control					
Locale		Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
		Extremely High	0	0	0	0	0	0	0	0	0	0	0
Moderately High	6	12.5	12.5	0	0	0	3	7.14	7.14	0	0	0	0
Slightly High	16	33.33	45.83	0	0	0	8	19.05	26.19	3	7.5	7.5	7.5
Average	4	8.33	54.17	6	15.79	15.79	8	19.05	45.24	5	12.5	20	20
Slightly Low	13	27.08	81.25	8	21.05	36.84	13	30.95	76.19	13	32.5	52.5	52.5
Moderately Low	6	12.50	93.75	11	28.95	65.79	6	14.29	90.48	11	27.5	80	80
Extremely Low	3	6.25	100.00	13	34.21	100.00	4	9.52	100	8	20	100	100

Figure 4.27



From the above table 4.27 and charts of 4.27, it was found that in the pre-creativity results of urban students between the experimental & the control groups showed similar trend for score distribution. Similar trend was also observed in the pre-creativity results of the rural students. Within both the groups, locale wise slight difference in frequency percentage of pre-creativity scores was observed.

Group		Experiment						Control					
Locale		Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High		9	18.75	18.75	1	2.63	2.63	1	2.38	2.38	0	0	0
Moderately High		14	29.17	47.92	2	5.26	7.89	2	5	7	0	0	0
Slightly High		16	33.33	81.25	12	31.58	39.47	9	21.43	28.57	3	7.5	7.5
Average		3	6.25	87.50	6	15.79	55.26	9	21.43	50.00	5	12.5	20
Slightly Low		4	8.33	95.83	8	21.05	76.32	12	28.57	78.57	15	37.5	57.5
Moderately Low		1	2.08	97.92	4	10.53	86.84	6	14.29	92.86	7	17.5	75
Extremely Low		1	2.08	100	5	13.16	100	3	7.14	100	10	25	100

Figure 4.28

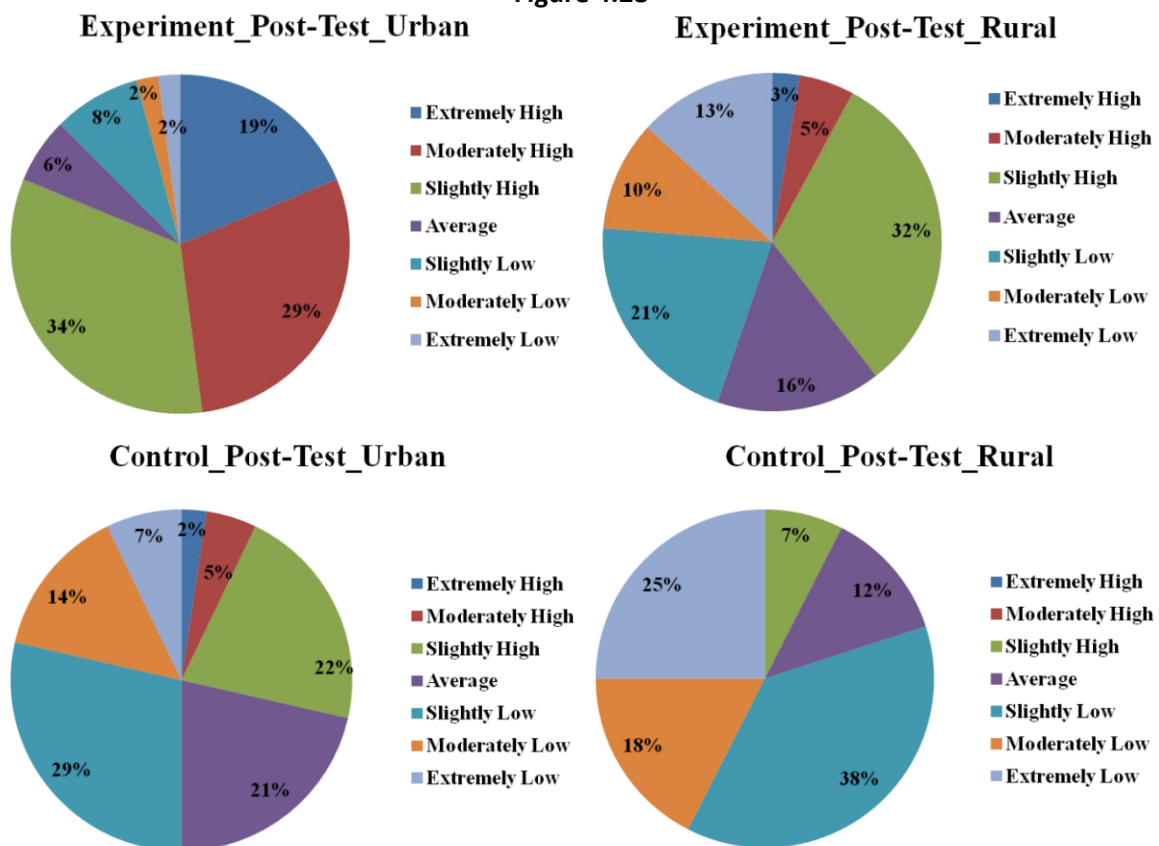
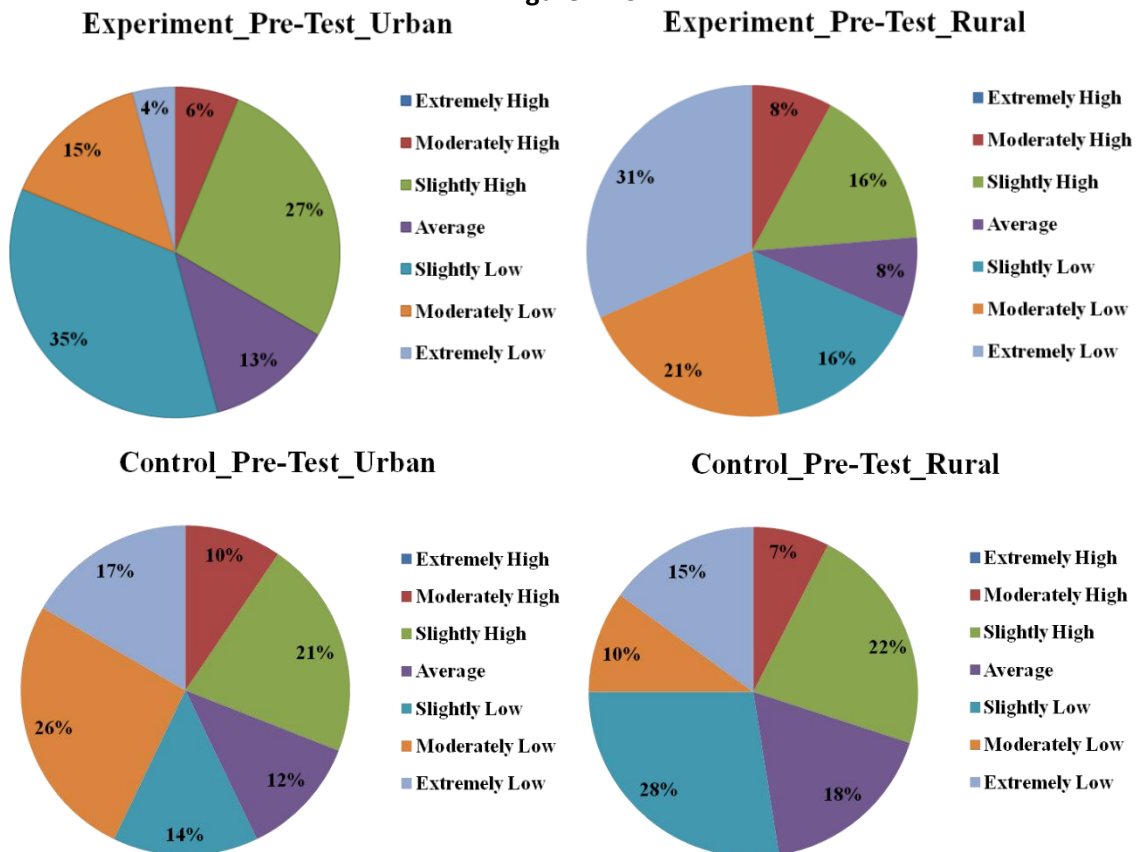


Table 4.28 and figure 4.28 reveal that in the post-test outcomes on creativity, the majority of urban school children of experimental group obtained slightly high score (34%) and most of the rural schoolchildren of experimental group also obtained slightly high scores (32%). Then again, majority of the urban control group students obtained slightly low score (29%) while the majority of the rural students of control group also obtained slightly low scores (38%). The above figures also indicate that no remarkable change was observed between the urban and rural students of the both the groups with regard to creativity development.

Group	Experiment						Control					
Locale	Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	0	0	0	0	0	0	0	0	0	0	0	0
Moderately High	3	6.25	6.25	3	7.89	7.89	4	9.52	9.52	3	7.5	7.5
Slightly High	13	27.08	33.33	6	15.79	23.68	9	21.43	30.95	9	22.5	30
Average	6	12.50	45.83	3	7.89	31.58	5	11.90	42.86	7	17.5	47.5
Slightly Low	17	35.42	81.25	6	15.79	47.37	6	14.29	57.14	11	27.5	75
Moderately Low	7	14.58	95.83	8	21.05	68.42	11	26.19	83.33	4	10	85
Extremely Low	2	4.17	100	12	31.58	100	7	16.67	100	6	15	100

Figure 4.29



From the above table 4.29 and charts of 4.29, it was found that in the pre-collaboration results of urban students between the experimental & the control groups showed similar trend regarding score distribution. Similar trend was also observed in the pre-collaboration results of the rural students. Within both the groups, locale wise slight difference in frequency percentage of pre-collaboration scores was observed.

Group		Experiment						Control					
Locale		Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High		6	12.5	12.5	4	10.53	10.53	0	0	0	0	0	0
Moderately High		10	20.83	33.33	3	7.89	18.42	4	9.52	9.52	2	5	5
Slightly High		21	43.75	77.08	14	36.84	55.26	10	23.81	33.33	10	25	30
Average		8	16.67	93.75	3	7.89	63.16	2	4.76	38.10	9	22.5	52.5
Slightly Low		2	4.17	97.92	11	28.95	92.11	9	21.43	59.52	9	22.5	75
Moderately Low		0	0.00	97.92	2	5.26	97.37	8	19.05	78.57	4	10	85
Extremely Low		1	2.08	100	1	2.63	100	9	21.43	100	6	15	100

Figure 4.30

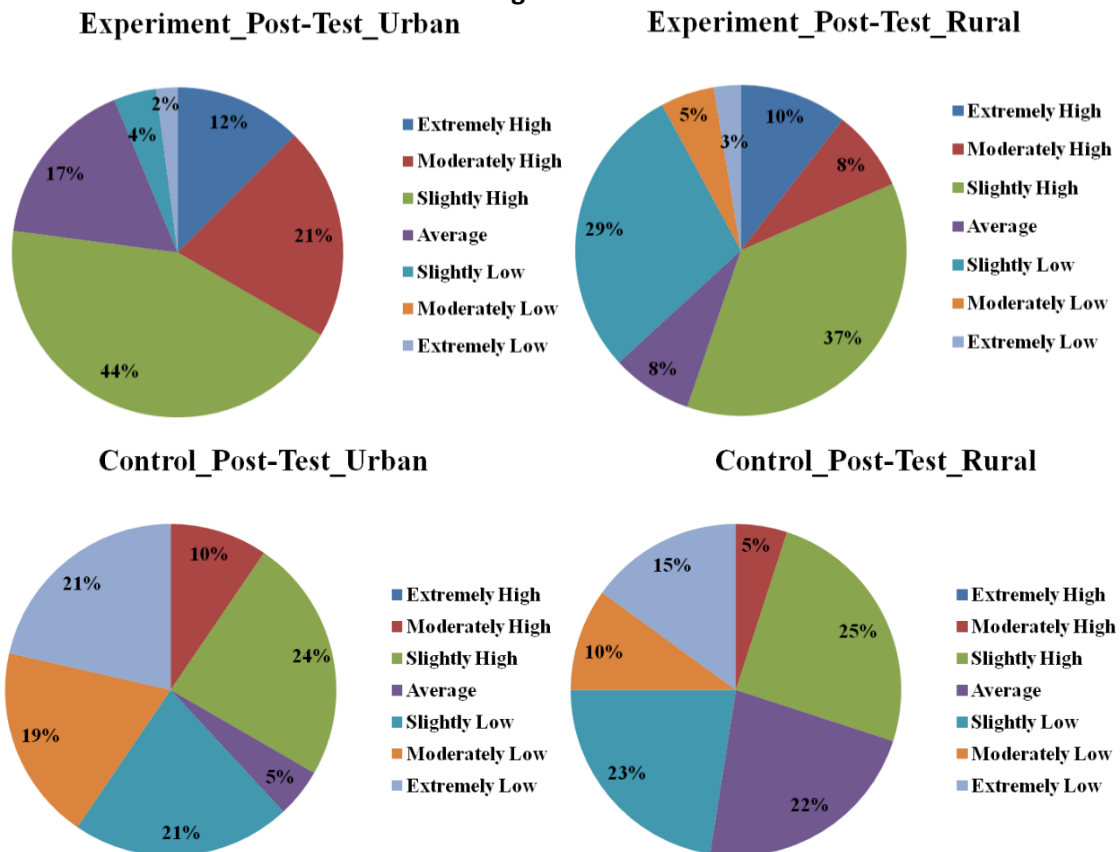
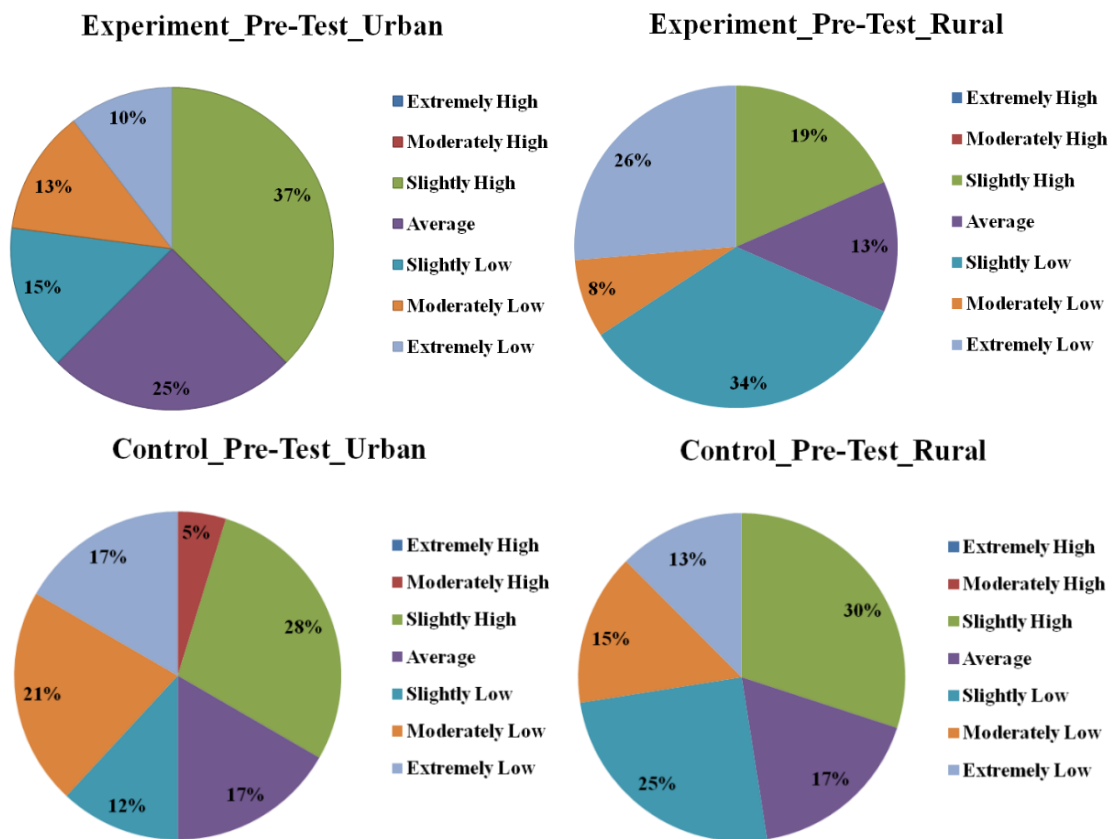


Table 4.30 and figure 4.30 reveal that in the post-test outcomes on collaboration, the majority of urban learners of experimental group obtained slightly high score (44%) and large number of the rural learners of experimental group also obtained slightly high scores (37%). Again, majority of the urban students of control group obtained slightly high score (24%) while the majority of the rural students of control group also obtained slightly high scores (25%). The above figures also indicate that no remarkable change was observed between the urban and rural students of the both the groups as for collaboration development.

Group		Experiment						Control					
Levels	Locale	Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
		Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
	Extremely High		0	0	0	0	0	0	0	0	0	0	0
Moderately High		0	0	0	0	0	0	2	4.76	4.76	0	0	0
Slightly High		18	37.50	37.50	7	18.42	18.42	12	28.57	33.33	12	30	30
Average		12	25	62.50	5	13.16	31.58	7	16.67	50.00	7	17.5	47.5
Slightly Low		7	14.58	77.08	13	34.21	65.79	5	11.90	61.90	10	25	72.5
Moderately Low		6	12.50	89.58	3	7.89	73.68	9	21.43	83.33	6	15	87.5
Extremely Low		5	10.42	100	10	26.32	100	7	16.67	100	5	12.5	100

Figure 4.31



From the above table 4.31 and charts of figure 4.31, it was found that in the pre-communication results of urban students between the experimental & the control groups showed similar trend concerning score distribution. Similar trend was also observed in the pre-communication results of the rural students. Within both the groups, locale wise slight difference in frequency percentage of pre-communication scores was observed.

Group	Experiment						Control					
Locale	Urban (n=48)			Rural (n=38)			Urban (n=42)			Rural (n=40)		
Levels	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Extremely High	5	10.42	10.42	2	5.26	5.26	1	2.38	2.38	0	0	0
Moderately High	10	20.83	31.25	2	5.26	10.53	1	2.38	4.76	0	0	0
Slightly High	26	54.17	85.42	19	50.00	60.53	13	30.95	35.71	12	30	30
Average	2	4.17	89.58	5	13.16	73.68	8	19.05	54.76	6	15	45
Slightly Low	1	2.08	91.67	5	13.16	86.84	3	7.14	61.90	13	32.5	77.5
Moderately Low	4	8.33	100	3	7.89	94.74	8	19.05	80.95	4	10	87.5
Extremely Low	0	0.00	100	2	5.26	100	8	19.05	100	5	12.5	100

Figure 4.32

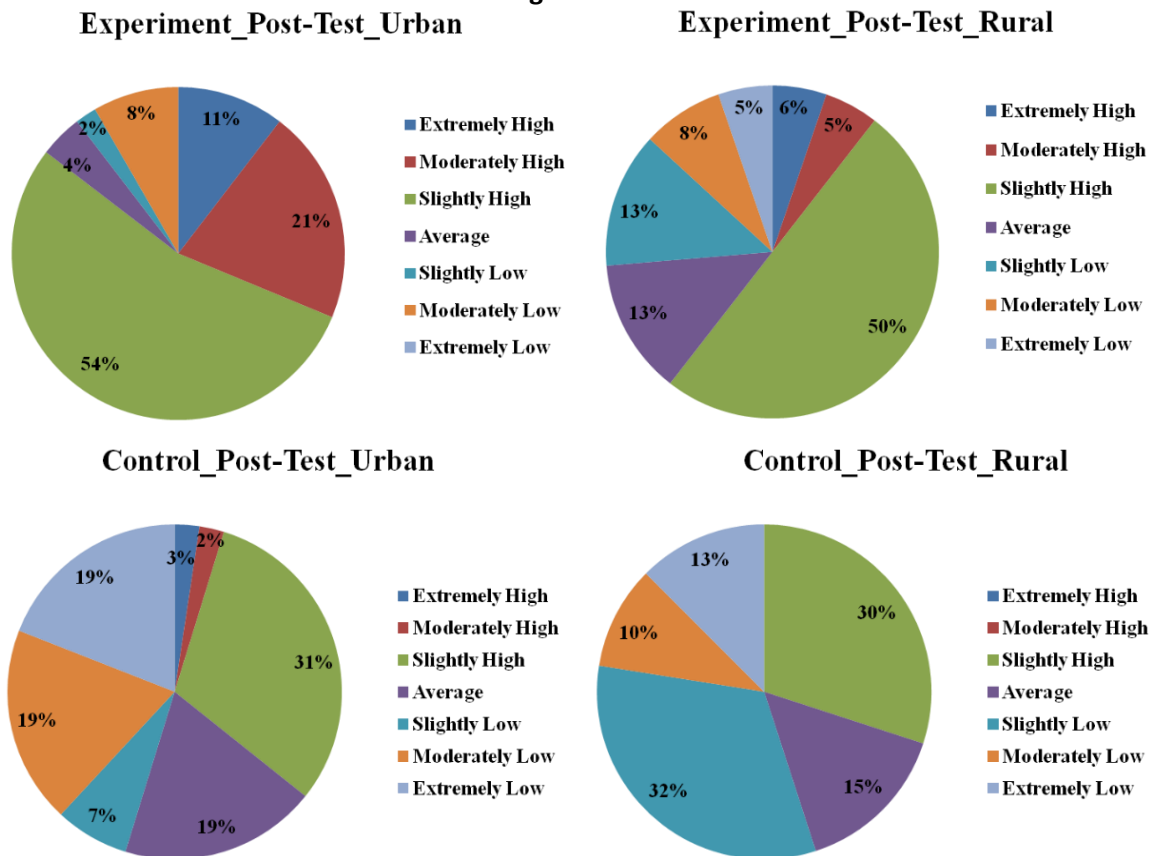


Table 4.32 and figure 4.32 reveal that in the post-test outcomes on communication, majority of the urban as well as the rural students of treatment group obtained slightly high scores (54 and 50%, respectively). Then again, majority of the urban control group students obtained slightly high scores (31%) whereas the rural students of control group obtained slightly low scores (32%). The above figures also indicate that no remarkable change was observed between the urban and rural students of both the groups in regard to communication development.

4.4.0 SECTION-II

(INFERENCE STATISTICAL RESULTS)

This second section is concerned with presenting the inferential statistical results. Inferential Statistics refers to the process of estimating a large population's measure from the known values of a sample selected from the population. Notably, inferential statistics utilises descriptive statistics as a base in order to develop conclusions or inferences from there. The second section involves the statistical inference based on parametric tests. The researcher applied different inferential statistics of parametric family such as analysis of variance (ANOVA) and analysis of co-variance (ANCOVA) in this study. These inferential statistical techniques were leveraged for testing the hypothesis. Hypothesis testing is essential in running inferential statistics for either rejecting or not rejecting the null hypothesis. If the p-value (probability value), is found to be below or equal to 0.05, then it supports the significance of difference existing between the average scores of groups, then consequently the null hypothesis gets rejected. On the other hand, if the p-value is found to be exceeding 0.05, then it is not in support of significance of difference, and so the null hypothesis does not get nullified. Noticeably, when the significance level is 0.05, then the corresponding confidence level is 95%, and when the significance level is 0.01, then the corresponding confidence level is 99%. In this investigation the researcher formulated null hypothesis for testing them at 0.05 level of significance.

4.4.1 EXPLORING THE UNDERLYING ASSUMPTIONS OF PARAMETRIC TESTS

Parametric analyses are based upon certain basic assumptions which relate to the population distribution from which the desired sample was chosen. It is very important to check whether those assumptions are satisfied or not before performing the parametric tests in order to avoid misleading results and thereby, to draw valid conclusion. However, the essential conditions for parametric statistical analysis are as follows-

1. Normality – The assumption of normality refers to mean that the data should be normally distributed which specifies that all data points should acquire a bell-shaped curve having no skewed data. There are some statistical Normality tests that can be used to check the normality assumption. Noticeably, p-value of this test needs to be more than 0.05 level to confirm the data to be normally distributed. Whereas, p-value below 0.05 indicates that the data are not normally distributed. Normality can be also checked visually with the help of histogram and Q-Q plot.

- Here the researcher used Normality test of Kolmogorov-Smirnova to be ensure about assumption of normality.

TABLE 4.33					
Tests of Normality: 4Cs					
Test Levels	Groups	Kolmogorov-Smirnov ^a			
		Statistic	df	Sig.	Remarks
Pre4Cs	Experimental	0.07	86	0.200 [*]	Normal
	Control	0.08	82	0.200 [*]	Normal
Post4Cs	Experimental	0.08	86	0.200 [*]	Normal
	Control	0.08	82	0.200 [*]	Normal

TABLE 4.34					
Tests of Normality: Critical Thinking					
Test Levels	Groups	Kolmogorov-Smirnov ^a			
		Statistic	df	Sig.	Remarks
PreTest	Experimental	0.08	86	0.200 [*]	Normal
	Control	0.06	82	0.200 [*]	Normal
PostTest	Experimental	0.06	86	0.200 [*]	Normal
	Control	0.08	82	0.200 [*]	Normal

TABLE 4.35					
Tests of Normality: Creativity Skill					
Test Levels	Groups	Kolmogorov-Smirnov ^a			
		Statistic	df	Sig.	Remarks
PreTest	Experimental	0.09	86	0.077	Normal
	Control	0.09	82	0.070	Normal
PostTest	Experimental	0.08	86	0.200 [*]	Normal
	Control	0.09	82	0.200 [*]	Normal

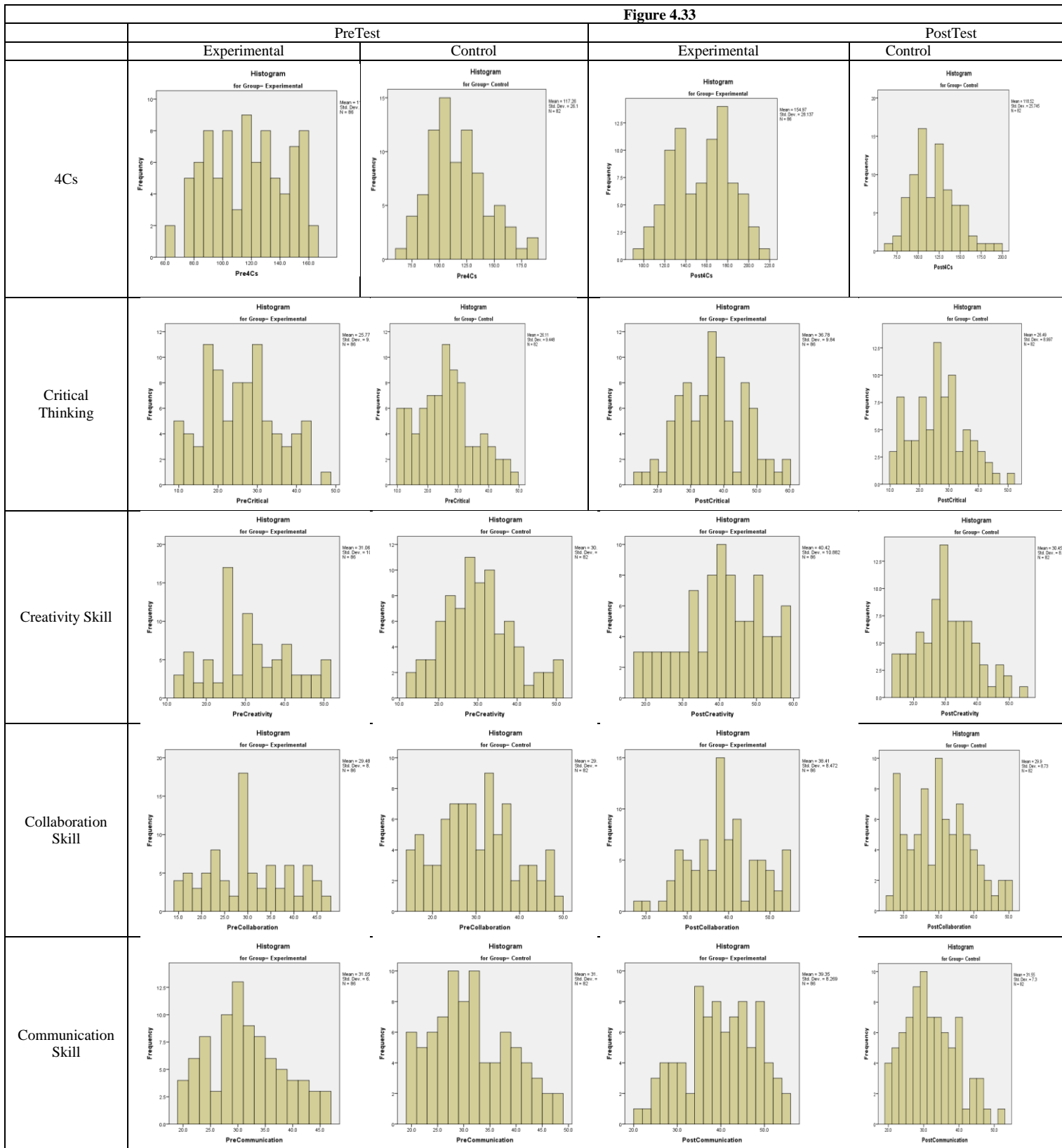
TABLE 4.36					
Tests of Normality: Collaboration Skill					
Test Levels	Groups	Kolmogorov-Smirnov ^a			
		Statistic	df	Sig.	Remarks
PreTest	Experimental	0.09	86	0.072	Normal
	Control	0.07	82	0.200*	Normal
PostTest	Experimental	0.07	86	0.200*	Normal
	Control	0.08	82	0.200*	Normal

TABLE 4.37					
Tests of Normality: Communication Skill					
Test Levels	Groups	Kolmogorov-Smirnov ^a			
		Statistic	df	Sig.	Remarks
PreTest	Experimental	0.10	86	0.052	Normal
	Control	0.10	82	0.068	Normal
PostTest	Experimental	0.08	86	0.200*	Normal
	Control	0.08	82	0.200*	Normal

It was evident from the above findings that all the significant values of pre-test & the post-tests were more than 0.05 (Vide Tables 4.33, 4.34, 4.35, 4.36 and 4.37). So, the data can be said to be normally distributed.

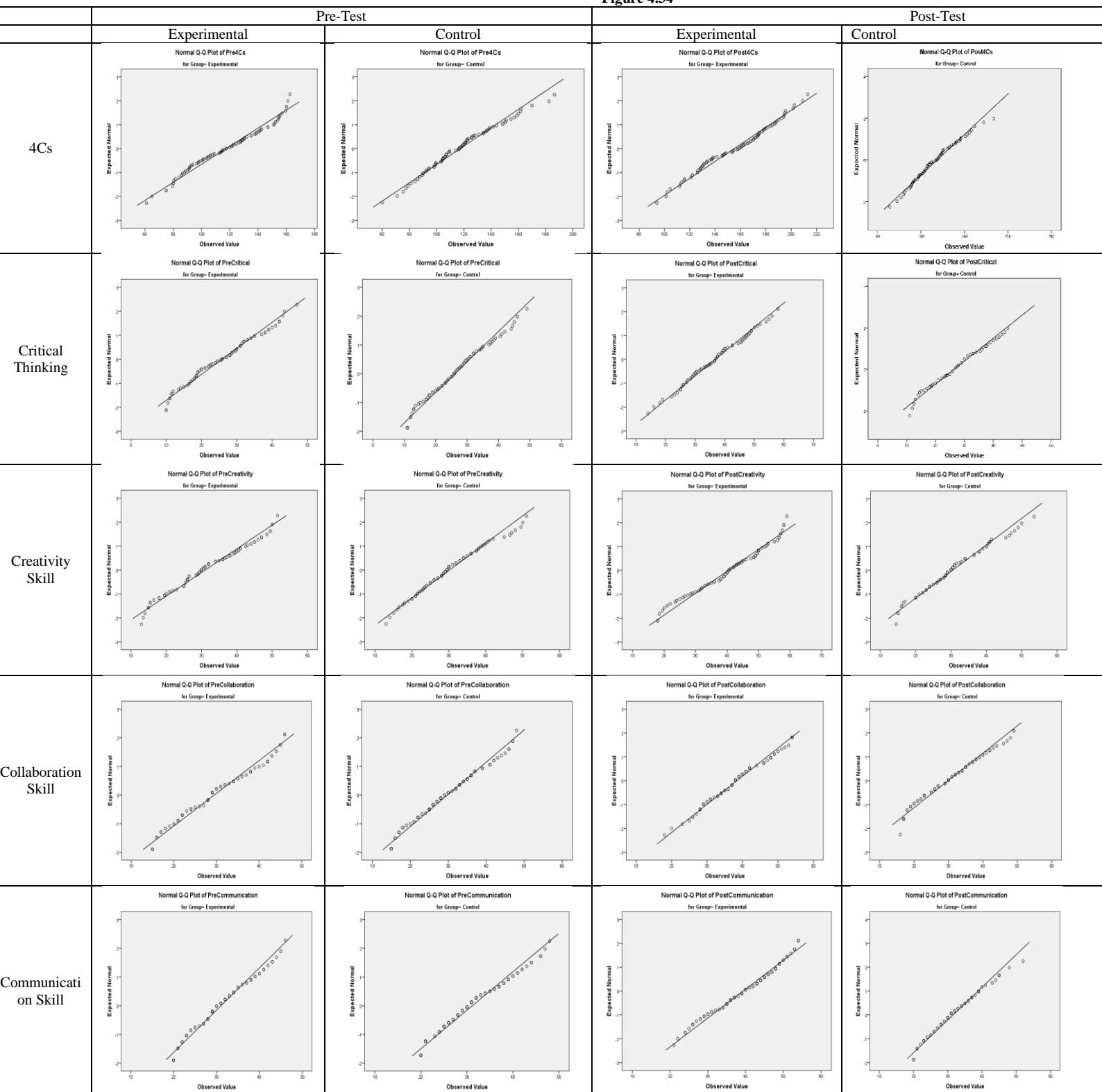
- The researcher used histogram to check the normality of the distribution. Histograms were plotted and it was found from those graphs that the distribution approximately took the shape of bell-shaped curve or at least it was symmetric (Vide Figure 4.33). Thereby, it can be assumed that data were likely to be normally distributed. The histograms are displayed below-

Figure 4.33



- The researcher also utilised Q-Q plot to visually verify the normality of the distribution.

Figure 4.34



It was observed here that the datapoints formed a trend in straight line, thereby it can be concluded that the dataset almost followed the normal distribution.

2. Homoscedasticity of variance – This assumption refers to mean homogeneity of variance. In simple terms, it demands that the data of each group must have roughly equal variance. Levene’s Test is very useful statistical test to assess homogeneity of Variances. If the p-value of Levene’s test is >0.05 , then the variances are not significantly different from each other, thereby it meets homogeneity assumption.

- The researcher performed Levene’s Test for the assessment of homogeneity of variance.

Table 4.38				
Test of Homogeneity of variance for overall TFCLS in English subject				
	Levene Statistic	df1	df2	Sig.
Pre-Test	0.66	1	166	0.42
Post-Test	2.30	1	166	0.13

Table 4.39				
Test of Homogeneity of variance for Critical Thinking skill in English subject				
	Levene Statistic	df1	df2	Sig.
Pre-Test	0.03	1	166	0.87
Post-Test	2.34	1	166	0.13

Table 4.40				
Test of Homogeneity of variance for Creativity skill in English subject				
	Levene Statistic	df1	df2	Sig.
Pre-Test	2.34	1	166	0.13
Post-Test	0.07	1	166	0.79

Table 4.41				
Test of Homogeneity of variance for Collaboration skill in English subject				
	Levene Statistic	df1	df2	Sig.
Pre-Test	0.07	1	166	0.79
Post-Test	0.86	1	166	0.35

Table 4.42				
Test of Homogeneity of variance for Communication skill in English subject				
	Levene Statistic	df1	df2	Sig.
Pre-Test	0.86	1	166	0.35
Post-Test	0.73	1	166	0.40

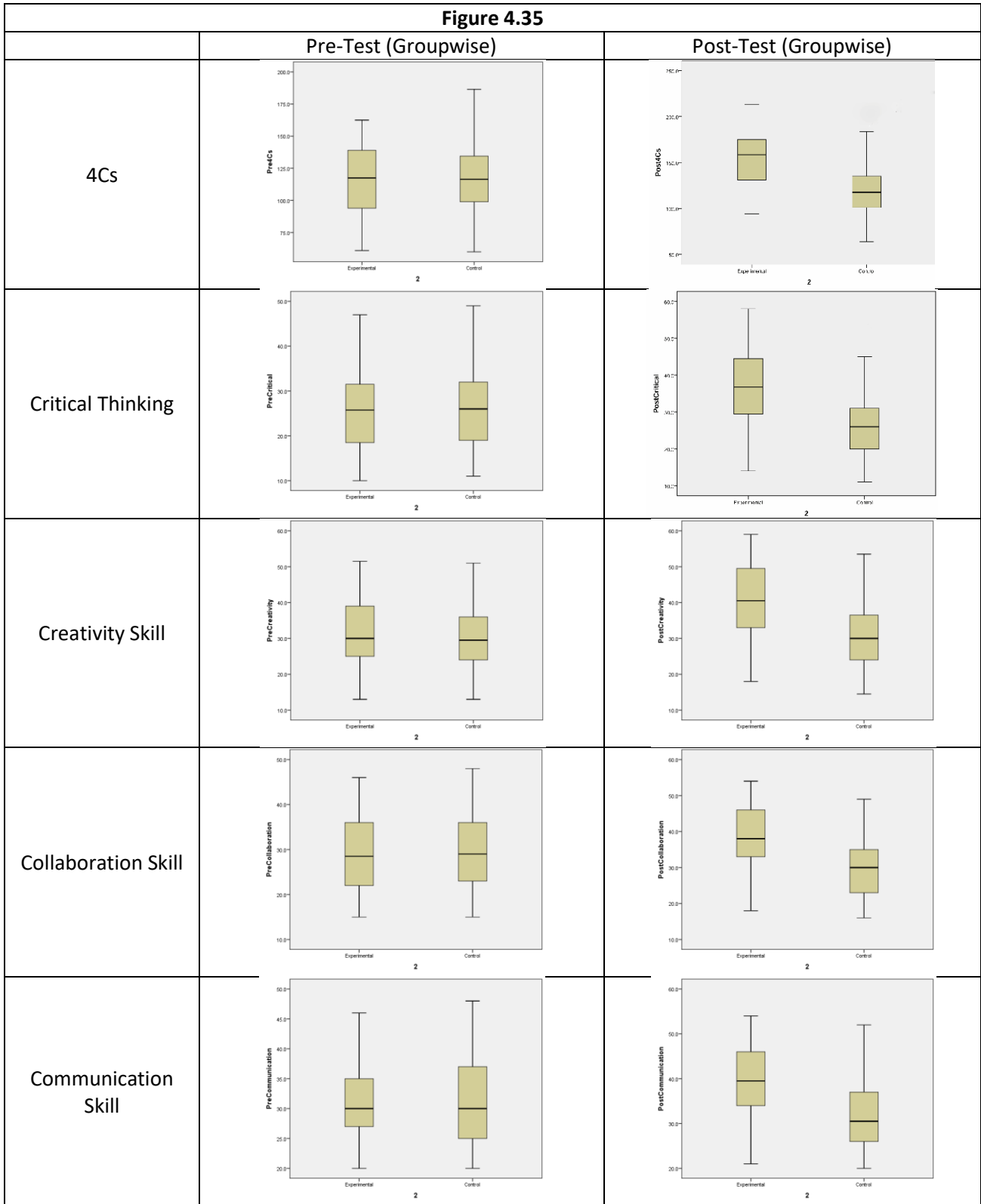
From the above tables (4.38, 4.39, 4.40, 4.41 and 4.42) it was evident that all the p-values of the Levene's Tests were above 0.05. So, it can be said that the assumption of equal variance was satisfied.

3. Interval/ Ratio Scaled Data: According to this assumption, the data should be either on interval scale or ratio scale. Noticeably, interval data always are expressed in numerical values where the distance between the two points is standardized, having no fixed zero and where the differences can be measured. Here the researcher used test scores of learners for academic assessment. She collected quantitative data on Twenty first century learning skills as dependent variable of the study. So, the data point values were for numerical/ continuous variables to be measured.

4. No Significant Outliers – The data set should not have extreme outliers. Outliers implies extreme values that can affect the overall data results in unfavourable way. Boxplots can be constructed in order to confirm whether the assumption regarding the absence of outliers is met.

- The researcher had already built the boxplots which are presented below.

Figure 4.35



It was evident from the graphical presentations of the boxplots that there were no outliers found in both the extremes of the dataset. Rather the boxplots revealed that the overall distribution patterns were devoid of any such extreme value.

4.4.2 Exploring the additional assumptions for ANCOVA

Along with the aforementioned assumptions, ANCOVA has some more underlying assumptions to be assessed. They are as follows-

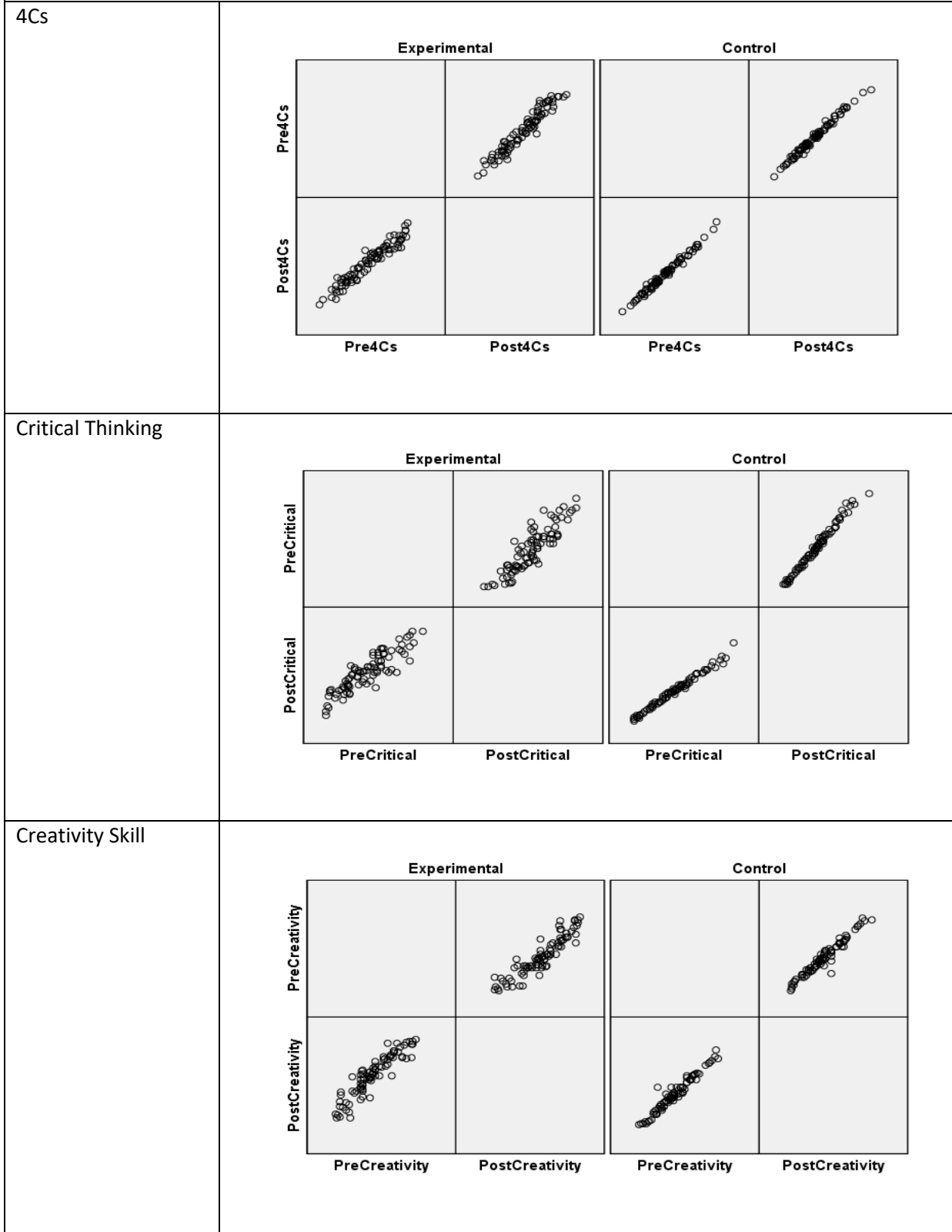
1) Independent variables (categorical variables) for One Way ANCOVA should be minimum one but having two or more than two levels), whereas for Two Way ANCOVA, there should be at least two independent variables, each of them having two or more than two levels. In this research, the method of teaching was one independent variable having two levels, namely, CAM and TLM for performing one-way ANCOVA. While Gender and Locale of Schools two categorical variables were employed as independent variables each of them having two levels (Male/Female, Urban/Rural) while dealing with two-way ANCOVA.

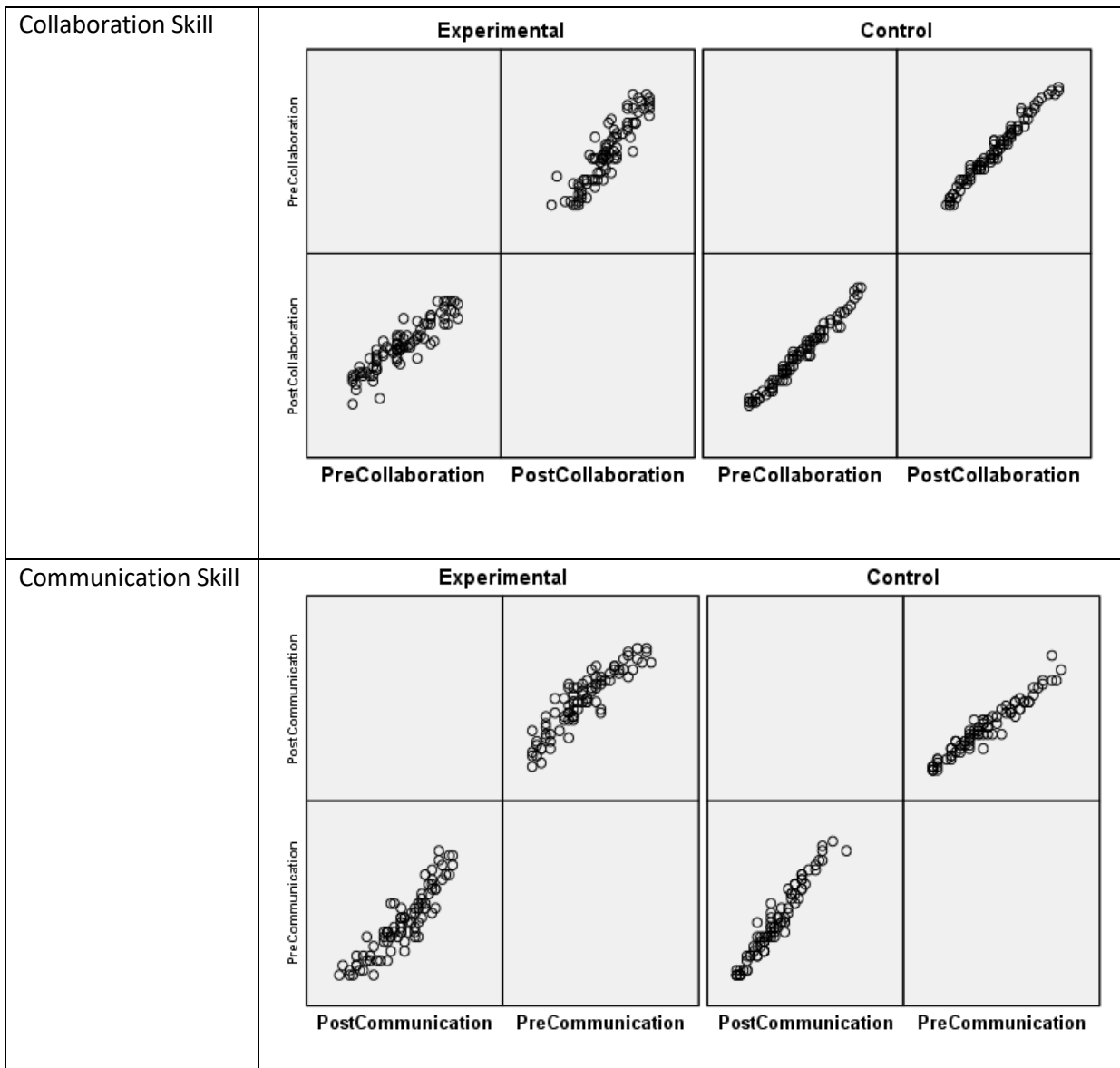
2) There should be at least one covariate which needs to be measured in interval or ratio scale. In this study, All the pre-tests were used as the covariates for computing ANCOVA value. The pre-test scores were interval scaled continuous data. So, this primary assumption was fulfilled.

3) Linearity assumption according to which there should exist a linear relation between the dependent variable & the covariate. Matrix Scatters use a grid of scatter plots to determine whether there are any linear correlations existing between the dependent variables & the covariates. The trends of scatterplot depicting linear relationships should be parallel.

Figure 4.36

SCATTER MATRIX FOR TESTING LINEARITY ASSUMPTION





In this study the post-tests were treated as dependent variables whereas the respective pre-tests were taken as their covariates. In all these scatter plot matrices the dependent variables and the covariates were found to be linearly related for both the treatment groups.

4) Homogeneity of regression slopes assumption according to which there should exist no interaction between the independent variable & the covariate. Simple Scatterplots are created to visually assess the homogeneity of regression slopes. It is the graphical illustration of the y data scores against the x data scores for both the methods. If the regression lines are found to be parallel or their slopes are found to be quite similar, then it signifies that the homogeneity of slopes assumption is satisfied. Eventually, it can be also concluded that covariates were independent of the treatment effects.

Figure 4.37

4Cs

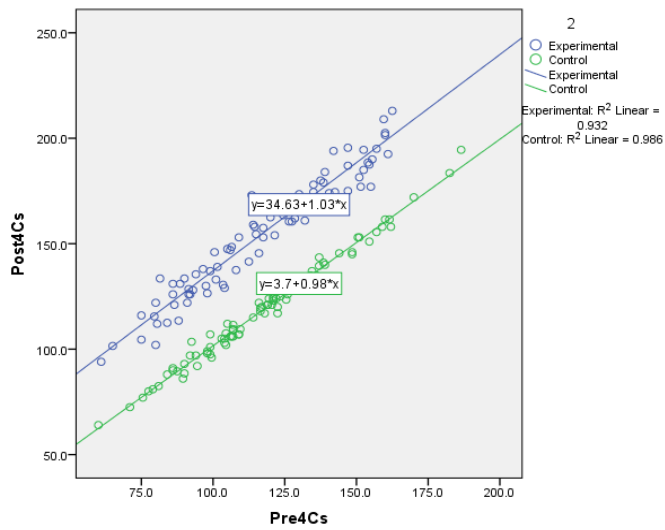


Figure 4.38

Critical Thinking

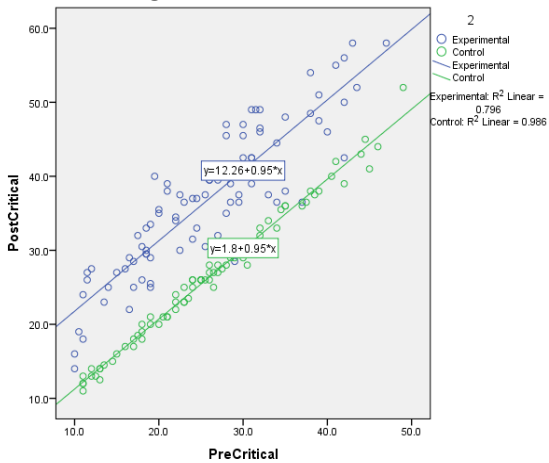


Figure 4.39

Creativity Skill

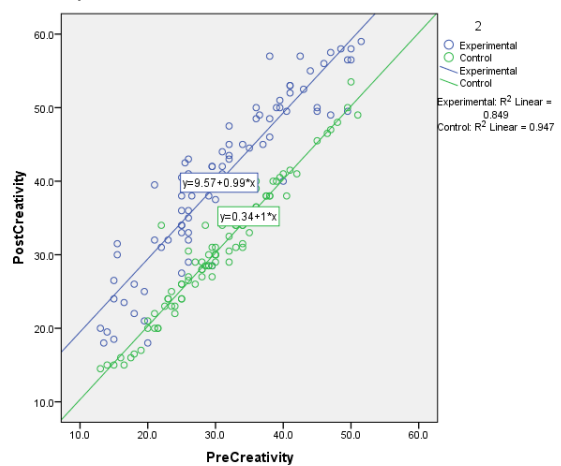


Figure 4.40

Collaboration Skill

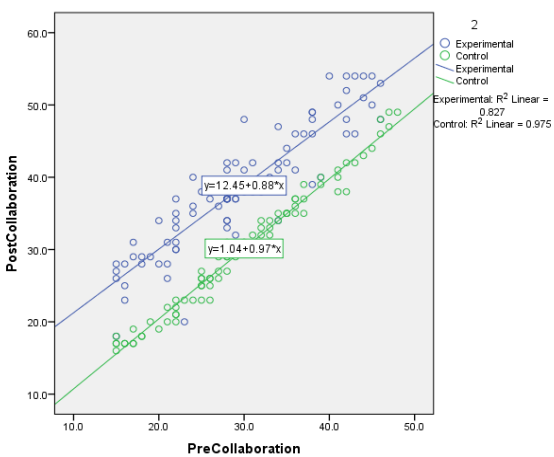
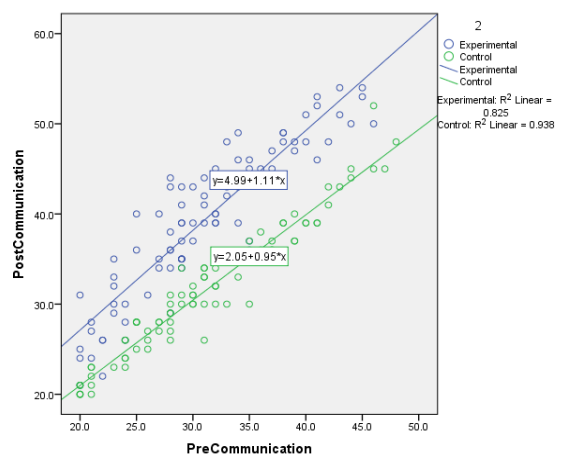


Figure 4.41

Communication Skill



The regression slopes in the two groups in each plot were found to be similar or nearly parallel. Thereby, it can be said that all these diagrams are instances of homogeneity of regression slopes.

Thus, prior to conducting the parametric analysis, the researcher carefully tested all these fundamental assumptions of parametric tests for the entire dataset. And only after finding out that all these assumptions of parametric tests concerning the collected data had not been violated, the researcher proceeded further to run the parametric tests.

4.5.0 TESTING THE HYPOTHESES OF THE STUDY

The results, derived from data analysis and interpretation, have been presented objective wise in different captions.

4.5.1 STUDY OF THE EFFECT OF CAM OVER TLM ON THE ENHANCEMENT OF OVERALL TWENTY FIRST CENTURY LEARNING SKILLS IN ENGLISH SUBJECT WITH REGARD TO THE PRE-TEST & POST-TEST RESULTS.

This first objective was meant to compare mean scores of overall Twenty first century learning skills in English subject of the experimental group & the control group at the pre-test and post-test level. Research data were analysed through One Way ANOVA for testing the first hypothesis affirming that there did not exist any significant difference between the mean scores of overall Twenty first century learning skills developed through CAM & the mean scores of overall Twenty first century learning skills inculcated through TLM in English subject pertaining to pre-test & post-test results. The outputs of SPSS for ANOVA are laid out in the succeeding tables-

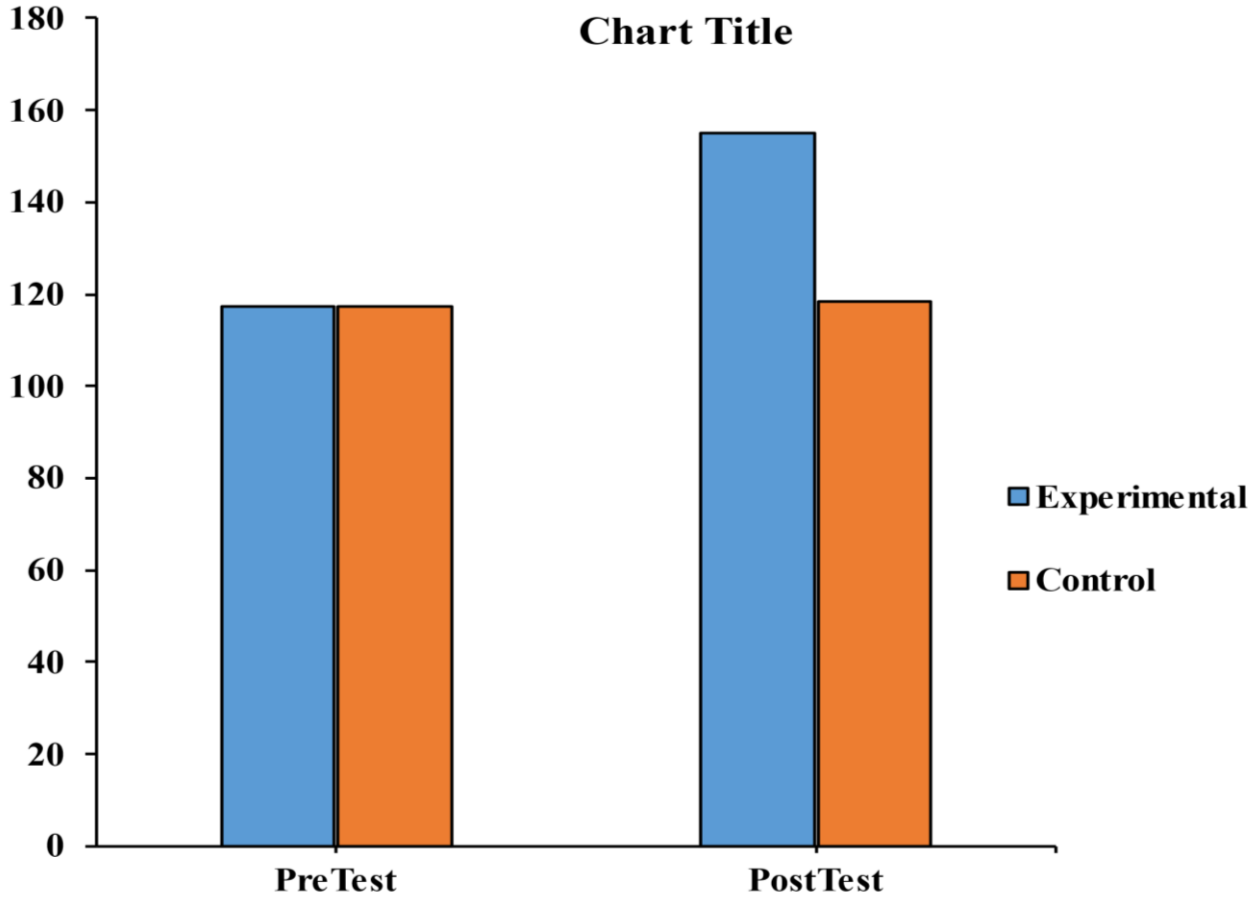
	Group	N	Mean	SD
Pre-Test	Experimental	86	117.349	26.4935
	Control	82	117.262	26.0997
	Total	168	117.307	26.2232
Post-Test	Experimental	86	154.965	28.1365
	Control	82	118.524	25.7446
	Total	168	137.179	32.5299

SD= Standard Deviation

N=Total number of observations

TFCLS=Twenty First Century Learning Skills

FIGURE 4.42



Bar graph representing the comparison between the mean level performances of control group & experimental group indicating the enhancement of overall Twenty first century learning skills in English subject

TABLE- 4.44

Table depicting the effect of CAM over TLM on the enhancement of overall TFCLS in English subject respecting the pre-test & post-test result distinctly

Summary of One-way ANOVA of TFCLS in English Subject: Computation of 'F' value

	Source of variation	SS	df	MS	F	Sig.	Remark
Pre-Test	Between Groups	0.32	1	0.32	0.00	0.99	#
	Within Groups (Error)	114838.65	166	691.80			
	Total	114838.96	167				
Post-Test	Between Groups	55741.30	1	55741.30	76.49	0.00	**
	Within Groups (Error)	120976.85	166	728.78			
	Total	176718.14	167				

* = Significant at 0.05 level

** = Significant at both 0.05 level and 0.01 level

= Not Significant at both 0.05

SS= Sum of Squares

MS=Mean Square

df= Degree of Freedom

N=Number of Observations

F= Result of Analysis of Variance

Sig.= Significance Level (p)

Interpretation of the ANOVA Results:

Summarization of the results is drawn from the aforementioned tables in order to interpret the analysed data. The table 4.44 demonstrates the effect of Constructivist Approach Based Module (CAM) over Traditional Lecture Method (TLM) on the enhancement of overall Twenty first century learning abilities in English subject with reference to the pre-test & post-test results. It focuses on computation of 'F' value for depicting the effect of CAM over TLM on the enhancement of overall Twenty first century learning skills in English subject concerning the pre-test & post-test outcomes distinctly. Analysis of the pre-test scores of both the groups, as shown in the table 4.44, asserted that there existed no significant difference between the pre-test score of the control group & the pre-test score of the experimental group. The attained F- ratio between the pre-test results of control group & the pre-test results of the experimental group was 0.00 which was not significant. In this case the null hypothesis was not rejected. Thereby, it can be determined that no significant difference existed between the mean score (117.262) of overall Twenty first century learning skills of the control group & mean score (117.349) of overall Twenty

first century learning skills of the experimental group at the initial stage of treatment. Analysis of the post-test outcomes of both the groups, as shown in table 4.44, asserted the existence of significant difference between the post-test score of the control group & the post-test score of the experimental group. The obtained F- ratio between the post-test outcomes of control group & the post-test outcomes of the experimental group was 76.49 which was significant at both 0.05 and 0.01 level with $df= 1/166$. In this case the null hypothesis which proclaimed that there was no significant difference between the mean scores of overall Twenty first century learning skills developed through CAM & the mean scores of overall Twenty first century learning skills developed through TLM in English subject with regard to pre-test and post-test scores was rejected. Hence it can be declared that significant difference was observed between the mean score of overall Twenty first century learning skills of the control group & mean score of overall Twenty first century learning skills of the experimental group at the final stage of treatment. Further, the mean value of overall Twenty first century learning skills of the experimental group at post-test level was 154.965 which was significantly superior to that of the control group whose mean score of overall Twenty first century learning skills was 118.524 (Vide Table 4.43). Therefore, it may be inferred that students who were taught through CAM were found to be successful for enhancing Twenty first century learning skills in English subject when compared to the students who were taught through TLM.

To summarise briefly it can be said that table 4.44 showed that at pre testing level, no significant difference was found between the mean scores of overall Twenty first century learning skills in English subject of both the groups- experimental and the control whereas at the stage of post testing, significant difference was found between the mean scores of overall Twenty first century learning skills in English subject of both the groups- experimental and the control. Here the researcher had to keep in mind that in this quasi-experimental design it was impracticable for the researcher to allocate the groups randomly. So, the experimental group & the control group were not equated prior to the intervention. In such condition, the differences found at the end of the experiment cannot be considered as valid enough to draw the inference. Thereby it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group occurred only because of the treatment effect even though it was found using ANOVA that there was significant difference between control group results & experimental group results at the post-test level while there was no significant difference between control group results & experimental group results at the pre-test level. To overcome this limitation, the researcher needed to employ analysis of covariance (ANCOVA) which allowed her

to statistically equate the treatment groups. Hence the researcher used pre-test scores as the covariate in order to control the pre-existing differences upon dependable variable at the initial stage of the experiment. Thus, through this analysis of covariance technique, the post- test results were covariated with the pre-test results so that valid inference concerning the treatment effect can be drawn.

The outputs of SPSS for ANCOVA are given in the subsequent tables-

TABLE-4.45				
Table showing the adjusted mean score of 4Cs (TFCLS)				
Dependent Variable: Post4Cs				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	154.92 ^a	0.62	153.70	156.14
Control	118.57 ^a	0.63	117.32	119.82

a. Covariate Pre-4Cs is estimated at 117.31 value

TABLE-4.46						
Table depicting the effect of CAM over TLM on the enhancement of overall Twenty first century learning skills in English subject by taking pre-test score as co-variate.						
Summary of One-way ANCOVA of overall TFCLS: Computation of Fy.x value						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Between Groups	1	55475.54	55475.54	1697.37	0.00	**
Within Groups (Error)	165	5392.74	32.68			
Total	168					

SSy.x= Adjusted sum of squares

MSy.x= Adjusted mean squares

Fy.x= Result of Analysis of covariance

Interpretation of the ANCOVA Results:

Table 4.46 concentrates upon analysis of the data with the help of ANCOVA to show the effect of CAM over TLM on the enhancement of overall Twenty first century learning skills in English subject pertaining to covariation of the pre-test scores with post-test results. ANCOVA summary aims at presenting the comparison between the adjusted mean scores of overall Twenty first century learning skills in English subject of both the groups (experimental vs. control) at their post-test level after their adjustment with the pre-test scores of overall Twenty first century learning skills in English subject. Form the table 4.46 it was evident that after adjusting or correlating the post-test results with the pre-test scores, the adjusted F-value ($F_{y,x}$) was found to be 1697.37 which was significant at both 0.05 and 0.01 level with $df = 1/165$. It indicated that the adjusted average scores of overall Twenty first century learning skills in English subject of learners of the control & experimental groups differed significantly when their pre-test was considered as covariate. So, the null hypothesis which stated that there was no significant difference between the adjusted mean values of overall Twenty first century learning skills developed through CAM & the adjusted mean scores of overall Twenty first century learning skills developed through TLM in English subject by considering their pre- twenty first century learning skills test as covariate was rejected. Further, the adjusted mean score of overall Twenty first century learning skills developed through CAM was found to be 154.92 which was significantly greater than those of TLM group learners whose adjusted average score of overall Twenty first century learning skills was 118.57(Vide Table 4.45). Therefore, it can be inferred that enhancement of overall Twenty first century learning skills of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-Twenty first century learning skills. Finally, the researched arrived at the conclusion that CAM was highly effective over the TLM in facilitating the augmentation of overall Twenty first century learning skills in English subject among the learners at secondary school level.

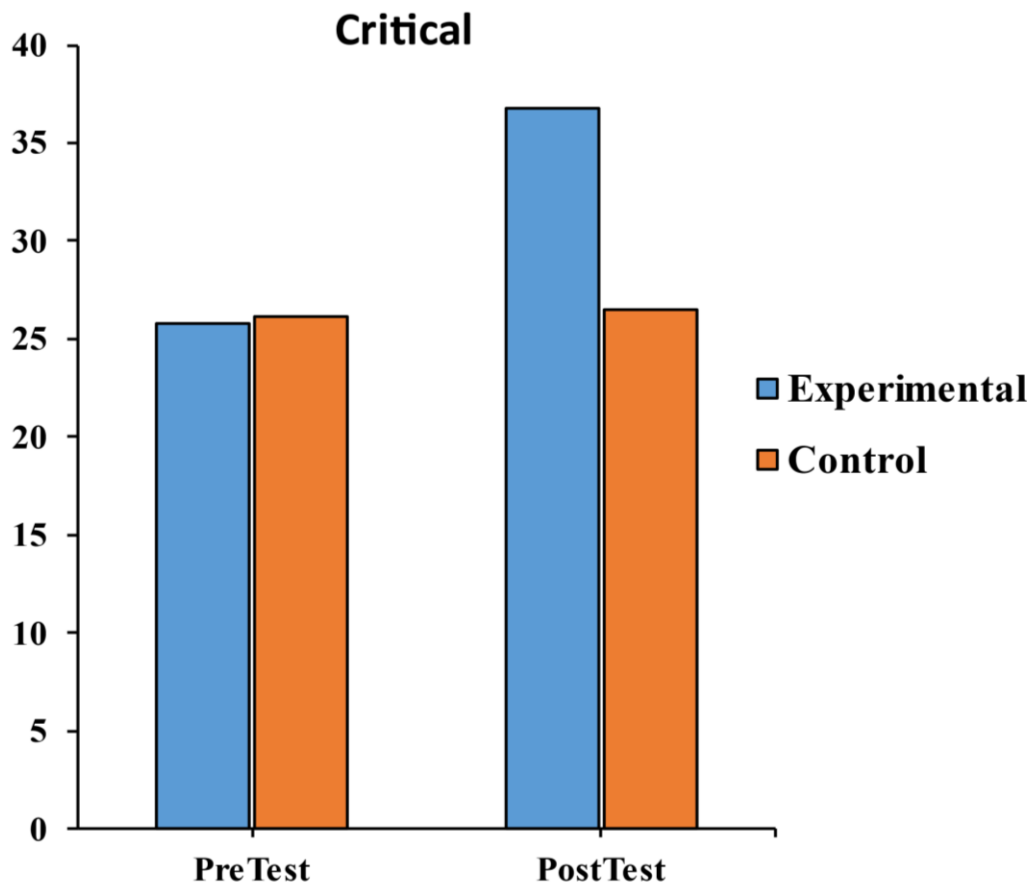
4.5. 2. STUDY OF THE EFFECT OF CAM OVER TLM ON THE ENHANCEMENT OF COMPONENT WISE TWENTY FIRST LEARNING SKILLS IN ENGLISH SUBJECT WITH REGARD TO THE PRE-TEST AND POST-TEST SCORES

The next objective of this research was meant to compare mean scores of component wise Twenty first century learning skills in English subject of the experimental & the control groups at the pre-test & post-test level. Research data were analysed via One Way ANOVA for testing the first hypothesis averring that there was no significant difference between the mean scores of component wise Twenty first century learning skills developed through CAM & the mean scores of component wise Twenty first century learning skills advanced through TLM in English subject pertaining to pre-test and post-test outcomes. The outputs of SPSS for ANOVA are presented in the following tables dealing with the component skills individually.

a) Study of the effect of CAM over TLM on the enhancement of critical thinking skill in English subject in regard to the pre-test and post-test outcomes

TABLE-4.47				
Table revealing the Descriptive statistics for Critical Thinking skill in English subject				
	Group	N	Mean	SD
Pre-Test	Experimental	86	25.77	9.22
	Control	82	26.11	9.45
	Total	168	25.93	9.31
Post-Test	Experimental	86	36.78	9.84
	Control	82	26.49	9.00
	Total	168	31.76	10.73

FIGURE 4.43



Bar graph representing the comparison between the mean level performances of control group & experimental group indicating the enhancement of critical thinking skill in English subject

TABLE-4.48

Table depicting the effect of CAM over TLM on the enhancement of Critical Thinking Skill in English subject pertaining to Pre-Test & Post-Test result distinctly

Summary of One-way ANOVA of critical thinking in English subject

	Source of variation	SS	df	MS	F	Sig.	Remarks
Pre-Test	Between Groups	4.92	1	4.92	0.06	0.81	#
	Within Groups (Error)	14458.86	166	87.10			
	Total	14463.78	167				
Post-Test	Between Groups	4450.73	1	4450.73	49.97	0.00	**
	Within Groups (Error)	14786.26	166	89.07			
	Total	19236.99	167				

Interpretation of the ANOVA Results:

Summarization of the results is drawn from the aforementioned tables in order to interpret the analysed data. The table 4.48 demonstrates the effect of Constructivist Approach Based Module (CAM) over Traditional Lecture Method (TLM) on the enhancement of Critical Thinking skill in English subject pertaining to the pre-test and post-test results. It focuses on computation of 'F' value for depicting the effect of CAM over TLM on the enhancement of Critical Thinking skill in English subject with regard to the pre-test & post-test outcomes distinctly. Analysis of the pre-test outcomes of both the groups, as shown in the table 4.48, asserted that there existed no significant difference between the pre-test score of the control group & the pre-test score of the experimental group. The attained F- ratio between the pre-test results of control group & the pre-test results of the experimental group was 0.06 which was not significant. In this case the null hypothesis was not rejected. Thereby, it can be resolved that no significant difference existed between the mean score 26.11 of critical thinking skill of the control group and mean score 25.77 of critical thinking skill of the experimental group at the initial stage of treatment. The analysis of the post-test results of both the groups as shown in the table 4.48 asserted the observance of significant difference between the post-test score of the control group & the post-test score of the experimental group. The obtained F- ratio between the post-test scores of control group & that of the experimental group was 49.97 which was significant at both 0.05 and 0.01 level with $df=1/166$. In this case the null hypothesis which stated that there was no significant difference between the mean scores of critical thinking skill developed through CAM & the mean scores of critical thinking skill developed through TLM in English subject regarding pre-test and post-test results was rejected. Hence it can be declared that significant difference was observed between the mean score of critical thinking skill of the control group and mean score of critical thinking skill of the experimental group at the final stage of treatment. Further, the mean score of critical thinking skill of the experimental group at post-test level was 36.78 which was significantly superior to that of the control group whose mean score of critical thinking skill was 26.49 (Vide Table 4.47). Therefore, it may be inferred that students who were taught through CAM were found to be successful for enhancing critical thinking skill in English subject when compared to the students who were taught through TLM.

The researcher had to keep in mind that in this quasi-experimental design it was impracticable for the researcher to allot the groups randomly. So, the experimental group & the control group were not equated prior to the intervention. Thereby it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group

occurred only because of the treatment effect even though it was found using ANOVA that there was significant difference between control group results & experimental group results at the post-test level while there was no significant difference between control group results & experimental group results at the pre-test level. To overcome this limitation, the researcher needed to employ analysis of covariance (ANCOVA) which allowed her to statistically equate the treatment groups. Hence the researcher used pre-test scores as the covariate for controlling the pre-existing differences upon dependable variable at the initial stage of the experiment, so that valid inference concerning the treatment effect can be drawn.

The outputs of SPSS for ANCOVA are given in the subsequent tables-

TABLE:4.49				
Table showing the adjusted mean score of Critical Thinking				
Dependent Variable: Post Critical Thinking				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	36.94 ^a	0.35	36.25	37.64
Control	26.32 ^a	0.36	25.61	27.04

a. Covariate Pre- Critical Thinking is estimated at 25.94 value

TABLE:4.50						
Table depicting the effect of CAM over TLM on the enhancement of Critical Thinking skill in English subject by taking Pre-Test scores as Co-Variate.						
Summary of One-way ANCOVA Results of critical thinking skill						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Between Groups	1	4734.24	4734.24	439.65	0.00	**
Within Groups (Error)	165	1776.74	10.77			
Total	168					

Interpretation of the ANCOVA Results:

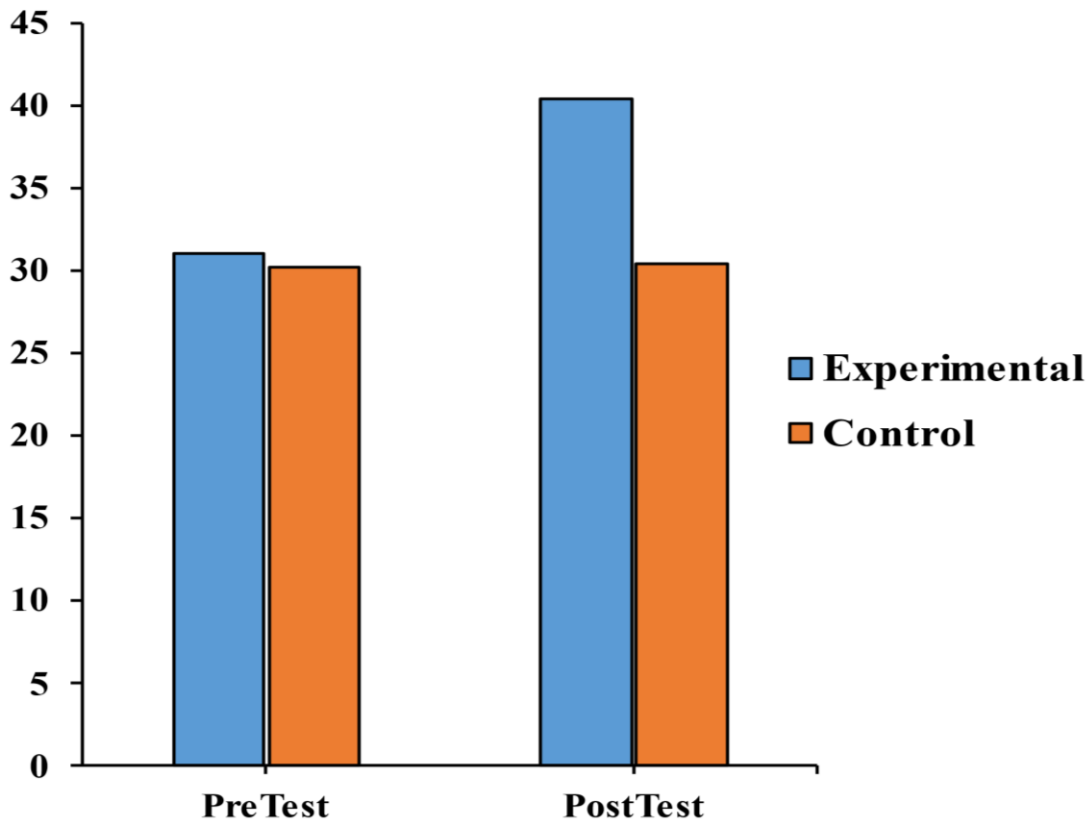
Table 4.50 concentrates upon analysis of the data with the help of ANCOVA to show the effect of CAM over TLM on the enhancement of critical thinking skill in English subject pertaining to covariation of the pre-test scores with post-test results. ANCOVA summary aims at presenting the comparison between the adjusted mean scores of critical thinking skill in English subject of both the groups at their post-test level after their adjustment with the pre-test results of critical thinking skill in English subject. From table 4.50 it was evident that after adjusting or correlating the post-test results with the pre-test scores, the adjusted F-value ($F_{y,x}$) was found to be 439.65 which was significant at both 0.05 and 0.01 level with $df = 1/165$. It indicates that the adjusted mean scores of critical thinking skill in English subject of students of the control & experimental groups differed significantly when the pre-test was utilized as covariate. Thus, the null hypothesis which stated that there was no significant difference between the adjusted mean values of critical thinking skill developed through CAM and the adjusted mean values of critical thinking skill developed through TLM in English subject by considering their pre- critical thinking skill as covariate was not accepted. Further, the adjusted mean score of critical thinking skill developed through CAM was found to be 36.94 which was significantly superior to those of TLM students whose adjusted mean score of critical thinking skill was 26.32 (Vide Table 4.49). Therefore, it can be inferred that enhancement of critical thinking skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre- critical thinking skill. Finally, the researched arrived at the conclusion that CAM was highly effective over the TLM in facilitating the development of critical thinking skill in English subject among learners studying at secondary school level.

b) Study of the effect of CAM over TLM on the enhancement of creativity skill in English subject pertaining to the pre-test and post-test results

	Group	N	Mean	SD
Pre-Test	Experimental	86	31.06	10.09
	Control	82	30.19	8.75
	Total	168	30.63	9.44
Post-Test	Experimental	86	40.42	10.88
	Control	82	30.45	8.97
	Total	168	31.76	10.73

FIGURE 4.44

Creativity



Bar graph representing the comparison between the mean level performances of control group & experimental group indicating the enhancement of creativity skill in English subject

TABLE 4.52

Table depicting the effect of CAM over TLM on the enhancement of Creativity Skill in English subject in regard to Pre-Test and Post-Test result distinctly

Summary of One-way ANOVA of creativity skill							
	Source of variation	SS	df	MS	F	Sig.	Remarks
Pre-Test	Between Groups	31.71	1	31.71	0.35	0.55	#
	Within Groups (Error)	14861.53	166	89.53			
	Total	14893.24	167				
Post-Test	Between Groups	4175.15	1	4175.15	41.793	0.00	**
	Within Groups (Error)	16583.56	166	99.90			
	Total	20758.71	167				

Interpretation of the ANOVA Results:

Summarization of the results is drawn from the aforementioned tables in order to interpret the analysed data. The table 4.52 demonstrates the effect of Constructivist Approach Based Module (CAM) over Traditional Lecture Method (TLM) on the enhancement of creativity skill in English subject with reference to the pre-test and post-test results. It focuses on computation of 'F' value for depicting the effect of CAM over TLM on the enhancement of creativity skill in English subject with regard to the pre-test and post-test outcomes distinctly. Analysis of the pre-test outcomes of both the groups, as shown in the table 4.52, asserted no existence of any significant difference between the pre-test result of the control group & that of the experimental group. The attained F- ratio between the pre-test results of control group & the pre-test results of the experimental group was 0.35 which was not significant. In this case the null hypothesis was accepted. Thereby, it can be determined that no significant difference existed between the mean score 30.19 of creativity skill of the control group and mean score 31.06 of creativity skill of the experimental group at the initial stage of treatment. The analysis of the post-test outcomes of both the groups as shown in the table 4.52 asserted that there existed significant difference between the post-test score of the control group & the post-test score of the experimental group. The obtained F- ratio between the post-test outcomes of control group & the post-test outcomes of the experimental group was 41.793 which was significant at something level with $df= 1/166$. In this case the null hypothesis which specified the nonexistence of any significant difference between the mean scores of creativity skill developed through CAM and the mean scores of creativity skill inculcated through TLM in English subject regarding pre-test and post-test outcomes was rejected. Hence it can be declared that significant variation was observed between the mean score of creativity skill of the control group & that of the experimental group in the final stage of treatment. Further, the average score of creativity skill of the experimental group at post-test level was 40.42 which was significantly more than that of the control group whose mean score of creativity skill was 30.45 (Vide Table 4.51). Therefore, it may be inferred that students who were taught through CAM were found to be successful for enhancing creativity skill in English subject when compared to the students who were taught through TLM.

The researcher had to keep in mind that in this quasi-experimental design it was impracticable for the researcher to allot the groups randomly. So, the experimental group & the control group were not equated prior to the intervention. Thereby it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group occurred only because of the treatment effect even though it was found using ANOVA that there

was significant difference between control group results & experimental group results at the post-test level while there was no significant difference between control group results & experimental group results at the pre-test level. To overcome this limitation, the researcher needed to employ analysis of covariance (ANCOVA) which allowed her to statistically equate the treatment groups. Hence the researcher used pre-test scores as the covariate for controlling the pre-existing differences upon dependable variable at the initial stage of the experiment, so that valid inference concerning the treatment effect can be drawn.

The outputs of SPSS for ANCOVA are given in the succeeding tables-

TABLE:4.53				
Table showing the adjusted mean score of Creativity Skill				
Dependent Variable: Post Creativity Skill				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	40.00 ^a	0.36	39.29	40.72
Control	30.89 ^a	0.37	30.16	31.63

a. Covariate Pre-Creativity is estimated at 30.63 value

TABLE:4.54						
Table depicting the effect of CAM over TLM on the enhancement of Creativity skills in English subject by taking Pre-Test scores as Co-Variate						
Summary of One-way ANCOVA Results of creativity skill						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Between Groups	1	3474.96	3474.96	307.44	0.00	**
Within Groups (Error)	165	1864.98	11.30			
Total	168					

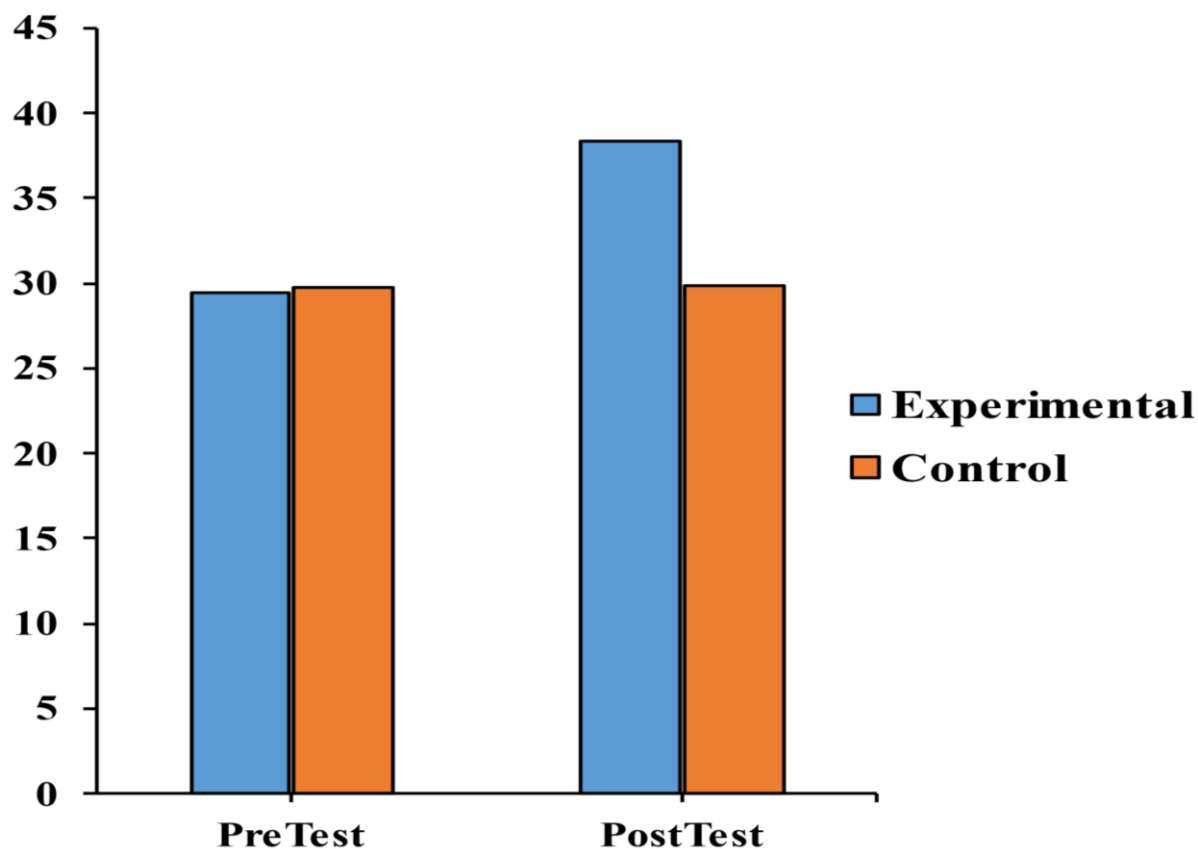
Interpretation of the ANCOVA Results:

Table 4.54 concentrates upon analysis of the data with the help of ANCOVA to show the effect of CAM over TLM on the enhancement of creativity skill in English subject pertaining to covariation of the pre-test scores with post-test results. ANCOVA summary aims at presenting the comparison between the adjusted mean scores of creativity skill in English subject of both the groups (experimental vs. control) at their post-test level after their adjustment with the pre-test scores of creativity skill in English subject. From the table 4.54 it was evident that after adjusting or correlating the post-test results with the pre-test ones, the adjusted F-value ($F_{y,x}$) was found to be 307.44 which was significant at both 0.05 and 0.01 level with $df = 1/165$. It indicates that the adjusted mean values of creativity skill in English subject of students of the control & experimental groups differed significantly when the pre-test was employed as covariate. Thus, the null hypothesis which gave assertion regarding the no observance of any significant difference between the adjusted mean values of creativity skill developed through CAM and the adjusted mean values of creativity skill developed through TLM in English subject by considering their pre- critical thinking skill as covariate was rejected. Further, the adjusted mean score of creativity skill developed through CAM was found to be 40.00 which was significantly superior to those of TLM group students whose adjusted mean value of creativity skill was 30.89 (Vide Table 4.53). Therefore, it can be inferred that enhancement of creativity skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-creativity skill. Finally, the researched arrived at the conclusion that CAM was highly effective over the TLM in facilitating the development of creativity skill in English subject among learners at secondary school level.

c) Study of the effect of CAM over TLM on the enhancement of Collaboration skill in English subject pertaining to the pre-test and post-test results

	Group	N	Mean	SD
Pre-Test	Experimental	86	29.48	8.75
	Control	82	29.79	8.90
	Total	168	29.63	8.80
Post-Test	Experimental	86	38.41	8.47
	Control	82	29.90	8.73
	Total	168	34.26	9.57

FIGURE 4.45
Collaboration



Bar graph representing the comparison between the mean level performances of control group & experimental group indicating the enhancement of collaboration skill in English subject.

Table 4.56							
Depicting the effect of CAM over TLM on the enhancement of Collaborative Skill in English subject respecting Pre-Test & Post-Test result distinctly							
Summary of One-way ANOVA of collaborative skill							
	Source of variation	SS	df	MS	F	Sig.	Remarks
Pre-Test	Between Groups	4.19	1	4.19	0.05	0.82	#
	Within Groups (Error)	12918.93	166	77.82			
	Total	12923.12	167				
Post-Test	Between Groups	3036.02	1	3036.02	41.06	0.00	**
	Within Groups (Error)	12273.98	166	73.94			
	Total	15309.99	167				

Interpretation of the ANOVA Results:

Summarization of the results is drawn from the aforementioned tables in order to interpret the analysed data. The table 4.56 demonstrates the effect of Constructivist Approach Based Module (CAM) over Traditional Lecture Method (TLM) on the enhancement of Collaboration skill in English subject relating to the pre-test and post-test results. It focuses on computation of 'F' value for depicting the effect of CAM over TLM on the enhancement of Collaboration skill in English subject with regard to the pre-test and post-test outcomes distinctly. Analysis of pre-test results of both the groups, as shown in the part- I of the table 4.56, asserted that there existed no significant difference between the pre-test score of the control group & that of the experimental group. The attained F- ratio between the pre-test results of control group & the pre-test results of the experimental group was 0.05 which was not significant. In this case the null hypothesis was not rejected. Thereby, it can be resolved that no significant difference existed between the mean score 29.79 of collaboration skill of the control group and mean score 29.48 of collaboration skill of the experimental group at the initial stage of treatment. The analysis of the post-test outcomes of both the groups, as shown in the table 4.56, asserted that there existed significant difference between the post-test score of the control group & the post-test score of the experimental group. The obtained F- ratio between the post-test scores of control group and that of the experimental group was 41.06 which was significant at both 0.05 and 0.01 level with $df= 1/166$. In this case the null hypothesis which declared no significant difference between the mean values of collaboration skill developed through CAM and the mean values of collaboration skill advanced through TLM in English subject with regard to pre-test and post-test results was rejected. Hence it can be declared that significant difference was observed between the mean score of collaboration skill of the control group & mean score of collaboration skill of the experimental group at the final stage of treatment. Further, the mean score of collaboration skill of the experimental group at post-test level was 38.41 which was significantly superior to that of the control group whose mean score of collaboration skill was 29.90 (Vide Table 4.55). Therefore, it may be inferred that students who were taught through CAM were found to be successful for enhancing collaboration skill in English subject when compared to the students who were taught through TLM.

The researcher had to keep in mind that in this quasi-experimental design it was impracticable for the researcher to allot the groups randomly. So, the experimental group & the control group were not equated prior to the intervention. Thereby it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group occurred only because of the treatment effect even though it was found using ANOVA that there

was significant difference between control group results & experimental group results at the post-test level while there was no significant difference between control group results & experimental group results at the pre-test level. To overcome this limitation, the researcher needed to employ analysis of covariance (ANCOVA) which allowed her to statistically equate the treatment groups. Hence the researcher used pre-test scores as the covariate for controlling the pre-existing differences upon dependable variable at the initial stage of the experiment, so that valid inference concerning the treatment effect can be drawn.

The outputs of SPSS for ANCOVA are given in the succeeding tables-

TABLE 4.57				
Table showing the adjusted mean score of Collaboration skill				
Dependent Variable: Post Collaboration Skill				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	38.55 ^a	0.30	37.97	39.13
Control	29.75 ^a	0.30	29.16	30.35

a. Covariate Pre- Collaboration is evaluated at 29.63 value

TABLE:4.58						
Table depicting the effect of CAM over TLM on the enhancement of Collaboration skills in English subject by taking Pre-Test scores as Co-Variate.						
Summary of One-way ANCOVA Results of collaboration skill						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Between Groups	1	3247.06	3247.06	433.58	0.00	**
Within Groups (Error)	165	1235.67	7.49			
Total	168					

Interpretation of the ANCOVA Results:

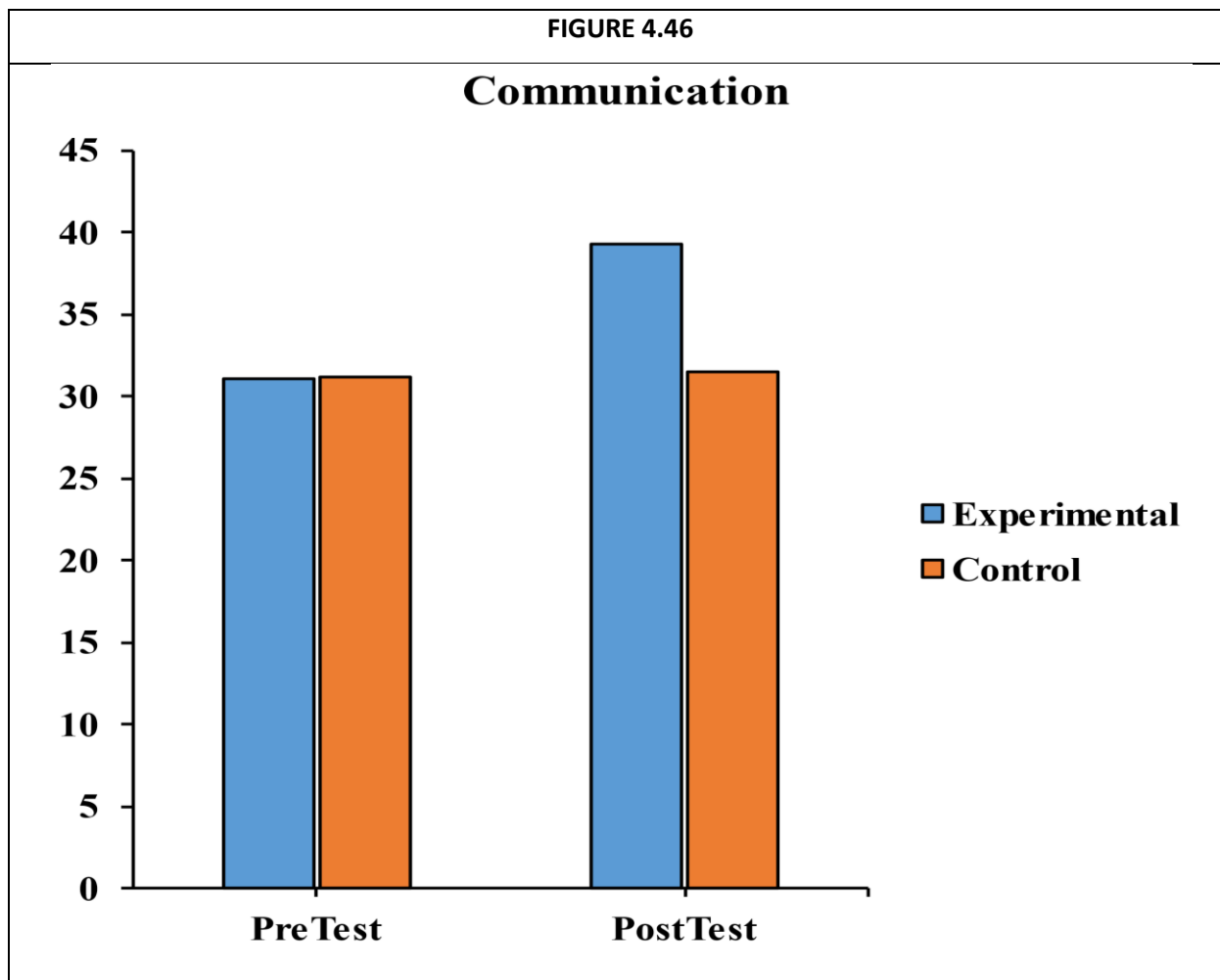
Table 4.58 concentrates upon analysis of the data with the help of ANCOVA to show the effect of CAM over TLM on the enhancement of collaboration skill in English subject with reference to covariation of the pre-test scores with post-test ones. ANCOVA summary aims at presenting the comparison between the adjusted mean scores of collaboration skill in English subject of both the

groups (experimental vs. control) at their post-test level after their adjustment with the pre-test scores of collaboration skill in English subject. Form the table 4.58 it was evident that after adjusting or correlating the post-test results with the pre-test ones, the adjusted F-value ($F_{y.x}$) was found to be 433.58 which was significant at both 0.05 and 0.01 level with $df = 1/165$. It indicates that the adjusted mean values of collaboration skill in English subject of students of the control & experimental groups differed significantly when the pre-test was utilized as covariate. Accordingly, the null hypothesis which stated that there was no significant difference between the adjusted average scores of collaboration skill developed through CAM and the adjusted average scores of collaboration skill developed through TLM in English subject by considering their pre-collaboration skill as covariate was rejected. Further, the adjusted mean score of collaboration skill developed through CAM was found to be 38.55 which was significantly greater than those of TLM group learners whose adjusted average score of collaboration skill was 29.75 (Vide Table 4.57). Therefore, it can be inferred that enhancement of collaboration skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre- collaboration skill. Finally, the researched arrived at the conclusion that CAM was highly effective over the TLM in facilitating the development of collaboration in English subject among learners at secondary school level.

d) Study of the effect of CAM over TLM on the enhancement of Communication Skill in English subject pertaining to the pre-test and post-test results

	Group	N	Mean	SD
Pre-Test	Experimental	86	31.05	6.79
	Control	82	31.17	7.47
	Total	168	31.11	7.11
Post-Test	Experimental	86	39.35	8.27
	Control	82	31.55	7.30
	Total	168	35.54	8.71

FIGURE 4.46



Bar graph representing the comparison between the mean level performances of control group & experimental group indicating the enhancement of communication skill in English subject.

TABLE 4.60

Table depicting the effect of CAM over TLM on the enhancement of Communication Skill in English subject relating to Pre-Test & Post-Test result distinctly

Summary of One-way ANOVA of communication skill

	Source of variation	SS	df	MS	F	Sig.	Remarks
Pre-Test	Between Groups	0.65	1	0.65	0.01	0.91	#
	Within Groups (Error)	8435.42	166	50.82			
	Total	8436.07	167				
Post-Test	Between Groups	2553.87	1	2553.87	41.86	0.00	**
	Within Groups (Error)	10127.84	166	61.01			
	Total	12681.71	167				

Interpretation of the ANOVA Results:

Summarization of the results is drawn from the aforementioned tables in order to interpret the analysed data. The table 4.60 demonstrates the effect of Constructivist Approach Based Module (CAM) over Traditional Lecture Method (TLM) on the enhancement of Communication skill in English subject with reference to the pre-test and post-test outcomes. It focuses on computation of 'F' value for depicting the effect of CAM over TLM on the enhancement of Communication skill in English subject with regard to the pre-test and post-test results distinctly. Analysis of the pre-test results of both the groups, as shown in the table 4.60, asserted that there existed no significant difference between the pre-test score of the control group & the pre-test score of the experimental group. The attained F- ratio between the pre-test results of control group & that of the experimental group was 0.01 which was not significant. In this case the null hypothesis was not rejected. Thereby, it can be determined that no significant difference existed between the mean score 31.17 of communication skill of the control group and mean score 31.05 of communication skill of the experimental group at the initial stage of treatment. The analysis of the post-test results of both the groups as shown in the table 4.60 asserted that there existed significant difference between the post-test score of the control group & the post-test score of the treatment group. The obtained F- ratio between the post-test outcomes of control group and that of the experimental group was 41.86 which was significant at 0.05 and 0.01 level with $df= 1/166$. In this case the null hypothesis which claimed that there was no significant difference between the mean values of communication skill developed through CAM and the mean values of communication skill advanced through TLM in English subject with regard to pre-test and post-test scores was rejected. Hence it can be declared that significant difference was observed between the mean value of communication skill of the control group & mean value of communication skill of the treatment group at the final stage of treatment. Further, the average score of communication skill of the experimental group at post-test level was 39.35 which was significantly more than that of the control group whose average score of communication skill was 31.55 (Vide Table 4.59). Therefore, it may be inferred that students who were taught through CAM were found to be successful for enhancing communication skill in English subject when compared to the students who were taught through TLM.

The researcher had to keep in mind that in this quasi-experimental design it was impracticable for the researcher to allot the groups randomly. So, the experimental group & the control group were

not equated prior to the intervention. Thereby it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group occurred only because of the treatment effect even though it was found using ANOVA that there was significant difference between control group results & experimental group results at the post-test level while there was no significant difference between control group results & experimental group results at the pre-test level. To overcome this limitation, the researcher needed to employ analysis of covariance (ANCOVA) which allowed her to statistically equate the treatment groups. Hence the researcher used pre-test scores as the covariate for controlling the pre-existing differences upon dependable variable at the initial stage of the experiment, so that valid inference concerning the treatment effect can be drawn. The outputs of SPSS for ANCOVA are given in the succeeding tables-

TABLE:4.61				
Table showing the adjusted mean score of Communication Skill in English Subject				
Dependent Variable: Post Communication Skill				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	39.41 ^a	0.31	38.80	40.02
Control	31.48 ^a	0.31	30.86	32.11

a. Covariate Pre- Communication is estimated at 31.11 value

TABLE:4.62						
Table depicting the effect of CAM over TLM on the enhancement of Communication skill in English subject by taking Pre-Test scores as Co-Variate						
Summary of One-way ANCOVA Results of communication skill						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Between Groups	1	2637.38	2637.38	325.29	0.00	**
Within Groups (Error)	165	1337.77	8.11			
Total	168					

Interpretation of the ANCOVA Results:

Table 4.62 concentrates upon analysis of the data with the help of ANCOVA to show the effect of CAM over TLM on the enhancement of communication skill in English subject regarding covariation of the pre-test scores with post-test ones. ANCOVA summary aims at presenting the comparison between the adjusted mean scores of communication skill in English subject of both the groups at their post-test level after their adjustment with the pre-test scores of communication skill in English subject. From the table 4.62 it was evident that after adjusting or correlating the post-test results with the pre-test ones, the adjusted F-value ($F_{y,x}$) was found to be 325.29 which was significant at both 0.05 and 0.01 level with $df = 1/165$. It indicates that the adjusted mean values of communication skill in English subject of students of the control & experimental groups differed significantly when the pre-test was utilized as covariate. Accordingly, the null hypothesis which proclaimed the non-significant difference between the adjusted mean values of communication skill developed through CAM and the adjusted mean values of communication skill developed through TLM in English subject by considering their pre-communication skill as covariate was rejected. Further, the adjusted mean score of communication skill developed through CAM was found to be 39.41 which was significantly superior to those of TLM group learners whose adjusted mean value of communication skill was 31.48 (Vide Table 4.61). Therefore, it can be inferred that enhancement of communication skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-communication skill. Finally, the researched arrived at the conclusion that CAM was highly effective over the TLM in facilitating the development of communication in English subject among learners at secondary school level.

4.5.3. STUDY OF THE EFFECT OF GROUP, GENDER & THEIR INTERACTION ON OVERALL TWENTY FIRST CENTURY LEARNING SKILLS BY CONSIDERING THE PRE-TEST AS COVARIATE

In this quasi-experimental design adopted in the present study it was not possible for the researcher to assign the treatment groups randomly. So, the experimental group and the control group were not equated prior to the intervention or the treatment. In such condition if any significant difference between the post-test outcomes of control group & the experimental group was observed, it cannot be concluded with guarantee that the significant difference was found only because of the treatment effect. For the purpose of avoiding this kind of practical limitation, the researcher directly preferred to employ analysis of covariance (ANCOVA) which allowed her

to statistically equate the treatment groups. Hence the researcher used pre-test scores as the covariate in order to control the pre-existing differences upon dependable variable at the initial stage of the experiment. Thus, through this ANCOVA technique, the post- test outcomes of overall Twenty first century learning skills were covariated with the pre-test scores of overall Twenty first century learning skills so that valid inference concerning the treatment effect can be drawn.

So, the third objective was meant for examining the effect of Group, Gender & their interaction on overall Twenty first century learning skills by considering the pre-test as covariate. Noticeably. in this instance of analysis, Group was consisted of two levels- Control Group (taught through TLM) and Experimental Group (Taught through CAM), while Gender was consisted of two levels-Males and Females. The post test score of overall Twenty first century learning skills was the dependent variable whereas the pre-test score of overall Twenty first century learning skills was regarded as the covariate. Accordingly, the gathered data were analysed via Two Way ANCOVA/ 2 X 2 Factorial Design ANCOVA for the purpose of testing the null hypothesis stating that there was no significant effect of Group, Gender & their interaction on overall 21st century learning Skills students by considering their pre- twenty first century learning skills test as covariate.

The outputs of SPSS for ANCOVA are given in the tables as follows-

TABLE:4.63				
Table revealing the Descriptive Statistics for overall TFCLS in English subject				
	Group	N	Mean	SD
Experimental	Male	48	22.23	166.865
	Female	38	27.84	139.934
	Total	86	28.14	154.965
Control	Male	42	26.78	123.048
	Female	40	24.03	113.775
	Total	82	25.75	118.524
Total	Male	90	32.78	146.417
	Female	78	28.95	126.519
	Total	168	32.53	137.179

Table 4.64				
Showing Group-wise Adjusted mean score of Overall TFCLS				
Dependent Variable: Post4Cs				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	154.86 ^a	0.62	153.63	156.09
Control	118.56 ^a	0.63	117.31	119.81

a. Covariate Pre4Cs is estimated here at 117.31value

TABLE 4.65				
Table showing Gender-wise Adjusted mean score of Overall TFCLS				
Dependent Variable: Post4Cs				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	137.16 ^a	0.62	135.93	138.39
Female	136.26 ^a	0.67	134.94	137.59

a. Covariate Pre4Cs is estimated here at 117.31value

TABLE 4.66					
Table showing adjusted mean score for interaction between Group and Gender of Overall TFCLS					
Dependent Variable: Post4Cs					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	155.38 ^a	0.85	153.70	157.07
	Female	154.34 ^a	0.97	152.43	156.25
Control	Male	118.94 ^a	0.89	117.18	120.69
	Female	118.18 ^a	0.91	116.38	119.98

a. Covariate Pre4Cs is estimated here at 117.31value

TABLE 4.67						
Two-way ANCOVA summary: Computation of Fy.x value of overall TFCLS results by regarding Pre-Test scores as Covariate.						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Group (A)	1	54896.97	54896.97	1668.66	0.00	**
Gender (B)	1	29.80	29.80	0.91	0.34	#
A*B	1	0.80	0.80	0.02	0.88	#
Within Groups (Error)	163	5362.50	32.90			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.67 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Gender and their interaction on overall Twenty first century learning skills by considering the pre-test as covariate. Two-way ANCOVA summary aims at presenting the group wise, gender wise and their interaction wise comparison of the adjusted mean scores of overall Twenty first century learning skills in English subject.

Effect of Group on overall Twenty first century learning skills by considering the pre-test as covariate.

Form the table 4.67 it was evident that the adjusted F-value (Fy.x) for Group was found to be 1668.66 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean scores of overall Twenty first century learning skills in English subject of pupils of the control & experimental groups differed significantly when their pre-test was taken as covariate. Consequently, the null hypothesis which proclaimed that there was no significant effect of Group on the adjusted mean scores of overall Twenty first century learning skills in English subject by considering their pre- twenty first century learning skills test as covariate was rejected. Further, the adjusted mean score of overall Twenty first century learning skills developed through CAM (experimental group) was found to be 154.86 which was significantly superior to those of TLM (control group) school children whose adjusted mean score of overall Twenty first century learning skills was 118.56 (Vide Table 4.64). Therefore, it can be inferred that enhancement of overall Twenty first century learning skills of students treated through CAM was evidently

superior to TLM when both the groups were matched in respect of their pre-Twenty first century learning skills.

Effect of Gender on overall Twenty first century learning skills by considering the pre-test as covariate.

Form the table 4.67 it was evident that the adjusted F-value ($F_{y.x}$) for Gender was found to be 0.91 which was not significant. It indicates that the adjusted mean scores of overall Twenty first century learning skills in English subject of pupils of the Male and Female did not differ significantly when their pre-test was engaged as covariate. Therefore, the null hypothesis which stated that there was no significant effect of Gender on adjusted mean scores of overall Twenty first century learning skills in English subject by considering their pre- twenty first century learning skills test as covariate was not declined. Therefore, it can be determined that overall Twenty first century learning skills was found to be independent of their Gender when pre-Twenty first century learning skills was regarded as covariate.

Effect of Interaction between Group & Gender on overall Twenty first century learning skills by considering the pre-test as covariate.

Form the table 4.67 it was evident that the adjusted F-value ($F_{y.x}$) for interaction between Group & Gender was found to be 0.02 which was not significant. It indicates that the adjusted mean scores of overall Twenty first century learning skills in English subject of pupils of the Male and Female belonging to Experimental & Control groups did not differ significantly when their pre-test was viewed as covariate. Consequently, the null hypothesis asserting that there was no significant effect of interaction between Group and Gender on adjusted mean scores of overall Twenty first century learning skills in English subject by considering their pre- twenty first century learning skills test as covariate was not rejected. Therefore, it can be determined that overall Twenty first century learning skills was found to be independent of interaction between Group and Gender of students when their pre-Twenty first century learning skills was regarded as covariate.

4.5.4 STUDY OF THE EFFECT OF GROUP, GENDER & THEIR INTERACTION ON COMPONENT WISE TWENTY FIRST LEARNING SKILLS BY CONSIDERING THEIR REPRESENTATIVE COMPONENTS AT PRE-TEST LEVEL AS COVARIATES

ANCOVA was utilized again to equate both the groups in statistical way. Hence the researcher used pre-test scores as the covariate in order to control the pre-existing differences upon

dependable variable at the initial stage of the experiment. By the means of the analysis of covariance technique, the post- test outcomes of component wise Twenty first century learning skills were covariated with the pre-test scores of component wise Twenty first century learning skills so that valid inference concerning the treatment effect can be drawn. So, the fourth objective was intended to examine the effect of Group, Gender & their interaction on component wise Twenty first century learning skills by considering their respective pre-tests as covariate. Noticeably. in this instance of analysis, Group was consisted of two levels- Control Group (taught through TLM) and Experimental Group (Taught through CAM), while Gender was consisted of two levels-Males and Females. Component wise Twenty first century learning skills scores at post-test level were the dependent variables and the pre-test scores of component wise Twenty first century learning skills were regarded as the covariates. Thus, the obtained research data were analysed via Two Way ANCOVA/ 2 X 2 Factorial Design ANCOVA to test the null hypothesis stating that there was no significant effect of Group, Gender & their interaction on component wise 21st century learning Skills students by considering their pre- component wise twenty first century learning skills as covariate. The outputs of SPSS for ANCOVA are presented in the following tables dealing with the component skills individually-

a) Studying the effect of Group, Gender & their interaction on critical thinking skill in view of pre- critical thinking as covariate

Two Way ANCOVA was employed for testing the null hypothesis which stated that there was no significant effect of Group, Gender & their interaction on critical thinking skill by using pre-critical thinking test as covariate. The outcomes are given below-

TABLE 4.68				
Table revealing Descriptive table for Critical Thinking in English subject				
	Group	N	Mean	SD
Experimental	Male	48	39.96	8.90
	Female	38	32.78	9.60
	Total	86	36.78	9.84
Control	Male	42	28.21	9.67
	Female	40	24.68	7.95
	Total	82	26.49	9.00
Total	Male	90	34.48	10.94
	Female	78	28.62	9.64
	Total	168	31.76	10.73

TABLE 4.69				
Table showing Group-wise Adjusted mean score of Critical Thinking				
Dependent Variable: Post Critical Thinking				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	36.97 ^a	0.36	36.26	37.68
Control	26.32 ^a	0.36	25.60	27.04

a. Covariate Pre- Critical Thinking is estimated at 25.935 value

TABLE:4.70				
Table showing Gender-wise Adjusted mean score of Critical Thinking				
Dependent Variable: Post Critical Thinking				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	31.48 ^a	0.36	30.77	32.19
Female	31.81 ^a	0.39	31.05	32.57

a. Covariate Pre- Critical Thinking is estimated at 25.935 value

TABLE 4.71					
Table showing Adjusted mean score for interaction between Group and Gender of Critical Thinking					
Dependent Variable: Post Critical Thinking					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	36.75 ^a	0.49	35.79	37.71
	Female	37.19 ^a	0.55	36.10	38.28
Control	Male	26.21 ^a	0.51	25.20	27.22
	Female	26.44 ^a	0.52	25.40	27.47

a. Covariate Pre- Critical Thinking is estimated at 25.935 value

TABLE 4.72						
Table depicting Two-way ANCOVA summary: Computation of $F_{y.x}$ value of Critical Thinking results in view of Pre-Test scores as Covariate.						
Source of variation	df	SS	MS	$F_{y.x}$	Sig.	Remark
Group (A)	1	4715.95	4715.954	433.747	0.000	**
Gender (B)	1	4.13	4.135	0.380	0.538	#
A*B	1	0.43	0.426	0.039	0.843	#
Within Groups (Error)	163	1772.23	10.873			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.72 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Gender & their interaction on critical thinking skill by considering the pre-test as covariate. Summarization of Two-way ANCOVA aims at presenting the group wise, gender wise and their interaction wise comparison of the adjusted mean scores of critical thinking skill in English subject.

Effect of Group on critical thinking skill by considering the pre-test as covariate.

Form the table 4.72 it was evident that the adjusted F-value ($F_{y.x}$) for Group was found to be 433.747 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean scores of critical thinking skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. Consequently, the null hypothesis which specified that there was no significant effect of Group on the adjusted mean values of critical thinking skill in English subject by considering their pre- critical thinking skill test as covariate was rejected. Further, the adjusted mean score of critical thinking skill developed through CAM was found to be 36.97 which was significantly more than those of TLM group learners whose adjusted mean value of critical thinking skill was 26.32 (Vide Table 4.69). Therefore, it can be inferred that enhancement of critical thinking skill of students treated through

CAM was evidently superior to TLM when both the groups were matched in respect of their pre-critical thinking skill.

Effect of Gender on critical thinking skill by considering the pre-test as covariate.

Form the table 4.72 it was evident that the adjusted F-value ($F_{y,x}$) for Gender was found to be .380 which was not significant. It specifies that the adjusted mean scores of critical thinking skill in English subject of students of the Male and Female students did not differ significantly while their pre-test was utilized as covariate. So, the null hypothesis which stated that there was no significant effect of Gender on adjusted mean values of critical thinking skill in English subject by considering their pre- critical thinking skill test as covariate was not declined. Therefore, it can be determined that critical thinking skill was observed to be free of their Gender when pre- critical thinking skill was regarded as covariate.

Effect of Interaction between Group & Gender on critical thinking skill by considering the pre-test as covariate.

Form the table 4.72 it was evident that the adjusted F-value ($F_{y,x}$) for interaction between Group & Gender was found to be .039 which was not significant. It demonstrates that the adjusted mean scores of critical thinking skill in in English subject of students of the Male & Female belonging to Experimental & Control groups did not differ significantly when their pre-test was viewed as covariate. So, the null hypothesis supporting that there was no significant effect of interaction between Group & Gender on adjusted mean values of critical thinking skill in English subject by considering their pre- critical thinking skill test as covariate was not declined. Therefore, it can be resolved that critical thinking skill was found to be non-dependent of interaction between Group & Gender of students when their pre- critical thinking skill was regarded as covariate.

b) Studying the effect of Group, Gender & their interaction on creativity by considering pre- creativity as covariate

Two Way ANCOVA again was employed to test the null hypothesis which stated that there was no significant effect of Group, Gender & their interaction on creativity by considering their pre-creativity test as covariate. The outcomes are given below-

	Group	N	Mean	SD
Experimental	Male	48	45.01	9.73
	Female	38	34.63	9.49
	Total	86	40.42	10.88
Control	Male	42	33.55	9.26
	Female	40	27.20	7.48
	Total	82	30.45	8.97
Total	Male	90	39.66	11.07
	Female	78	30.82	9.25
	Total	168	35.56	11.15

Dependent Variable: Post Creativity Skill				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	40.01 ^a	0.37	39.29	40.73
Control	30.88 ^a	0.37	30.15	31.62

a. Covariate Pre- Creativity is estimated at 30.634 value

Dependent Variable: Post Creativity Skill				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	35.63 ^a	0.37	34.89	36.37
Female	35.26 ^a	0.41	34.46	36.06

a. Covariate Pre- Creativity is estimated at 30.634 value

TABLE 4.76

Table showing Adjusted mean score for interaction between Group and Gender of Creativity Skill

Dependent Variable: Post Creativity					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	39.98 ^a	0.51	38.97	40.99
	Female	40.04 ^a	0.57	38.91	41.17
Control	Male	31.29 ^a	0.52	30.25	32.32
	Female	30.48 ^a	0.54	29.40	31.55

a. Covariate Pre- Creativity is estimated at 30.634 value

TABLE 4.77

Table depicting Two-way ANCOVA summary: Computation of $F_{y.x}$ value of Creativity Skill results in view of Pre-Test scores as Covariate.

Source of variation	df	SS	MS	$F_{y.x}$	Sig.	Remark
Group (A)	1	3470.69	3470.69	305.50	0.00	**
Gender (B)	1	4.78	4.78	0.42	0.52	#
A*B	1	7.80	7.80	0.69	0.41	#
Within Groups (Error)	163	1851.79	11.36			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.77 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Gender & their interaction on creativity by considering the pre-test as covariate. Summarization of Two-way ANCOVA aims at presenting the group wise, gender wise and their interaction wise comparison of the adjusted mean values of creativity skill in English subject.

Effect of Group on creativity skill by considering the pre-test as covariate.

Form the table 4.77 it was evident that the adjusted F-value ($F_{y.x}$) for Group was found to be 305.50 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of creativity skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. Accordingly, the null hypothesis which declared that there was no significant effect of Group on the adjusted mean

scores of creativity skill in English subject by considering their pre-creativity skill test as covariate was rejected. Further, the adjusted mean score of creativity skill developed through CAM was found to be 40.01 which was significantly superior to those of TLM group learners whose adjusted mean value of creativity skill was 30.88 (Vide Table 4.74). Therefore, it can be inferred that enhancement of creativity skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-creativity skill.

Effect of Gender on creativity skill by considering the pre-test as covariate.

Form the table 4.77 it was evident that the adjusted F-value ($F_{y,x}$) for Gender was found to be 0.42 which was not significant. It specifies that the adjusted mean scores of creativity skill in English subject of students of the Male and Female students did not differ significantly when their pre-test was engaged as covariate. Consequently, the null hypothesis which stated that there was no significant effect of Gender on adjusted mean values of creativity skill in English subject by considering their pre-creativity skill test as covariate was not declined. Therefore, it can be resolved that creativity skill was found to be independent of their Gender when pre-creativity skill was regarded as covariate.

Effect of Interaction between Group & Gender on creativity skill by considering the pre-test as covariate

Form the table 4.77 it was evident that the adjusted F-value ($F_{y,x}$) for interaction between Group & Gender was found to be 0.69 which was not significant. It reflects that the adjusted mean values of creativity skill in English subject of students of the Male & Female belonging to Experimental & Control groups did not differ significantly when their pre-test was in consideration of covariate. Accordingly, the null hypothesis stating that there was no significant effect of interaction between Group & Gender on adjusted mean values of creativity skill in English subject by considering their pre-creativity skill test as covariate was not declined. Therefore, it can be resolved that creativity skill was observed to be independent of interaction between Group & Gender of learners when their pre-creativity skill was regarded as covariate.

c) Study of the effect of Group, Gender and their interaction on collaboration skill by considering pre-collaboration as covariate

Two Way ANCOVA was employed to test the null hypothesis which stated that there was no significant effect of Group, Gender & their interaction on collaboration by considering their pre-collaboration as covariate. The outcomes are given below-

	Group	N	Mean	SD
Experimental	Male	48	40.31	7.62
	Female	38	36.00	8.97
	Total	86	38.41	8.47
Control	Male	42	29.33	9.40
	Female	40	30.50	8.04
	Total	82	29.90	8.73
Total	Male	90	35.19	10.09
	Female	78	33.18	8.89
	Total	168	34.26	9.57

2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	38.53 ^a	0.30	37.94	39.12
Control	29.76 ^a	0.30	29.16	30.36

a. Covariate Pre- Collaboration is estimated at 29.631 value

TABLE 4.80				
Table showing Gender-wise Adjusted mean score of Collaboration Skill				
Dependent Variable: Post Collaboration				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	34.18 ^a	0.29	33.60	34.75
Female	34.11 ^a	0.31	33.49	34.72

a. Covariate Pre- Collaboration is estimated at 29.631 value

TABLE 4.81					
Table showing Adjusted mean score for interaction between Group and Gender of Collaboration Skill					
Dependent Variable: Post Collaboration					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	38.71 ^a	0.40	37.92	39.49
	Female	38.35 ^a	0.45	37.46	39.24
Control	Male	29.65 ^a	0.42	28.81	30.49
	Female	29.86 ^a	0.44	29.00	30.72

a. Covariate Pre- Collaboration is estimated at 29.631 value

TABLE 4.82						
Table depicting Two-way ANCOVA summary: Computation of Fy.x value of Collaboration Skill results in consideration of Pre-Test scores as Covariate.						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Group (A)	1	3204.39	3204.39	423.88	0.00	**
Gender (B)	1	0.22	0.22	0.03	0.87	#
A*B	1	3.22	3.22	0.43	0.51	#
Within Groups (Error)	163	1232.22	7.56			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.82 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Gender & their interaction on collaboration by considering the pre-test as covariate. Summarization of Two-way ANCOVA aims at presenting the group wise, gender wise and their interaction wise comparison of the adjusted mean values of collaboration skill in English subject.

Effect of Group on collaboration skill by considering the pre-test as covariate.

Form the table 4.82 it was evident that the adjusted F-value ($F_{y.x}$) for Group was found to be 423.88 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of collaboration skill in English subject of students of the control & treatment groups differed significantly when pre-test was taken as covariate. Accordingly, the null hypothesis which opined that there was no significant effect of Group on the adjusted mean scores of collaboration skill in English subject by considering their pre- collaboration skill test as covariate was rejected. Further, the adjusted mean score of collaboration skill developed through CAM was found to be 38.53 which was significantly more than those of TLM learners whose adjusted mean value of collaboration skill was 29.76 (Vide Table 4.79). Therefore, it can be inferred that enhancement of collaboration skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre- collaboration skill.

Effect of Gender on collaboration skill by considering the pre-test as covariate.

Form the table 4.82 it was evident that the adjusted F-value ($F_{y.x}$) for Gender was found to be 0.03 which was not significant. It specifies that the adjusted mean values of collaboration skill in English subject of students of the Male and Female students did not differ significantly when their pre-test was utilized as covariate. Accordingly, the null hypothesis which stated that there was no significant effect of Gender on adjusted mean values of collaboration skill in English subject by considering their pre- collaboration skill as covariate was not rejected. Therefore, it can be decided that collaboration skill was found to be independent of their Gender when pre-collaboration skill was regarded as covariate.

Effect of Interaction between Group & Gender on collaboration skill by considering the pre-test as covariate

Form the table 4.82 it was evident that the adjusted F-value ($F_{y.x}$) for interaction between Group & Gender was found to be 0.43 which was not significant. It reflects that the adjusted mean values of collaboration skill in English subject of the boys & girls learners belonging to Experimental &

Control groups did not vary significantly when pre-test was viewed as covariate. Accordingly, the null hypothesis which proclaimed that there was no significant effect of interaction between Group & Gender on the adjusted mean values of collaboration skill in English subject by considering their pre- collaboration skill test as covariate was not declined. Therefore, it can be conclusively opined that collaboration skill was observed to be independent of interaction between Group & Gender of learners when their pre- collaboration skill was regarded as covariate.

d) Study of the effect of Group, Gender & their interaction on communication by considering pre- communication as covariate

Two Way ANCOVA was employed to test the null hypothesis which stated that there was no significant effect of Group, Gender & their interaction on communication by considering their pre-communication as covariate. The outcomes are given below-

	Group	N	Mean	SD
Experimental	Male	41.58	7.69	41.58
	Female	36.53	8.21	36.53
	Total	39.35	8.27	39.35
Control	Male	31.74	7.71	31.74
	Female	31.35	6.94	31.35
	Total	31.55	7.30	31.55
Total	Male	36.99	9.11	36.99
	Female	33.87	7.97	33.87
	Total	35.54	8.71	35.54

TABLE 4.84				
Table showing Group-wise Adjusted mean score of Communication Skill				
Dependent Variable: Post Communication				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	39.30 ^a	0.30	38.70	39.90
Control	31.48 ^a	0.31	30.87	32.09

a. Covariate Pre- Communication is estimated at 31.107 value

TABLE 4.85				
Table showing Gender-wise Adjusted mean score of Communication Skill				
Dependent Variable: Post Communication				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	35.95 ^a	0.29	35.37	36.53
Female	34.83 ^a	0.32	34.21	35.46

a. Covariate Pre- Communication is estimated at 31.107 value

TABLE 4.86					
Table showing Adjusted mean score for interaction between Group and Gender of Communication Skill					
Dependent Variable: Post Communication					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	40.25 ^a	0.40	39.45	41.04
	Female	38.36 ^a	0.45	37.46	39.25
Control	Male	31.65 ^a	0.43	30.81	32.50
	Female	31.31 ^a	0.44	30.44	32.18

a. Covariate Pre- Communication is estimated at 31.107 value

TABLE 4.87

Table depicting Two-way ANCOVA summary: Computation of $F_{y.x}$ value of Communication Skill results by taking Pre-Test scores as Covariate.

Source of variation	df	SS	MS	$F_{y.x}$	Sig.	Remark
Group (A)	1	2547.45	2547.45	329.19	0.00	**
Gender (B)	1	51.54	51.54	6.66	0.01	**
A*B	1	24.52	24.52	3.17	0.08	#
Within Groups (Error)	163	1261.38	7.74			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.87 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Gender & their interaction on communication by considering the pre-test as covariate. Summarization of Two-way ANCOVA aims at presenting the group wise, gender wise and their interaction wise comparison of the adjusted mean values of communication skill in English subject.

Effect of Group on communication skill in view of the pre-test as covariate.

Form table 4.87 it was evident that the adjusted F-value ($F_{y.x}$) for Group was found to be 329.19 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of communication skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. So, the null hypothesis declaring that there was no significant effect of Group on the adjusted mean scores of communication skill in English subject by considering their pre- communication skill test as covariate was rejected. Further, the adjusted mean score of communication skill developed through CAM was found to be 39.30 which was significantly superior to those of TLM group

students whose adjusted mean value of communication skill was 31.48 (Vide Table 4.84). Therefore, it can be inferred that enhancement of communication skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-communication skill.

Effect of Gender on communication skill by considering the pre-test as covariate.

Form the table 4.87 it was evident that the adjusted F-value ($F_{y,x}$) for Gender was found to be 6.66 which was significant at 0.05 level with $df= 1/163$. It indicates that the adjusted mean values of communication skill in English subject of students of the Male and Female students differed significantly when the pre-test was taken as covariate. Consequently, the null hypothesis declaring that there was no significant effect of Gender on adjusted mean scores of communication skill in English subject by considering their pre- communication skill as covariate was rejected. Further, the adjusted mean score of communication skill of Male students was 35.95 which was significantly higher than those of Female students whose adjusted mean score of communication skill was 34.83 (Vide 4.85). Therefore, it can be resolved that Male pupils were found to be enriched with higher communicative skill as compared to their counterparts of Female students when pre- communication skill was regarded as covariate.

Effect of Interaction between Group & Gender on communication skill in view of the pre-test as covariate

Form the table 4.87 it was evident that the adjusted F-value ($F_{y,x}$) for interaction between Group & Gender was found to be 3.17 which was not significant. It reflects that the adjusted mean values of communication skill in English subject of the boys & girls students belonging to Experimental & Control groups did not differ significantly when their pre-test was utilised as covariate. Hence, the null hypothesis proclaiming that there was no significant effect of interaction between Group & Gender on adjusted mean values of communication skill in English subject by considering their pre- communication skill test as covariate was not rejected. Thus, it can be determined that communication skill was independent of interaction between Group & Gender of learners when their pre- communication skill was regarded as covariate.

4.5.5 STUDY OF THE EFFECT OF GROUP, LOCALE OF SCHOOLS AND THEIR INTERACTION ON OVERALL TWENTY FIRST CENTURY LEARNING SKILLS BY CONSIDERING PRE-TEST AS COVARIATE

ANCOVA was utilized again to equate both the groups in statistical way. Hence the researcher used pre-test scores as the covariate in order to control the pre-existing differences upon dependable variable at the starting stage of the experiment. Through the analysis of covariance technique, the post- test score of overall Twenty first century learning skills were covariated with the pre-test score of overall Twenty first century learning skills so that valid inference concerning the treatment effect can be drawn. So, the fourth objective was meant to study of the effect of Group, Locale of Schools and their interaction on overall Twenty first century learning skills by considering the pre-test as covariate. Noticeably. in this instance of analysis, Group was consisted of two levels- Control Group (taught through TLM) and Experimental Group (Taught through CAM), while Locale of School was consisted of two levels-Urban and Rural. Overall Twenty first century learning skills score at post-test level was the dependent variables and the pre-test score of overall Twenty first century learning skills was regarded as the covariate. Thus, the obtained research data were analysed by the means of Two Way ANCOVA/ 2 X 2 Factorial Design ANCOVA to test the null hypothesis declaring the no significant effect of Group, Locale of School and their interaction on overall 21st century learning Skills students by considering their pre-twenty first century learning skills as covariate. The outputs of SPSS for ANCOVA are supplied in the succeeding tables-

TABLE 4.88				
Table revealing Descriptive table for overall TFCLS in English subject				
	Group	N	Mean	SD
Experimental	Urban	48	157.08	25.47
	Rural	38	152.75	30.84
	Total	86	154.97	28.14
Control	Urban	42	116.11	26.69
	Rural	40	121.06	24.79
	Total	82	118.52	25.74
Total	Urban	90	137.07	33.11
	Rural	78	137.29	32.12
	Total	168	137.18	32.53

TABLE 4.89				
Table showing Group-wise Adjusted mean score of Overall TFCLS/4Cs				
Dependent Variable: Post4Cs				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	154.86 ^a	0.58	153.72	156.00
Control	118.55 ^a	0.59	117.37	119.72

a. Covariate Pre4Cs is estimated at 117.31 value

TABLE 4.90				
Table showing Locale-wise Adjusted mean score of Overall TFCLS				
Dependent Variable: Post4Cs				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Urban	138.51 ^a	0.58	137.36	139.66
Rural	134.90 ^a	0.59	133.72	136.07

a. Covariate Pre4Cs is estimated at 117.31 value

TABLE 4.91					
Table showing Adjusted mean score for interaction between Group and Locale of Overall TFCLS					
Dependent Variable: Post4Cs					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Urban	157.54 ^a	0.81	155.94	159.14
	Rural	152.18 ^a	0.83	150.55	153.82
Control	Urban	119.48 ^a	0.83	117.84	121.12
	Rural	117.61 ^a	0.85	115.93	119.29

a. Covariate Pre4Cs is estimated at 117.31 value

TABLE 4.92						
Table depicting Two-way ANCOVA summary: Computation of Fy.x value of overall TFCLS results in consideration of Pre-Test scores as Covariate.						
Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Group (A)	1	55323.20	55323.20	1916.09	0.00	**
Locale (C)	1	544.73	544.73	18.87	0.00	**
A*C	1	126.55	126.55	4.38	0.04	*
Within Groups (Error)	163	4706.30	28.87			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.92 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Locale of School and their interaction on overall Twenty first century learning skills by considering the pre-test as covariate. Two-way ANCOVA summary aims at presenting the group wise, Locale of School wise and their interaction wise comparison of the adjusted mean scores of overall Twenty first century learning skills in English subject.

Effect of Group on overall Twenty first century learning skills by considering the pre-test as covariate.

Form the table 4.92 it is apparent that the adjusted F-value (Fy.x) for Group was found to be 1916.09 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of overall Twenty first century learning skills in English subject of learners of the control & experimental groups differed significantly when pre-test was taken as covariate. Consequently, the null hypothesis declaring the no significant effect of Group on the adjusted mean scores of overall Twenty first century learning skills in English subject by considering their pre- twenty first century learning skills test as covariate was rejected. Further, the adjusted mean score of overall Twenty first century learning skills developed through CAM was found to be 154.86 which was significantly superior to those of TLM experienced learners whose adjusted mean value of overall Twenty first century learning skills was 118.55 (Vide Table 4.89). Therefore, it can be inferred that enhancement of overall Twenty first century learning skills of

students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-Twenty first century learning skills.

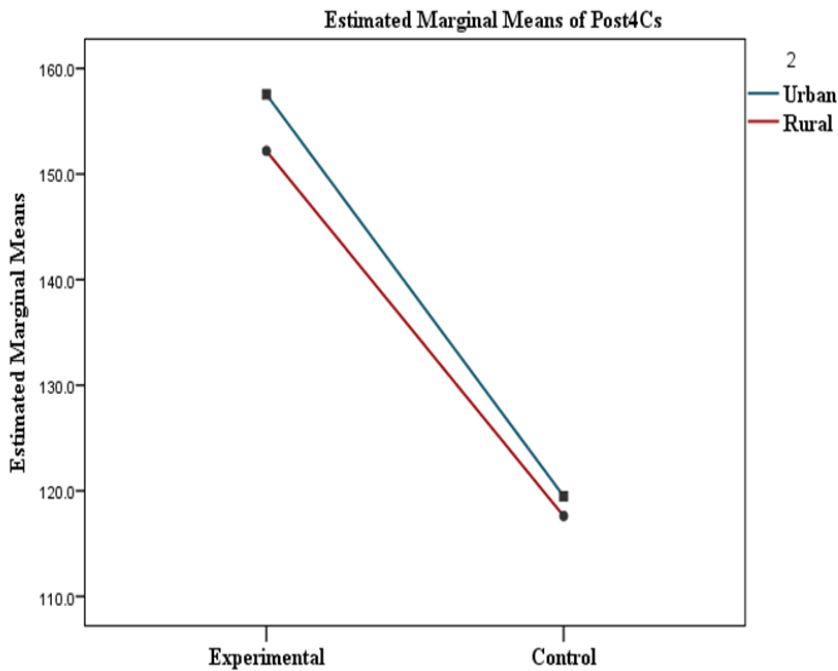
Effect of Locale of School on overall Twenty first century learning skills by considering the pre-test as covariate.

Form the table 4.92 it is apparent that the adjusted F-value ($F_{y.x}$) for Locale of School was found to be 18.87 which was significant at 0.05 and 0.01 level with $df=1/163$. It indicates that the adjusted mean values of overall Twenty first century learning skills in English subject of schoolchildren of the Urban school and Rural school differed significantly when their pre-test was taken as covariate. Consequently, the null hypothesis declaring the no significant effect of Locale of School on adjusted mean scores of overall Twenty first century learning skills in English subject by considering their pre- twenty first century learning skills test as covariate was rejected. Further, the adjusted mean score of overall Twenty first century learning skills of learners of schools situated in urban area was 138.51 which was significantly higher than those studying in schools situated in rural area whose adjusted mean score of overall Twenty first century learning skills was 134.90 (Vide Table 4.90). Therefore, it can be conclusively determined that learners of Urban school were found to have higher overall Twenty first century learning skills as compared to their counterparts of students of Rural school when pre-Twenty first century learning skills was regarded as covariate.

Effect of Interaction between Group & Locale of School on overall Twenty first century learning skills by considering the pre-test as covariate.

Form the table 4.92 it is obvious that the adjusted F-value ($F_{y.x}$) for interaction between Group and Locale of School was found to be 4.38 which was significant at 0.05 level with $df=1/163$. It indicates that the adjusted mean values of overall Twenty first century learning skills in English subject of schoolchildren of the Urban school and Rural school belonging to Experimental and Control groups differed significantly when their pre-test was taken as covariate. Thus, the null hypothesis which stated that there was no significant effect of Interaction between Group & Locale of School on overall Twenty first century learning skills by considering the pre-test as covariate was rejected. In order to know the trend of the effect of interaction between Group & Locale of School on overall Twenty first century learning skills of learners by considering the pre-test as covariate, the Graph 4.47 has been plotted below.

Figure 4.47



Covariates appearing in the model are evaluated at the following values: Pre4Cs = 117.307

From the figure 4.47, the observation can be drawn that the Urban learners belonging to the treatment group were found to have significantly higher 4Cs compared to the Rural students belonging to the treatment group. However, no significant difference between the urban students & the rural students of the control group was observed. And it was also evident from this graph that there was a sharp increase in the development of 4Cs in both urban and rural students as Group changes from control to the experimental one.

4.5.6 STUDY OF THE EFFECT OF GROUP, LOCALE OF SCHOOLS AND THEIR INTERACTION ON COMPONENT WISE TWENTY FIRST CENTURY LEARNING SKILLS BY CONSIDERING THEIR REPRESENTATIVE COMPONENTS AT PRE-TEST LEVEL AS COVARIATES

ANCOVA was employed again to equate both the groups in statistical way. Hence the researcher used pre-test scores as the covariate in order to control the pre-existing differences upon dependable variable at the initial stage of the experiment. Through the analysis of covariance technique, the post- test outcomes of component wise Twenty first century learning skills were covariated with the pre-test scores of component wise Twenty first century learning skills so that

valid inference concerning the treatment effect can be drawn. So, the sixth objective was meant to study of the effect of Group, Locale of school and their interaction on component wise Twenty first century learning skills by considering their respective pre-tests as covariate. Noticeably. in this instance of analysis, Group was consisted of two levels- Control Group (taught through TLM) and Experimental Group (taught through CAM), while Locale of School was consisted of two levels-Urban and Rural. Component wise Twenty first century learning skills scores at post-test level were the dependent variables and the pre-test scores of component wise Twenty first century learning skills were regarded as covariates. Hence, the collected data were analysed via Two Way ANCOVA/ 2 X 2 Factorial Design ANCOVA to test the null hypothesis stating that there was no significant effect of Group, Locale of school and their interaction on component wise 21st century learning Skills students by considering their pre- component wise twenty first century learning skills as covariates. The outputs of SPSS for ANCOVA are presented in the following tables dealing with the component skills individually-

a) Study of the effect of Group, Locale of Schools and their interaction on critical thinking by considering pre- critical thinking as covariate

Two Way ANCOVA was employed to test the null hypothesis which proclaimed that there was no significant effect of Group, Locale of Schools& their interaction on critical thinking by considering their pre-critical thinking test as covariate. The outcomes are given below-

TABLE 4.93

Table revealing Descriptive statistics for Critical Thinking in English subject

	Group	N	Mean	SD
Experimental	Urban	48	37.20	8.30
	Rural	38	36.35	11.32
	Total	86	36.78	9.84
Control	Urban	42	26.31	9.62
	Rural	40	26.68	8.41
	Total	82	26.49	9.00
Total	Urban	90	31.88	10.47
	Rural	78	31.63	11.07
	Total	168	31.76	10.73

TABLE 4.94				
Table showing Group-wise Adjusted mean score of Critical Thinking				
Dependent Variable: Post Critical Thinking				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	36.91 ^a	0.34	36.24	37.59
Control	26.31 ^a	0.35	25.62	27.00

a. Covariate Pre- Critical Thinking is estimated at 25.935 value

TABLE 4.95				
Table showing Locale-wise Adjusted mean score of Critical Thinking				
Dependent Variable: Post Critical Thinking				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Urban	32.46 ^a	0.34	31.78	33.13
Rural	30.77 ^a	0.35	30.08	31.46

a. Covariate Pre- Critical Thinking is estimated at 25.935 value

TABLE 4.96					
Table showing Adjusted mean score for interaction between Group and Locale of Critical Thinking					
Dependent Variable: Post Critical Thinking					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Urban	38.23 ^a	0.48	37.29	39.17
	Rural	35.60 ^a	0.49	34.64	36.56
Control	Urban	26.68 ^a	0.49	25.72	27.64
	Rural	25.94 ^a	0.50	24.96	26.93

a. Covariate Pre- Critical Thinking is estimated at 25.935 value

TABLE 4.97

Table depicting Two-way ANCOVA summary: Computation of $F_{y.x}$ value of Critical Thinking results in view of Pre-Test scores as Covariate.

Source of variation	df	SS	MS	$F_{y.x}$	Sig.	Remark
Group (A)	1	4714.96	4714.96	475.01	0.00	**
Locale (C)	1	118.17	118.17	11.91	0.00	**
A*C	1	37.57	37.57	3.79	0.05	*
Within Groups (Error)	163	1617.96	9.93			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.97 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Locale of Schools and their interaction on critical thinking by considering the pre-test as covariate. Two-way ANCOVA summary aims at presenting the group wise, locale wise and their interaction wise comparison of the adjusted mean values of critical thinking skill in English subject.

Effect of Group on critical thinking skill by considering the pre-test as covariate.

Form the table 4.97 it is apparent that the adjusted F-value ($F_{y.x}$) for Group was found to be 475.01 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of critical thinking skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. Accordingly, the null hypothesis proclaiming that there was no significant effect of Group on the adjusted mean values of critical thinking skill in English subject by considering their pre- critical thinking skill test as covariate was rejected. Further, the adjusted mean score of critical thinking skill developed through CAM was found to be 36.91 which was significantly superior to those of TLM group learners whose adjusted mean value of critical thinking skill was 26.31 (Vide Table 4.94). Therefore, it can be inferred that enhancement of critical thinking skill of students treated through

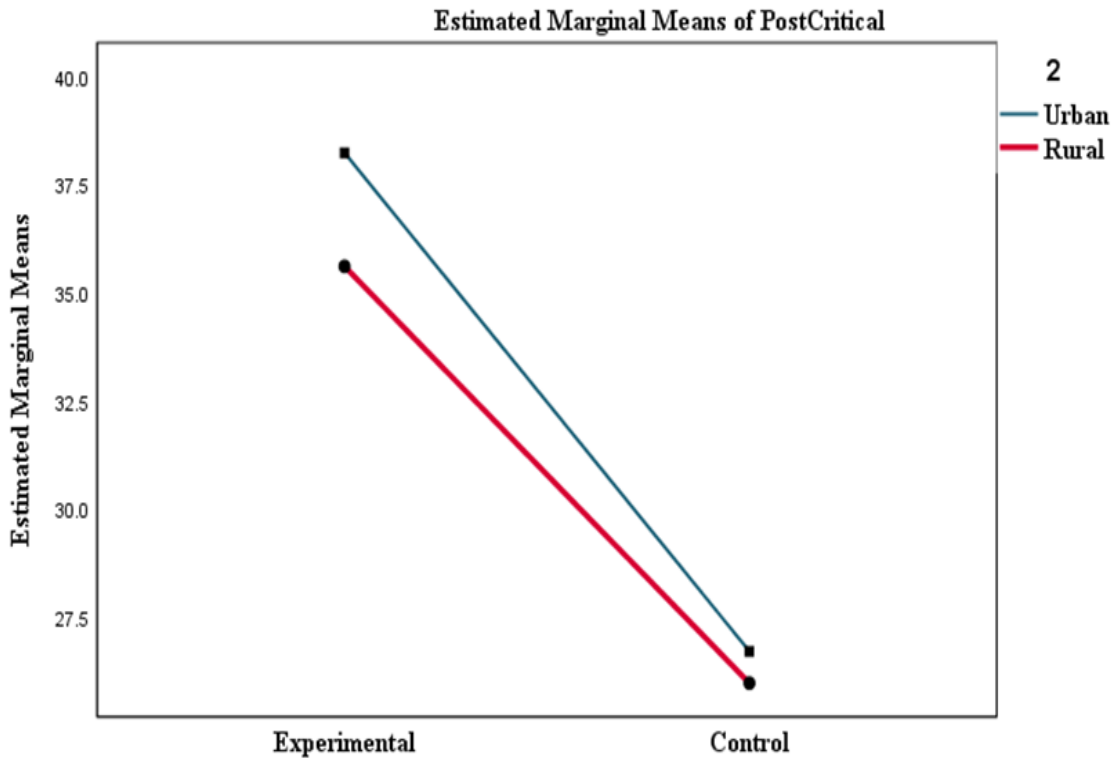
CAM was evidently superior to TLM when both the groups were matched in respect of their pre-critical thinking skill.

Effect of Locale of School on critical thinking skill by considering the pre-test as covariate.

Form the table 4.97 it is apparent that the adjusted F-value ($F_{y.x}$) for Locale of School was found to be 11.91 which was significant at 0.05 and 0.01 level with $df=1/163$. It indicates that the adjusted mean values of critical thinking skill in English subject of students of the Urban school and Rural school differed significantly when their pre-test was taken as covariate. Consequently, the null hypothesis declaring that there was no significant effect of Locale of School on adjusted mean scores of critical thinking skill in English subject by considering their pre-critical thinking skill test as covariate was rejected. Further, the adjusted mean score of critical thinking of students of schools situated in urban area was 32.46 which was significantly higher than those studying in schools situated in rural area whose adjusted mean score of critical thinking skill was 30.77 (Vide Table 4.95). Therefore, it can be resolved that learners of Urban school were found to have higher critical thinking skill as compared to their counterparts of students of Rural school when pre-critical thinking skill was regarded as covariate.

Effect of Interaction between Group and Locale of school on critical thinking skill by considering the pre-test as covariate.

Form the table 4.97 it is apparent that the adjusted F-value ($F_{y.x}$) for interaction between Group and Locale of School was found to be 3.79 which was significant at 0.05 level with $df=1/163$. It indicates that the adjusted mean values of critical thinking skill in English subject of students of the Urban school and Rural school belonging to Experimental and Control groups differed significantly when their pre-test was taken as covariate. Thus, the null hypothesis the statement of which was that there was no significant effect of Interaction between Group & Locale of School on critical thinking skill by viewing the pre-test as covariate was declined. In order to know the trend of the effect of interaction between Group and Locale of School on critical thinking skill of students by considering the pre-critical thinking test as covariate, the Graph 4.48 has been plotted below.



2

Covariates appearing in the model are evaluated at the following values: PreCritical = 25.935

Figure: 4.48

From the figure 4.48, the observation can be made that the Urban pupils belonging to the experimental group were found to have significantly higher Critical Thinking Skill compared to the Rural students belonging to the experimental group. However, no significant difference in critical thinking was observed between the urban students of the control group and the rural ones of the control group. The graph evidently illustrates that there was a sharp increase in the advance of Critical Thinking Skill in both urban & rural students as Group changes from control to the experimental one.

b) Study of the effect of Group, Locale of Schools & their interaction on creativity skill by utilizing pre-creativity as covariate

Two Way ANCOVA was employed to test the null hypothesis that declared the no significant effect of Group, Locale of Schools and their interaction on creativity skill by considering their pre-creativity skill test as covariate. The outcomes are given below-

	Group	N	Mean	SD
Experimental	Urban	48	40.85	9.56
	Rural	38	39.98	12.22
	Total	86	40.42	10.88
Control	Urban	42	29.51	8.36
	Rural	40	31.44	9.57
	Total	82	30.45	8.97
Total	Urban	90	35.31	10.61
	Rural	78	35.81	11.75
	Total	168	35.56	11.15

Dependent Variable: Post Creativity				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	39.99 ^a	0.36	39.27	40.71
Control	30.90 ^a	0.37	30.16	31.63

a. Covariate Pre- Creativity is estimated at 30.634 value

Dependent Variable: Post Creativity				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Urban	35.62 ^a	0.36	34.90	36.34
Rural	35.27 ^a	0.37	34.54	36.00

a. Covariate Pre- Creativity is estimated at 30.634 value

TABLE 4.101

Table showing Adjusted mean score for interaction between Group and Locale of Creativity Skill

Dependent Variable: Post Creativity					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Urban	40.45 ^a	0.51	39.45	41.46
	Rural	39.53 ^a	0.52	38.50	40.55
Control	Urban	30.78 ^a	0.52	29.75	31.81
	Rural	31.01 ^a	0.53	29.96	32.06

a. Covariate Pre- Creativity is estimated at 30.634 value

TABLE 4.102

Table depicting Two-way ANCOVA summary: Computation of Fy.x value of Creativity Skill results in view of Pre-Test scores as Covariate.

Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Group (A)	1	3463.28	3463.28	305.88	0.00	**
Locale (C)	1	5.07	5.07	0.45	0.50	#
A*C	1	13.95	13.95	1.23	0.27	#
Within Groups (Error)	163	1845.52	11.32			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.102 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Locale of Schools and their interaction on creativity skill by considering the pre-test as covariate. Two-way ANCOVA summary aims at presenting the group wise, locale wise and their interaction wise comparison of the adjusted mean values of creativity skill in English subject.

Effect of Group on creativity skill by considering the pre-test as covariate.

Form the table 4.102 it is obvious that the adjusted F-value ($F_{y.x}$) for Group was found to be 305.88 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of creativity skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. Consequently, the null hypothesis proclaiming that there was no significant effect of Group on the adjusted mean scores of creativity skill in English subject by considering their pre-creativity skill test as covariate was rejected. Further, the adjusted mean score of creativity skill developed through CAM was found to be 39.99 which was significantly superior to those of TLM group learners whose adjusted mean value of creativity skill was 30.90 (Vide Table 4.99). Therefore, it can be inferred that enhancement of creativity skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-creativity skill.

Effect of Locale of School on creativity skill by considering the pre-test as covariate.

Form the table 4.102 it is obvious that the adjusted F-value ($F_{y.x}$) for Locale of School was found to be 0.45 which was not significant. It demonstrates that the adjusted mean scores of creativity skill in English subject of students of the Urban school and Rural school did not vary significantly when pre-test was utilized as covariate. Thus, the null hypothesis which stated that there was no significant effect of Locale of School on adjusted mean scores of creativity skill in English subject by considering their pre-creativity skill test as covariate was not declined. Therefore, it is determined that both the students of Urban school and the students of Rural school were found to have creativity skill to the same extent when pre-creativity skill was regarded as covariate.

Effect of Interaction between Group and Locale of school on creativity skill by considering the pre-test as covariate.

Form the table 4.102 it is obvious that the adjusted F-value ($F_{y.x}$) for interaction between Group and Locale of School was found to be 1.23 which was not significant. It reflects that the adjusted mean values of creativity skill in English subject of students of the Urban school and Rural school belonging to Experimental and Control groups did not vary significantly when their pre-test was utilized as covariate. Consequently, the null hypothesis which stated that there was no significant effect of Interaction between Group & Locale of School on creativity skill by taking the pre-test as covariate was not declined. Therefore, it is conclusively resolved that creativity was observed to be non-dependent of interaction between Group & Locale of school when the pre-creativity test was considered as covariate.

c) **Study of the effect of Group, Locale of Schools & their interaction on collaboration skill in consideration of pre- collaboration as covariate**

Two Way ANCOVA was employed to test the null hypothesis which declared the no significant effect of Group, Locale of Schools and their interaction on collaboration skill by considering the pre- collaboration skill test as covariate. The outcomes are given below-

	Group	N	Mean	SD
Experimental	Urban	48	38.93	8.36
	Rural	38	37.86	8.66
	Total	86	38.41	8.47
Control	Urban	42	29.17	8.87
	Rural	40	30.68	8.62
	Total	82	29.90	8.73
Total	Urban	90	34.16	9.87
	Rural	78	34.35	9.32
	Total	168	34.26	9.57

Dependent Variable: Post Collaboration				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	38.54 ^a	0.30	37.96	39.13
Control	29.75 ^a	0.30	29.15	30.34

a. Covariate Pre4Cs is estimated at 29.631 value

Dependent Variable: Post Collaboration				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Urban	34.43 ^a	0.30	33.84	35.01
Rural	33.86 ^a	0.30	33.26	34.46

a. Covariate Pre4Cs is estimated at 29.631 value

TABLE 4.106

Table showing Adjusted mean score for interaction between Group and Locale of Collaboration Skill

Dependent Variable: Post Collaboration					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Urban	38.86 ^a	0.41	38.05	39.68
	Rural	38.22 ^a	0.42	37.39	39.06
Control	Urban	29.99 ^a	0.42	29.16	30.83
	Rural	29.50 ^a	0.43	28.64	30.36

a. Covariate Pre4Cs is estimated at 29.631 value

TABLE 4.107

Table depicting Two-way ANCOVA summary: Computation of Fy.x value of Collaboration Skill results in view of Pre-Test scores as Covariate.

Source of variation	df	SS	MS	Fy.x	Sig.	Remark
Group (A)	1	3244.17	3244.17	432.79	0.00	**
Locale (C)	1	13.49	13.49	1.80	0.18	#
A*C	1	0.24	0.24	0.03	0.86	#
Within Groups (Error)	163	1221.83	7.50			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.107 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Locale of Schools and their interaction on collaboration skill by considering the pre-test as covariate. Two-way ANCOVA summary aims at presenting the group wise, locale wise and their interaction wise comparison of the adjusted mean values of collaboration skill in English subject.

Effect of Group on collaboration skill by considering the pre-test as covariate.

Form the table 4.107 it is obvious that the adjusted F-value ($F_{y.x}$) for Group was found to be 432.79 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of collaboration skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. Accordingly, the null hypothesis proclaiming that there was no significant effect of Group on the adjusted mean scores of collaboration skill in English subject by considering their pre- collaboration skill test as covariate was rejected. Further, the adjusted mean score of collaboration skill developed through CAM was found to be 38.54 which was significantly superior to those of TLM group learners whose adjusted mean value of collaboration skill was 29.75 (Vide Table 104). Therefore, it can be inferred that enhancement of collaboration skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre- collaboration skill.

Effect of Locale of School on collaboration skill by considering the pre-test as covariate.

Form the table 4.107 it is apparent that the adjusted F-value ($F_{y.x}$) for Locale of School was found to be 1.80 which was not significant. It reveals that the adjusted mean scores of collaboration skill in English subject of students of the Urban school and Rural school did not vary significantly while their pre-test was utilised as covariate. So, the null hypothesis which stated that there was no significant effect of Locale of School on adjusted mean scores of collaboration skill in English subject by considering their pre- collaboration skill test as covariate was not rejected. Therefore, it was conclusively determined that both the students of Urban school and the students of Rural school were found to have collaboration skill to the same extent when pre- collaboration skill was regarded as covariate.

Effect of Interaction between Group & Locale of school on collaboration by utilising the pre-test as covariate.

Form the table 4.107 it is apparent that the adjusted F-value ($F_{y.x}$) for interaction between Group and Locale of School was found to be 0.03 which was not significant. It reflects that the adjusted mean values of collaboration skill in English subject of students of the Urban school and Rural school belonging to Experimental and Control groups did not vary significantly while pre-test was used as covariate. So, the null hypothesis which stated that there was no significant effect of

Interaction between Group & Locale of School on collaboration skill by treating the pre-test as covariate was not rejected. Therefore, it was conclusively determined that collaboration skill was observed to be non-dependent of interaction between Group& Locale of school when the pre-collaboration was considered as covariate.

d) Study of the effect of Group, Locale of Schools and their interaction on communication skill in consideration of pre- communication as covariate

Two Way ANCOVA was employed to test the null hypothesis which declared no significant effect of Group, Locale of Schools and their interaction on communication skill by viewing their pre-communication skill test as covariate. Its results are given below-

	Group	N	Mean	SD
Experimental	Urban	48	40.09	7.51
	Rural	38	38.57	9.02
	Total	86	39.35	8.27
Control	Urban	42	30.93	7.81
	Rural	40	32.20	6.76
	Total	82	31.55	7.30
Total	Urban	90	35.62	8.90
	Rural	78	35.46	8.57
	Total	168	35.54	8.71

Dependent Variable: Post Communication				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	39.40 ^a	0.31	38.80	40.00
Control	31.48 ^a	0.31	30.86	32.09

a. Covariate Pre-communication is estimated at 31.107 values

TABLE 4.110

Table showing Locale-wise Adjusted mean score of Communication Skill

Dependent Variable: Post Communication				
2	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Urban	35.84 ^a	0.31	35.24	36.45
Rural	35.03 ^a	0.31	34.41	35.65

a. Covariate Pre-communication is estimated at 31.107 values

TABLE 4.111

Table showing Adjusted mean score for interaction between Group and Locale of Communication Skill

Dependent Variable: Post Communication					
2		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Urban	39.95 ^a	0.43	39.10	40.79
	Rural	38.85 ^a	0.44	37.99	39.71
Control	Urban	31.74 ^a	0.44	30.88	32.61
	Rural	31.21 ^a	0.45	30.33	32.10

a. Covariate Pre-communication is estimated at 31.107 values

TABLE 4.112Table depicting Two-way ANCOVA summary: Computation of $F_{y,x}$ value of Communication Skill results by taking Pre-Test scores as Covariate.

Source of variation	df	SS	MS	F_{y,x}	Sig.	Remark
Group (A)	1	2631.74	2631.74	328.40	0.00	**
Locale (C)	1	27.68	27.68	3.45	0.06	#
A*C	1	3.28	3.28	0.41	0.52	#
Within Groups (Error)	163	1306.26	8.01			
Total	168					
Corrected Total	167					

Interpretation of the TWO-WAY ANCOVA Results:

Table 4.112 concentrates upon analysis of the data with the help of ANCOVA to show the effect of Group, Locale of Schools and their interaction on communication skill by utilising the pre-test as covariate. Two-way ANCOVA summary aims at presenting the group wise, locale wise and their interaction wise comparison of the adjusted mean values of communication skill in English subject.

Effect of Group on communication skill in view of the pre-test as covariate.

Form table 4.112 it is obvious that the adjusted F-value ($F_{y.x}$) for Group was found to be 328.40 which was significant at both 0.05 and 0.01 level with $df = 1/163$. It indicates that the adjusted mean values of communication skill in English subject of students of the control & experimental groups differed significantly when pre-test was taken as covariate. Consequently, the null hypothesis declaring that there was no significant effect of Group on the adjusted mean scores of communication skill in English subject by considering their pre- communication skill test as covariate was rejected. Further, the adjusted mean score of communication skill developed through CAM was found to be 39.40 which was significantly superior to those of TLM group learners whose adjusted mean value of communication skill was 31.48 (Vide Table 4.109). Therefore, it can be inferred that enhancement of communication skill of students treated through CAM was evidently superior to TLM when both the groups were matched in respect of their pre-communication skill.

Effect of Locale of School on communication skill by regarding the pre-test as covariate.

Form the table 4.112 it is evidently observable that the adjusted F-value ($F_{y.x}$) for Locale of School was found to be 3.45 which was not significant. It reveals that the adjusted mean scores of communication skill in English subject of students of the Urban school and Rural school did not vary significantly when pre-test was used as covariate. Accordingly, the null hypothesis which stated that there was no significant effect of Locale of School on adjusted mean scores of communication skill in English subject by considering their pre- communication skill test as covariate was not rejected. Therefore, the conclusion can determine that both the students of Urban school and the students of Rural school were found to have communication skill to the same extent when pre- communication skill test was regarded as covariate.

Effect of Interaction between Group & Locale of school on communication skill in view of the pre-test as covariate.

Form the table 4.112 it is quite obvious that the adjusted F-value ($F_{y.x}$) for interaction between Group and Locale of School was found to be 0.41 which was not significant. It reflects that the adjusted mean values of communication skill in English subject of students of the Urban school and Rural school belonging to Experimental and Control groups did not vary significantly when their pre-test was utilised as covariate. Consequently, the null hypothesis which stated that there was no significant effect of Interaction between Group & Locale of School on communication skill by taking the pre-test as covariate was not rejected. Therefore, in this context the conclusion can be determined that communication skill was observed to be independent of Group & Locale-interaction when the pre- communication test was considered as covariate.