Chapter V

Analysis And Interpretation Of Data

Chapter V

ANALYSIS AND INTERPRETATION OF DATA

V.1 INTRODUCTION:

The investigator conducted an experiment on the sample under investigation. He used valid and reliable tools in collecting the required data. Data thus collected from the experimentation of the Developed Multimedia Instructional System is further analyzed and interpreted. This chapter deals with the analysis and interpretation of the data and testing the null hypothesis.

V.2 ANALYSIS AND INTERPRETATION OF THE DATA OBTAINED IN PRE TESTING:

As it was discussed in the previous chapter, the Solomon four-group experimental design was used and a pretest on two groups was administered. The scores obtained y the pupil-teachers from both the groups in a pretest are further analyzed and interpreted in the following paragraphs. The objectives behind this analysis were to confirm the equivalency of the pupil-teachers before going for further experimental treatment. The original scores are given in Appendix N.

Table V.1

FREQUENCY DISTRIBUTION TABLE OF THE SCORES OBTAINED BY THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A PRE TEST (SCORES OUT OF 25)

C.I.	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
08 – 10	0	1	1	0	1	1
05 – 07	4	4	8	2	4	6
02 – 04	2	1	3	4	1	5
Total	**6**	**6**	**12**	**6**	**6**	**12**

Fig. V.1: SCORES OBTAIN BY EVERY INDIVIDUAL PUPIL-TEACHER FROM CON. AND EXP. GROUP IN PRE TEST

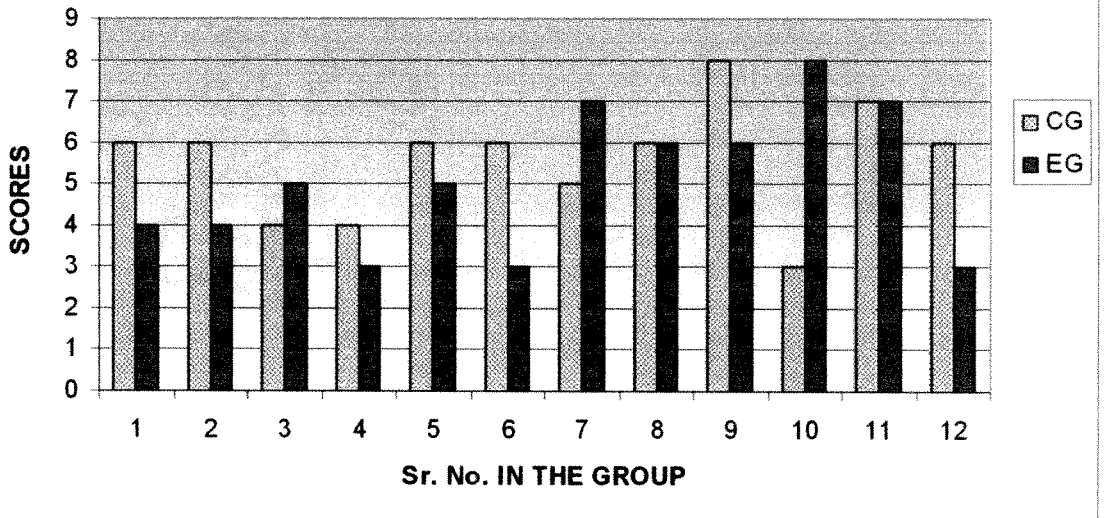


FIG. V.2: FREQUENCY DISTRIBUTION OF PUPIL-TEACHERS FROM CON. GROUP IN PRE TEST

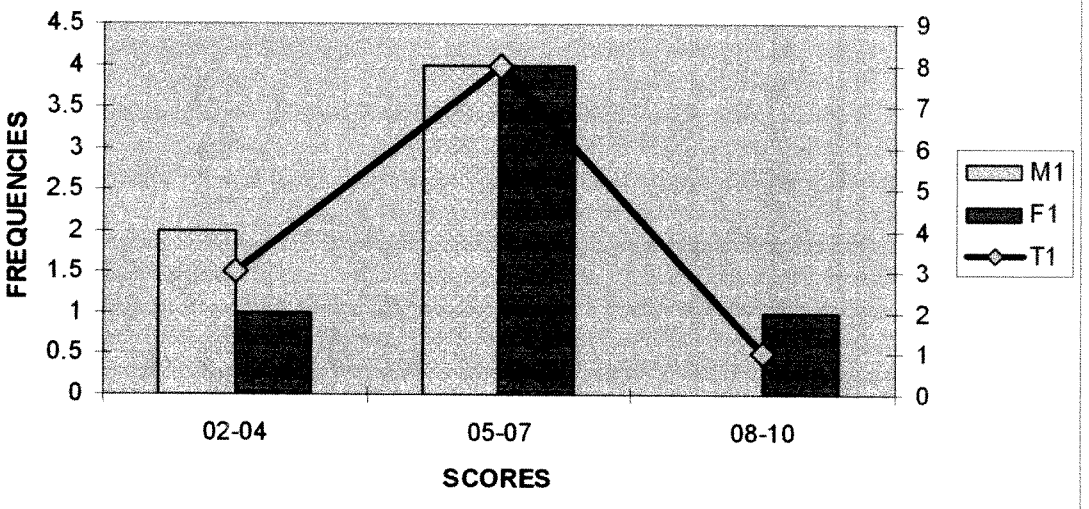


FIG. V.3: FREQUENCY DISTRIBUTION OF PUPIL-TEACHERS FROM EXP. GROUP IN PRE TEST

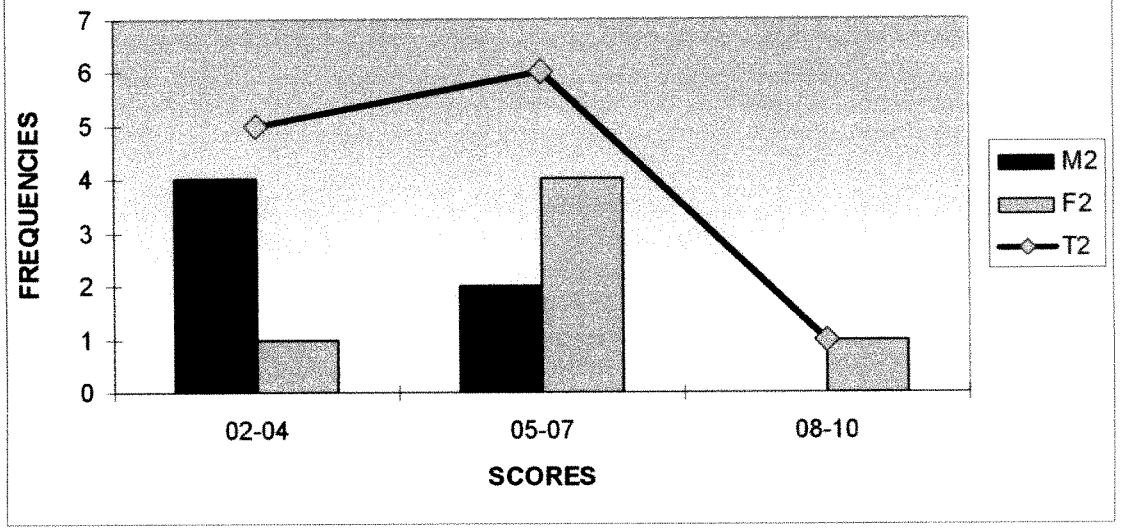


FIG. V.4: FREQUENCY DISTRIBUTION OF MALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN PRE TEST

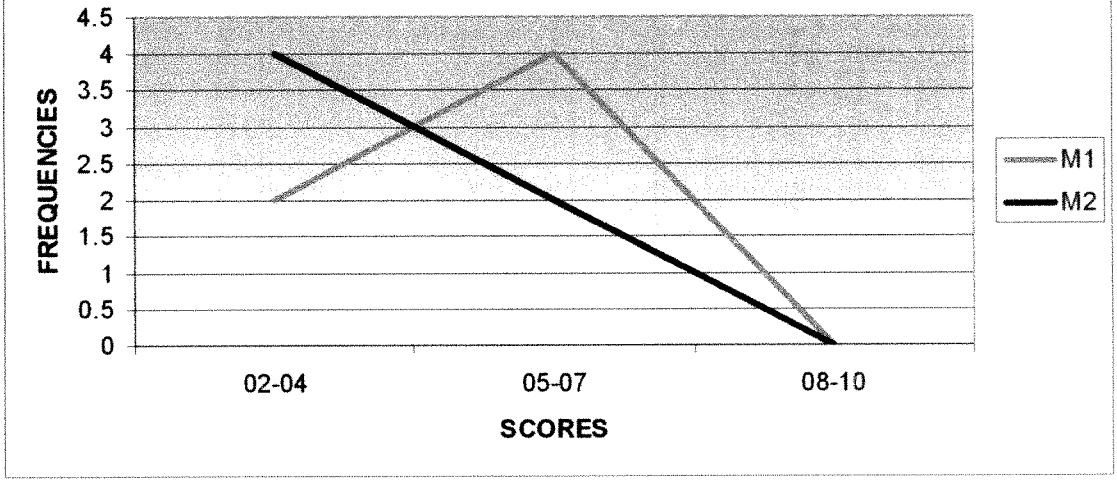


FIG. V.5: FREQUENCY DISTRIBUTION OF FEMALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN PRE TEST

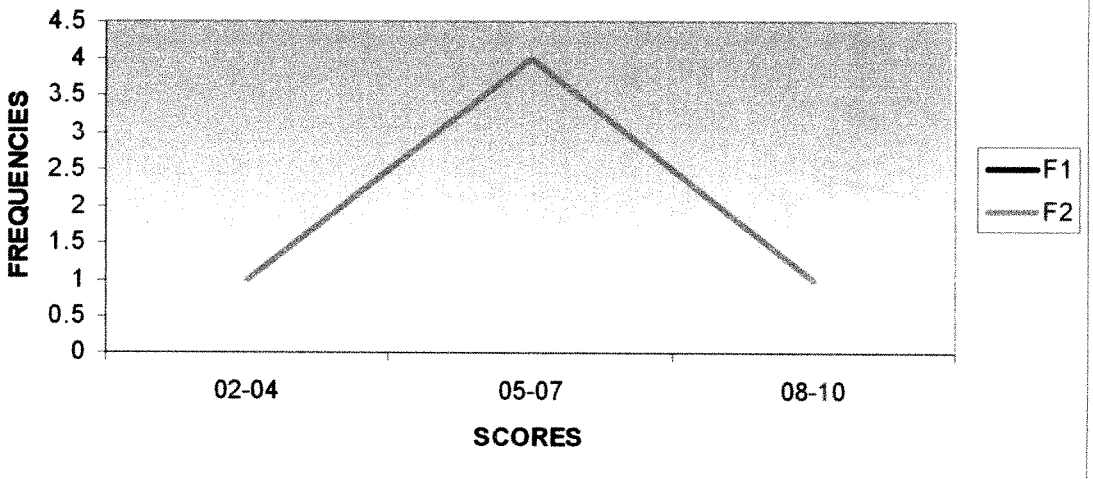
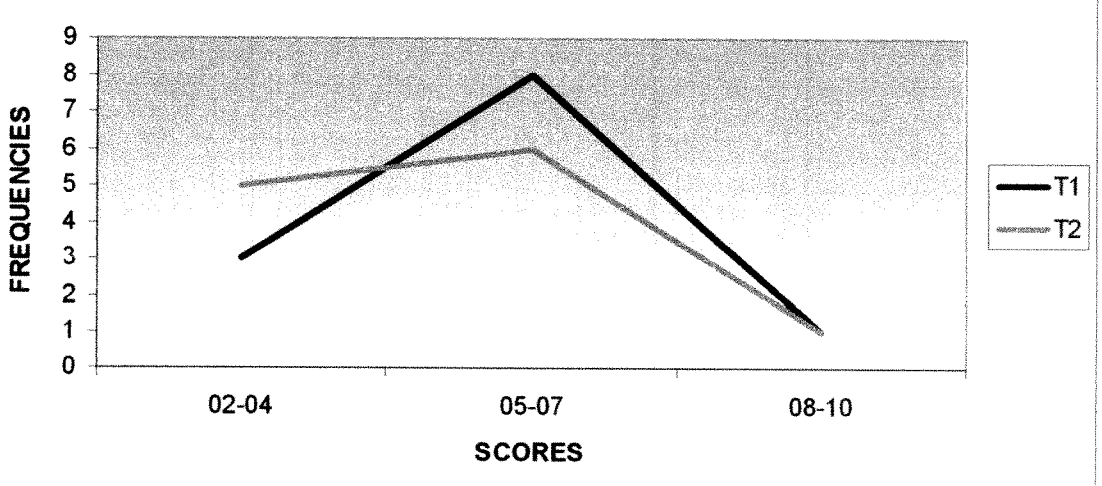


FIG. V.6: COMPARATIVE GRAPH OF THE FREQUENCIES OF TOTAL PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN PRE TEST



The above table is based on the data given in Appendix (N). The means and S.D.S. of the scores were calculated and tabulated in the next table.

The scores obtained by every individual pupil teacher from control and experimental group are depicted in Fig. V.1, which indicates that the pairs are nearly equivalent in the groups in a pre-test.

Fig. V.2 and Fig. V.3 are the frequency distribution graphs of the frequencies obtained by the male pupil-teachers, female pupil-teachers and total 24 pupil-teachers from control and experimental groups respectively. The graphs show the difference in frequencies of male and female pupil-teachers in both the groups.

Fig. V.4 is a comparative graph of frequencies of male pupil-teachers from control and experimental groups in pre test. The frequencies from both the groups nearly coincide which indicates that the scores obtained by the male pupil teachers are nearly equivalent in both the groups.

Fig. V.5 is a comparative graph of frequency distribution obtained by the female pupil-teachers from control and experimental groups respectively. The V.5 also shows that the frequencies of female pupil-teachers from both the groups coincide which indicates that the scores obtained by the female pupil-teachers are equivalent in both the groups.

Fig. V.6 is a comparative graph of frequencies of total pupil-teachers from control and experimental groups in pre test. The frequencies from both the groups nearly coincide which indicates that the scores obtained by the pupil teachers are nearly equivalent in both the groups are nearly equivalent.

Table V.2

MEANS AND S.D.s OF THE SCORES OBTAINED BY THE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A PRE TEST (SCORES OUT OF 25)

Measure	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
N	6	6	12	6	6	12
M	5.33	5.83	5.58	4.00	6.16	5.08
σ	1.5414	2.244	1.9626	1.122	2.353	1.9094

The following was the null hypothesis to be tested.

Ho.1: There is no significant difference between the performance of the pupil-teachers from control and experimental group in pretest.

The significance of differences between the statistical measures were calculated by using t technique and interpreted in the following tables.

Table V.3

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE MALE AND FEMALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRETEST SCORES

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	6	6	6	6
M	5.33	5.83	4.00	6.16
σ	1.541	2.244	1.122	2.353
D means	0.50		2.16	
t	0.597 (NS)		2.71 (NS)	
df	10		10	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.1: There is no significant difference between the means in performance of the male and female pupil-teachers from the control group in pre test.

Ho 1.2: There is no significant difference between the means in performance of the male and female pupil-teachers from the experimental group in pre test.

The differences between the means of male and female pupil teachers from control and experimental groups in pre test scores were 0.50 and 2.16 are found to be non-significant at 0.05 and 0.01 levels of significance because **the t values are less than 2.23 and 3.17 for df 10. Hence the hypothesis Ho 1.1 and Ho 1.2 are accepted.** It means that male and female pupil teachers from any group do not differ in their performance in the pre test.

Table V.4

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	**Control group**	**Experimental group**
	F_1	**F_2**
N	6	6
M	5.83	6.16
σ	2.244	2.353
D means	0.33	
t	0.3303 (NS)	
df	10	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.3: There is no significant difference between the means in performance of the female pupil-teachers from control and experimental group in pre test.

The difference between the means of females pupil-teachers from control and experimental groups in pretest scores was 0.33, is found to be non-significant at 0.05 and 0.01 levels of significance because **the t value is less than 2.33 and 3.17 for df 10. Hence the null hypothesis is accepted.** It means that the female pupil teachers from control and experimental groups do not differ in their performance in the pre test.

Table V.5

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE MALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	Control group	Experimental group
	M_1	M_2
N	6	6
M	5.33	4.00
σ	1.541	1.122
D means	1.33	
t	2.035 (NS)	
df	10	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.4: There is no significant difference between the means in performance of the male pupil-teachers from control and experimental group in pre test.

From table V.5, the difference between the means of male pupil-teachers from control and experimental in pre-test scores was 1.33, is found to be non-

significant at 0.05 and 0.01 levels of significance because **the t value is less than 2.23 and 3.17 for df 10. Hence the hypothesis is accepted.** It means that the male pupil-teachers from control and experimental groups do not differ in their performance in the pre test.

Table V.6

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	**Control group**	**Experimental group**
	T_1	T_2
N	12	12
M	5.58	5.08
σ	1.962	1.9094
D means	0.50	
t	0.7836 (NS)	
df	22	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.5: There is no significant difference between the means in performance of the total pupil-teachers from control and experimental group in pre test.

The difference between the means of pupil-teachers from control and experimental groups in pre-test scores was 0.50, is found to be non-significant at 0.05 and 0.01 levels of significance because **the t value is less than 2.07 and 2.82 for df 22. Hence the null hypothesis is accepted.** It means that the pupil-teachers from control and experimental groups do not differ in their performance in the pre test.

From the above tables (table V.3 to V.6) it can be confidently interpreted that as the differences between the means were non-significant, both the groups were equivalent in their achievement w.r.t. means before going for any further treatment in the experiment.

The significance of differences between the S.D.s of the pupil-teachers was further tested with the help of F test. The details are tabulated in following four tables.

Table V.7

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE MALE AND FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	6	6	6	6
M	5.33	5.83	4.00	6.16
σ	1.541	2.244	1.122	2.353
D.S.D.s	0.703		1.231	
F	0.2024 (NS)		4.119 (NS)	
df	5 – 5		5 – 5	

NS: Not Significant at 0.05 and 0.01 levels of significance.

Ho 1.6: There is no significant difference between the variability in performance of the male and female pupil-teachers from control group in pre test.

Ho 1.7: There is no significant difference between the variability in performance of the male and female pupil-teachers from experimental group in pre test.

The differences between the S.D.s of male and female pupil teachers from control and experimental groups in pre test scores were 0.703 and 1.231 are found to be non-significant at 0.05 and 0.01 levels of significance because **the F values are less than 5.05 and 10.97 for df 5 - 5. Hence the null hypotheses are accepted.** It means that male and female pupil teachers from any group do not differ in their variability about the performance in the pre test.

Table V.8

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE FEMALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	**Control group**	**Experimental group**
	F_1	F_2
N	6	6
M	5.83	6.16
σ	2.244	2.353
D.S.D.s	0.109	
F	0.0618 (NS)	
df	5 – 5	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.8: There is no significant difference between the variability's in performance of the female pupil-teachers from control and experimental group in pre test.

The differences between the S.D.s of female pupil teachers from control and experimental groups in pre test scores was 0.109 is found to be non-significant

at 0.05 and 0.01 levels of significance because **the F value is less than 5.05 and 10.97 for df 5 - 5. Hence the null hypothesis is accepted.** It means that female pupil teachers from control and experimental group do not differ in their variability.

Table V.9

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE MALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	**Control group**	**Experimental group**
	M_1	**M_2**
N	6	6
M	5.33	4.00
σ	1.541	1.122
D.S.D.s	0.419	
F	2.921 (NS)	
df	5 – 5	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.9: There is no significant difference between the variability's in performance of the male pupil-teachers from control and experimental group in pre test.

The differences between the S.D.s of male pupil teachers from control and experimental groups in pre test scores was 0.419, is found to be non-significant at 0.05 and 0.01 levels of significance because **the F value is less than 5.05 and 10.97 for df 5 - 5. Hence the null hypothesis is accepted.** It means that male pupil teachers from control and experimental group do not differ in their variability about the performance in pre test.

Table V.10

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE TOTAL PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE TEST SCORES

Measure	Control group	Experimental group
	T_1	T_2
N	12	12
M	5.58	5.08
σ	1.9626	1.9094
D.S.D.s	0.0532	
F	0.4002 (NS)	
df	11 – 11	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho 1.9: There is no significant difference between the variability's in performance of the total pupil-teachers from control and experimental group in pre test.

The differences between the S.D.s of the total pupil teachers from control and experimental groups in pre test scores was 0.0532, is found to be non-significant at 0.05 and 0.01 levels of significance because **the F value is less than 2.79 and 4.40 for df 11 - 11. Hence the hypothesis is accepted.** It means that male pupil teachers from control and experimental group do not differ in their variability about the performance in pre test.

From the above tables (table V.7 to V.10) it can be confidently interpreted that as the differences between the S.D.s were non-significant, both the groups were equivalent in their achievements w.r.t. S.D.s before going for any further treatment in the experiment.

The analysis and interpretation of the data obtained in pre testing confirmed the equivalency of the control and experimental groups before going to a further treatment. **The hypothesis Ho.1 is accepted**. The sub-groups of male and female pupil teachers i.e. M_1, F_1, M_2 and F_2 were also found to be equivalent in their performances at pre test. This analysis helped the investigator to form four parallel groups for further analysis and interpretation.

V.3 ANALYSIS AND INTERPRETATION OF THE DATA OBTAINED IN POST TESTING:

The analysis and interpretation of the data obtained in pre-testing confirmed the equivalency of control and experimental groups. M_1, F_1, M_1, F_2 groups were also found to be equivalent. The control group was then exposed to conventional instructional system for the two units in Educational Technology and the experimental group was treated with the developed multimedia instructional system for the same units. A post test was again administrated on both the groups after the treatment. The data obtained in terms of scores was further analyzed and interpreted in the following tables. The original scores are given in Appendix O

Table V.11

FREQUENCY DISTRIBUTION TABLE OF THE SCORES OBTAINED BY THE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A POST TEST (SCORES OUT OF 25)

C.I.	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
22 – 24	0	0	0	4	5	9
19 – 21	0	0	0	7	6	13
16 – 18	6	7	13	1	1	2
13 – 15	3	2	5	0	0	0
10 – 12	2	2	4	0	0	0
7 – 9	0	1	1	0	0	0
4 – 6	1	0	1	0	0	0
Total	**12**	**12**	**24**	**12**	**12**	**24**

The above table is based on the data given in Appendix O.

Fig. V.7: SCORES OBTAIN BY EVERY INDIVIDUAL FROM CON. AND EXP. GROUP IN POST TEST

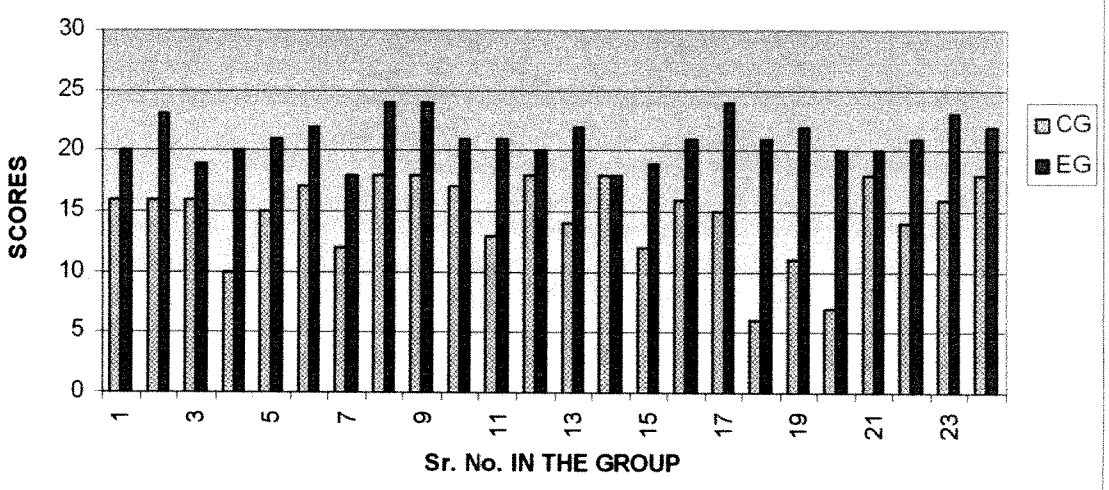


FIG. V.8: FREQUENCY DISTRIBUTION OF PUPIL-TEACHERS FROM CON. GROUP IN POST TEST

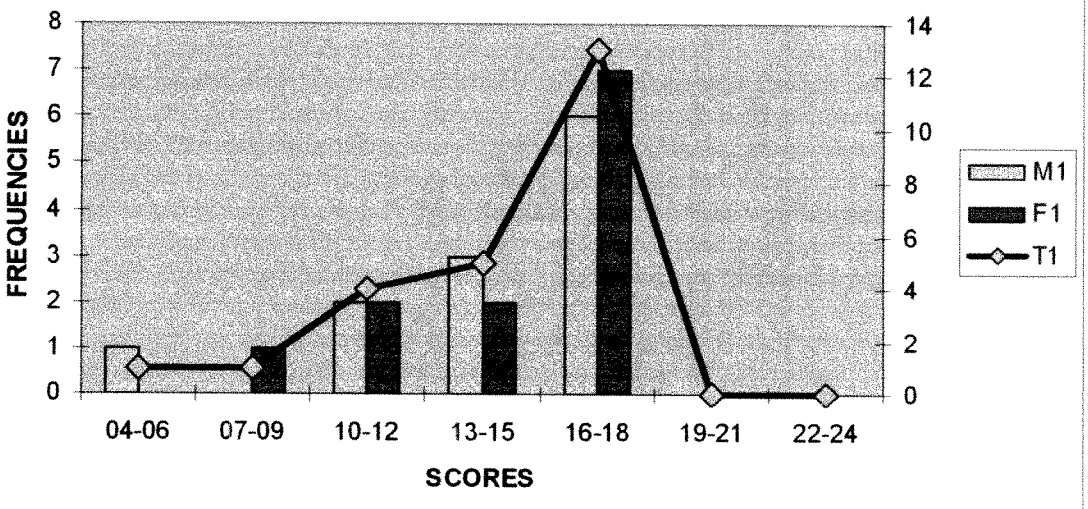


FIG. V.9: FREQUENCY DISTRIBUTION OF PUPIL-TEACHERS FROM EXP. GROUP IN POST TEST

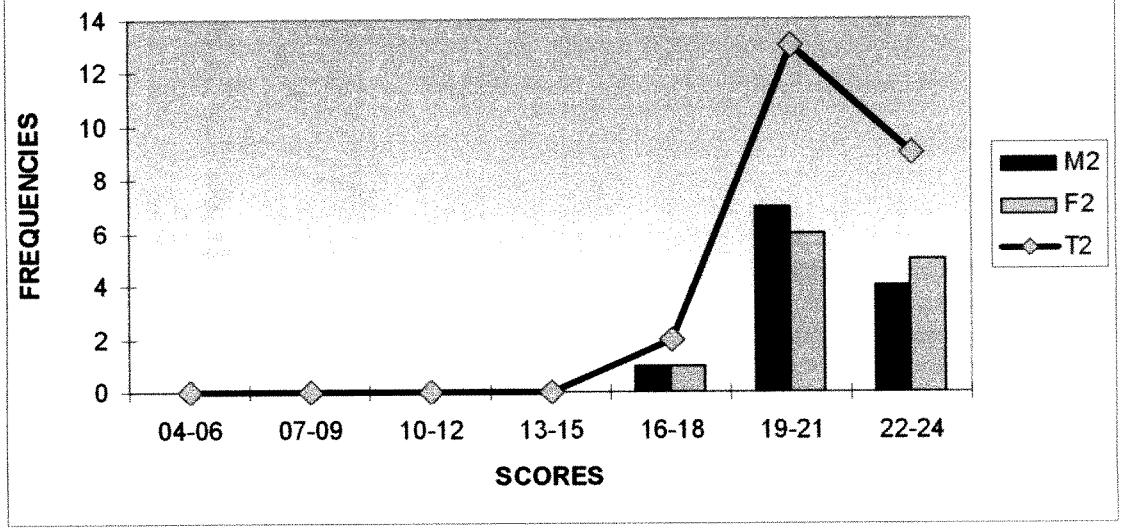


FIG. V.10: FREQUENCY DISTRIBUTION OF MALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN POST TEST

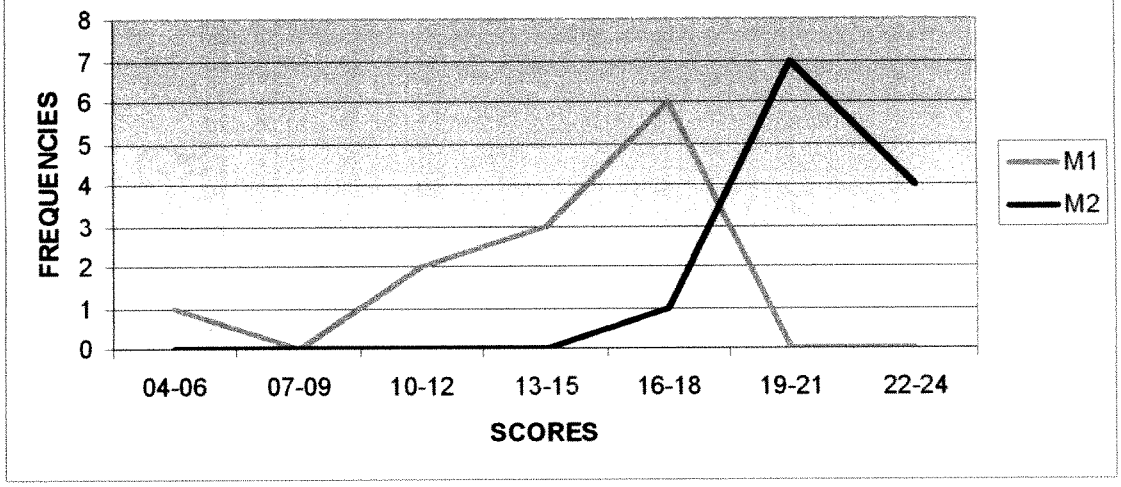


FIG. V.11: FREQUENCY DISTRIBUTION OF FEMALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN POST TEST

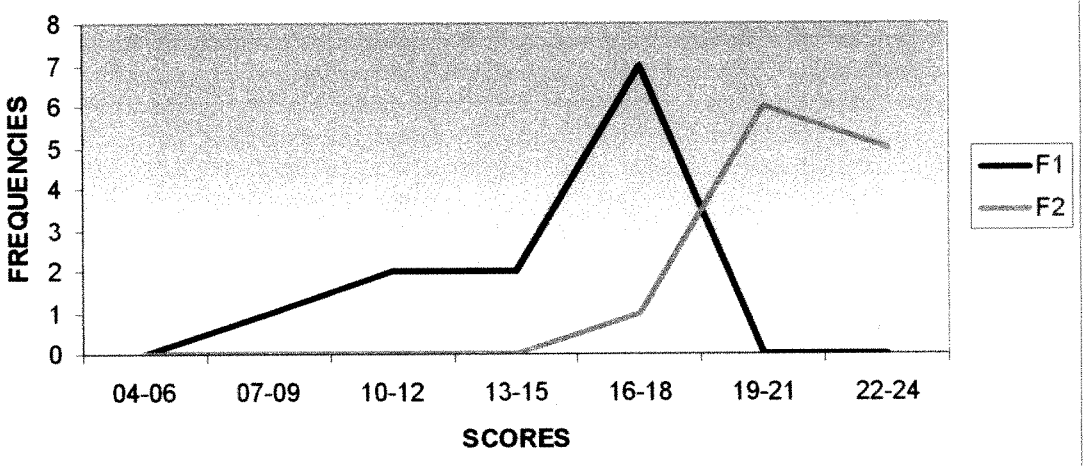
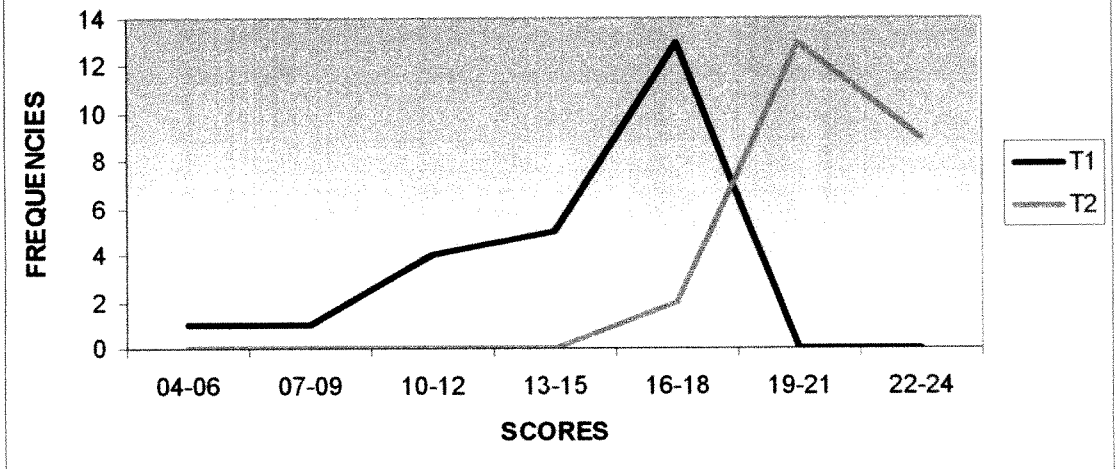


FIG. V.12: COMPARATIVE GRAPH OF THE FREQUENCIES OF TOTAL PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN POST TEST



The scores obtained by every individual pupil teacher from control and experimental group in post test are depicted in Fig. V.7, which indicates that the pairs are not equivalent in the groups in a post-test.

Fig. V.8 and Fig. V.9 are the frequency distribution graphs of the frequencies obtained by the male, female and total 24 pupil-teachers from control and experimental groups respectively. The frequencies of male and female pupil-teachers do not coincide in any group.

Fig. V.10 is a comparative graph of frequency distribution of male pupil-teachers from control and experimental groups in post test. The frequencies of males from both the groups in post test do not coincide which means that the sub-groups M_1 and M_2 are not equivalent in scores in post-test.

Fig. V.11 represents a comparative graph of frequency distribution of female pupil-teachers from control and experimental groups in post-test. The frequencies of females from both the groups in post test do not coincide which means the sub-groups F_1 and F_2 are not equivalent in scores in post test.

The Fig. V.12 represents a comparative graph of frequency distribution of total 24 pupil-teachers from control and experimental groups in post test. The frequencies of pupil-teachers from both the groups in post test do not coincide which means that the control and experimental groups are not equivalent in scores in post test.

The means and S.D.s of the scores in post test were calculated and tabulated in the following table.

Table V.12

MEANS AND S.D.S OF THE SCORES OBTAINED BY THE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A POST TEST (SCORES OUT OF 25)

Measure	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
N	12	12	24	12	12	24
M	14.25	15	14.625	20.83	21.33	21.08
σ	3.780	2.076	2.234	4.469	4.638	4.650

The following was null hypothesis to be tested.

Ho. 2: There is no significant difference between the performance of the pupil-teachers from the control and experimental group in post-test.

The significance of the difference between the statistical measures were calculated by using t technique and interpreted in the following tables.

Table V.13

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE MALE AND FEMALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	12	12	12	12
M	14.25	15	20.83	21.33
σ	3.780	2.076	4.469	4.638
D means	0.75		0.50	
t	0.5235 (NS)		0.6867 (NS)	
df	22		22	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho. 1: There is no significant difference between the means of the male and female pupil-teachers from the control group in post-test scores.

Ho. 2: There is no significant difference between the means of the male and female pupil-teachers from the experimental group in post-test scores.

The differences between the means of male and female pupil teachers from control and experimental groups in pre test scores were 0.75 and 0.50 are found to be non-significant at 0.05 and 0.01 levels of significance because **the t values are less than 2.07 and 2.82 for df 22. So the null hypotheses are accepted.** It means that male and female pupil teachers from any group do not differ in their performance in the post test.

Table V.14

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE FEMALE TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	**Control group**	**Experimental group**
	F_1	F_2
N	12	12
M	15	21.33
σ	2.076	4.638
D means	6.33	
t	5.424 *	
df	22	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3: There is no significant difference between the mean of the female pupil-teachers from the control and experimental group in post-test scores.

From the table V.14, the difference between the means of females pupil-teachers from control and experimental groups in post test scores was 6.33, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df 22. Hence the null hypothesis Ho 2.3 is rejected** which means that the female pupil teachers from control and experimental groups differ in their performance as compared with the female pupil teachers from the control group in the post test. It means the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the female pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

Table V.15

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE MALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	**Control group**	**Experimental group**
	M_1	**M_2**
N	12	12
M	14.25	20.83
σ	3.780	4.469
D means	6.58	
t	5.961*	
df	22	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 2.4: There is no significant difference between the means of the male pupil-teachers from the control and experimental group in post-test scores.

The difference between the means of male pupil-teachers from control and experimental in post test scores was 6.58, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df. 22. Hence the null hypothesis Ho. 2.4 is rejected.** It means that the male pupil-teachers from control and experimental groups differ in their performance as compared with the male pupil-teachers from control group in post test. It means the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the male pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

Table V.16

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE TOTAL PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	**Control group**	**Experimental group**
	T_1	T_2
N	24	24
M	14.625	21.08
σ	2.234	4.650
D means	12.91	
t	8.1602*	
df	46	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 2.5: There is no significant difference between the mean of the total pupil-teachers from the control and experimental group in post-test scores.

The difference between the means of total pupil-teachers from control and experimental in post-test scores was 12.91, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.02 and 2.69 for df 46. Hence the null hypothesis is rejected.** It means that the pupil-teachers from control and experimental groups differ in their performance as compared with the total pupil-teachers from the control group in the post test. It means the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the total pupil-teachers treated than the total pupil-teaches treated with **Conventional Instructional System (CIS)** in the control group.

From the above tables (table V.13 to V.16) it can be confidently interpreted that as the differences between the means were significant, both the groups were not equivalent in their achievements w.r.t. means in post test after the treatment in the experiment.

The significance of differences between the S.D.s of the pupil-teachers was further tested with the help of F test. The details are tabulated in following four tables.

Table V.17

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE MALE AND FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	12	12	12	12
M	14.25	15	20.83	21.33
σ	3.780	2.076	4.469	4.638
D.S.D.s	1.704		0.169	
F	0.3625 (NS)		0.072 (NS)	
df	11 – 11		11 – 11	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho. 2.6: There is no significant difference between the variability in performance of the male and female pupil-teachers from the control group in post-test.

Ho. 2.7: There is no significant difference between the variability in performance of the male and female pupil-teachers from the experimental group in post-test.

The differences between the S.D.s of male and female pupil teachers from control and experimental groups in post test scores were 1.704 and 0.169 are found to be non-significant at 0.05 and 0.01 levels of significance because **the F value is less than 2.79 and 4.40 for df 11 - 11. Hence the null hypotheses are accepted.** It means that male and female pupil teachers from both the group do not differ in their variability about the performance in the post test.

Table 4.18

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE FEMALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	**Control group**	**Experimental group**
	F_1	**F_2**
N	12	12
M	15	21.33
σ	2.076	4.638
D.S.D.s	2.562	
F	18.610*	
df	11 – 11	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 2.8: There is no significant difference between the variability in performance of the female pupil-teachers from the control and experimental group in post-test.

The differences between the S.D.s of female pupil teachers from control and experimental groups in post test scores was 2.562, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df 11 - 11. The null hypothesis is rejected.** It means that female pupil teachers from control and experimental group differ in their variability about the performance in the post test.

Table V.19

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE MALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	**Control group**	**Experimental group**
	M_1	**M_2**
N	12	12
M	14.25	20.83
σ	3.780	4.469
D.S.D.s	0.689	
F	15.165*	
df	11 – 11	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 2.9: There is no significant difference between the variability in performance of the male pupil-teachers from the control and experimental group in post-test.

The differences between the S.D.s of male pupil teachers from control and experimental groups in post test scores was 0.689, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df 11 - 11. The null hypothesis is rejected.** It means that male pupil teachers from control and experimental group differ in their variability about the performance in the post test.

Table V.20

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.S OF THE TOTAL PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN POST TEST SCORES

Measure	**Control group**	**Experimental group**
	T_1	T_2
N	24	24
M	14.625	21.083
σ	2.234	4.650
D.S.D.s	2.416	
F	37.61*	
df	23 – 23	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 2.10:There is no significant difference between the variability in performance of the total pupil-teachers from the control and experimental group in post-test.

The differences between the S.D.s of the total pupil teachers from control and experimental groups in post test scores was 2.416, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.00 and 2.70 for df 23 - 23. Hence the null hypothesis is rejected.** It means that total pupil teachers from control and experimental group differ in their variability about the performance in post test.

From the above tables (table V.17 to V.20) it can be confidently interpreted that as the differences between the S.D.s were found to be significant for male and female pupil teachers but non-significant for total pupil teachers are considered. It means that the treatments in the groups when considered, as a whole did not affected the variability.

The analysis and interpretation of the data obtained in post testing indicate that the male and female pupil-teachers from control group are equally good in the performance; the male and female pupil-teachers form experimental groups are also equally good in the performance in post test. There is no significant difference between the achievement of the male and female pupil-teachers from any group. When the performance of the female pupil-teachers from control group was compared with the female pupil-teachers from experimental group, the female pupil-teachers from experimental group significantly achieved more. It is true with male pupil teachers from experimental group than in control group. When the performance of the total 24 pupil teachers from control group was compared with the performance of 24 pupil-teachers from experimental group, the experimental group significantly achieved more. The null hypothesis Ho 2 is rejected which means that the Developed Multimedia Instructional System helped the male, female and all 24 pupil-teachers in performing better than the pupil-teachers from control group. The differences between the S.D.s were found to be significant w.r.t. male and female pupil-teachers but non-significant in total which means that the treatments affected the performances in terms of means scores but not affected the performances in terms of S.D.s.

V. 4 ANALYSIS AND INTERPRETATION OF THE PRE OVER POST TEST DATA:

From the preceding tables, it was found that the control and experimental groups performed well in achievement in their respective groups. In order to understand 'How much they achieved?' the data was further analyzed to compare the differences between their performances on pre over post test in their respective groups. t-test technique is used to test the Null hypotheses.

Table V.21

STATISTICAL MEASURES REGARDING PRE AND POST TEST SCORES OBTAINED BY THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUP

	Pre Test			Post test			r	Mean diff.
	N	M	σ	N	M	σ		
CG								
M_1	6	5.33	1.54	6	14.25	3.78	0.612	8.92
F_1	6	5.83	2.24	6	15	2.07	0.08	9.17
T_1	12	5.58	1.96	12	14.62	2.23	0.283	9.04
EG								
M_2	6	4.00	1.12	6	20.83	4.46	- 0.3	16.83
F_2	6	6.16	2.35	6	21.33	4.63	- 0.015	15.17
T_2	12	5.08	1.90	12	21.08	4.65	0.027	16.00

The original scores are given in Appendices (N) and (O). The data is depicted in the figures.

Fig. V.13: SCORES OBTAIN BY EVERY INDIVIDUAL FROM CON. AND EXP. GROUP IN PRE AND POST TEST

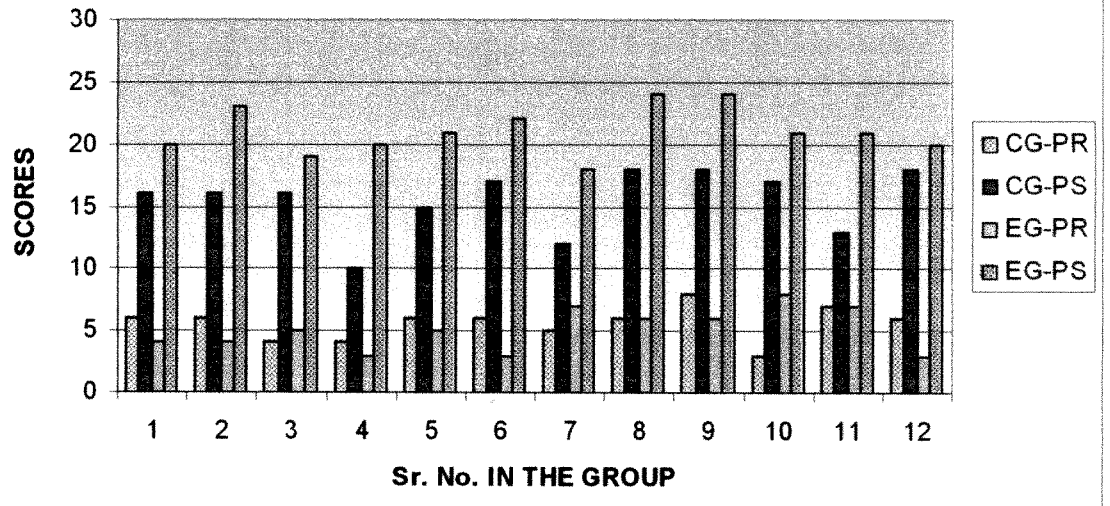


FIG. V.14: SCORES OBTAINED BY MALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN PRE AND POST TEST

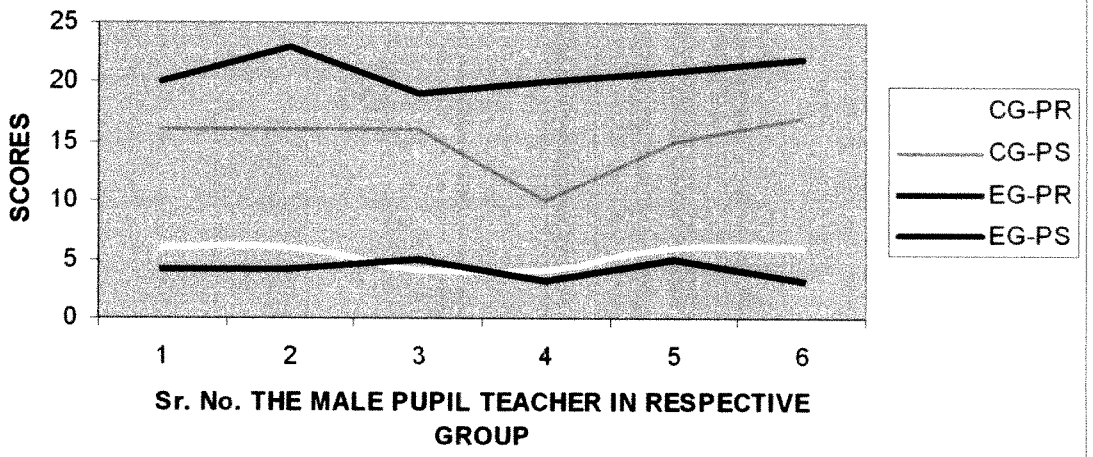


FIG. V.15: SCORES OBTAINED BY FEMALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN PRE AND POST TEST

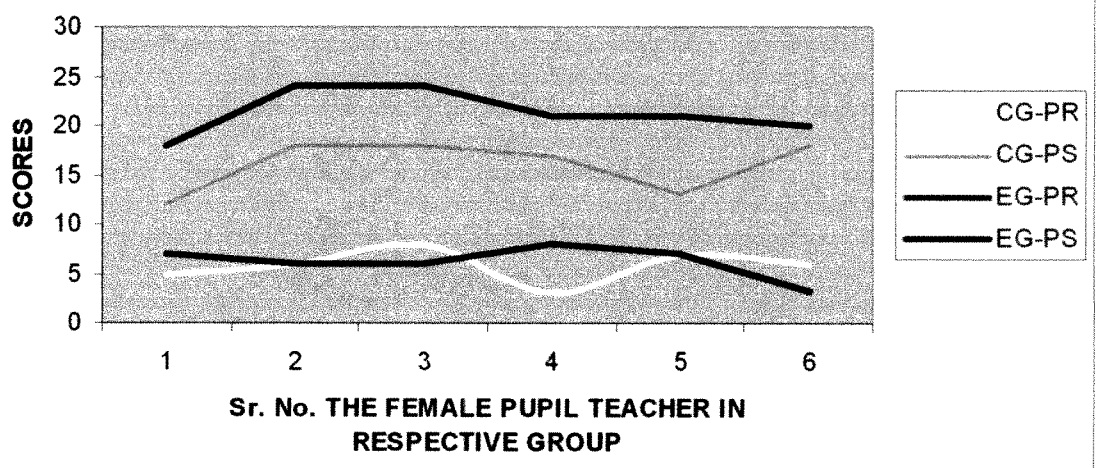


FIG. V.16: MEANS OF THE SCORES OF PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN PRE AND POST TEST

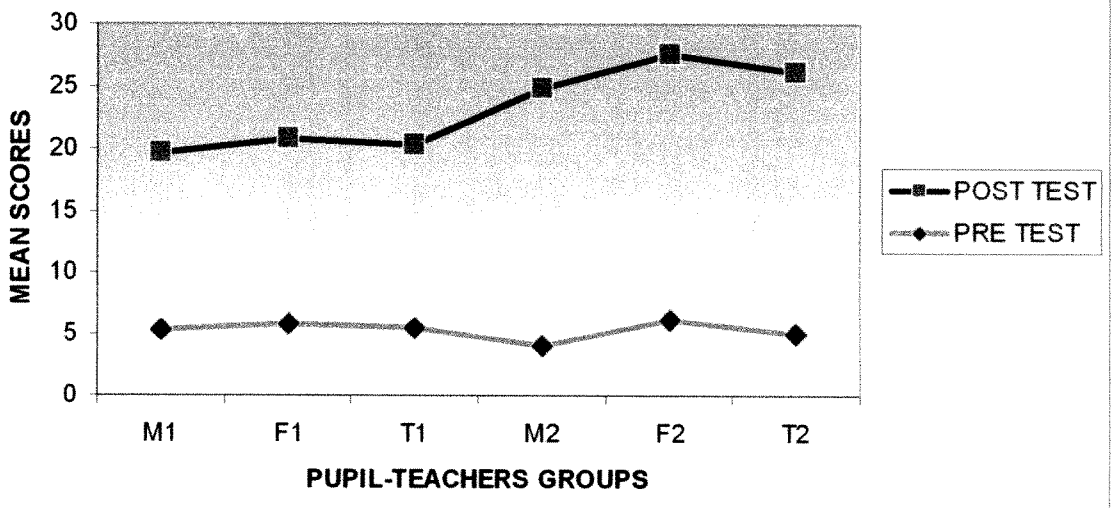


Fig. V.13 is a comparative graph of the scores obtained by every individual from control and experimental group in pre and post test. The graph clearly explains that the scores obtained by the pupil-teachers from experimental group in post test are superior to the pupil-teachers from control group.

Fig. V.14 shows the scores obtained by the male pupil teachers from both the groups in pre and post test. The graph clearly explains the difference in performance in pre over post test.

Fig. V.15 shows the scores obtained by the female pupil teachers from both the groups in pre and post test. The graph clearly explains the difference in performance in pre over post test.

Fig. V.16 is of the means of scores obtained by sub-groups M_1, M_2 and F_1, F_2 and also groups T_1, T_2 in pre and post test. The post test means are higher than pre test means w.r.t. each sub-group and total pupil-teacher from control and experimental group.

The following were the null hypotheses to be tested.

Ho. 3: There is no significant difference between the performances of the pupil-teachers from control group in pre over post testing.

Ho. 4: There is no significant difference between the performances of the pupil-teachers from experimental group in over post testing.

The coefficient of correlation between the pre test and post test scores were calculated and used in computing t values.

Since it is one-tailed test considering positive gain, statistics regarding one-tailed test is used.

Table V.22

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SCORES OBTAINED BY THE FEMALE PUPIL-TEACHERS FROM CONTROL GROUP IN PRE OVER POST TEST

Pre Test			Post test			r	Mean diff	t	df
N	M	σ	N	M	σ				
6	5.83	2.24	6	15	2.07	0.08	9.17	6.940*	10

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3.1: There is no significant difference between the means in performance of the female pupil-teachers from control group in pre over post testing.

The difference between the means of female pupil-teachers from control group in pre and post test scores was 9.17, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.23 and 3.17 for df. 10. Hence the null hypothesis is rejected** which means that female pupil-teachers from the control group at pre testing differ in their performance as compared with the performance in the post test. It means that the **Conventional Instructional System** used in the control group favored the female pupil teachers in that group. The female pupil-teachers achieved more in the post test.

Table V.23

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SCORES OBTAINED BY THE MALE PUPIL-TEACHERS FROM CONTROL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	Mean diff	t	df
6	5.33	1.54	6	14.25	3.78	0.612	8.92	8.007*	10

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3.2: There is no significant difference between the means in performance of the male pupil-teachers from control group in pre over post testing.

The difference between the means of male pupil-teachers from control group in pre and post test scores was 8.92, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.23 and 3.17 for df. 10. Hence the null hypothesis is rejected** which means that male pupil-teachers from the control group at pre testing differ in their performance as compared with the performance in the post test. It means that the **Conventional Instructional System** used in the control group favored the male pupil teachers in that group. The male pupil-teachers achieved more in the post test.

Table V.24

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SCORES OBTAINED BY THE TOTAL PUPIL-TEACHERS FROM CONTROL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	Mean diff	t	df
12	5.58	1.96	12	14.62	2.23	0.283	9.04	9.556	22

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3.3: There is no significant difference between the means in performance of the total pupil-teachers from control group in pre over post testing.

The difference between the means of total pupil-teachers from control group in pre and post test scores was 9.04, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df. 22. Hence the null hypothesis is rejected** which means that total pupil-

teachers from the control group at pre testing differ in their performance as compared with the performance in the post test. It means that the **Conventional Instructional System** used in the control group favored the total pupil teachers in that group. The pupil-teachers achieved more in the post test.

Table V.25

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SCORES OBTAINED BY THE FEMALE PUPIL-TEACHERS FROM EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	Mean diff	t	df
6	6.16	2.35	6	21.33	4.63	- 0.015	15.17	12.80*	10

* Significant at 0.05 and 0.01 levels of significance.

Ho. 4.1: There is no significant difference between the means in performance of the female pupil-teachers from experimental group in pre over post testing.

The difference between the means of female pupil-teachers from experimental group in pre and post test scores was 15.17, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.23 and 3.17 for df. 10. Hence the null hypothesis is rejected.** It means that female pupil-teachers from the experimental group at pre testing differ in their performance as compared with the performance in the post test. It means that the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the female pupil teachers in that group. The female pupil-teachers achieved more in the post test.

Table V.26

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SCORES OBTAINED BY THE MALE PUPIL-TEACHERS FROM EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	Mean diff	t	df
6	4	1.12	6	20.83	4.46	- 0.3	16.83	12.97*	10

* Significant at 0.05 and 0.01 levels of significance.

Ho. 4.2: There is no significant difference between the means in performance of the male pupil-teachers from experimental group in pre over post testing.

The difference between the means of male pupil-teachers from experimental group in pre and post test scores was 16.83, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.23 and 3.17 for df. 10. Hence the null hypothesis is rejected**. It means that male pupil-teachers from the experimental group at pre testing differ in their performance as compared with the performance in the post test. It means that the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the male pupil teachers in that group. The male pupil-teachers achieved more in the post test.

Table V.27

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF SCORES OBTAINED BY THE TOTAL PUPIL-TEACHERS FROM EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	Mean diff	t	df
12	5.08	1.90	12	21.08	4.65	0.027	16	21.68*	22

* Significant at 0.05 and 0.01 levels of significance.

Ho. 4.3: There is no significant difference between the means in performance of the total pupil-teachers from experimental group in pre over post testing.

The difference between the means of total pupil-teachers from experimental group in pre and post test scores was 16, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df. 22. Hence the null hypothesis is rejected** which means that total pupil-teachers from the control group at pre testing differ in their performance as compared with the performance in the post test. It means that the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the male pupil teachers in that group. The male pupil-teachers achieved more in the post test.

The significance of difference between the S.D.s of the pupil-teachers was further tested with the help of F test. The details are tabulated in following six tables.

Table V.28

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF SCORES OBTAINED BY THE FEMALE PUPIL-TEACHERS FROM CONTROL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	S.D. diff.	F	df
6	5.83	2.24	6	15	2,07	0,08	0.17	54.32*	5-5

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3.4: There is no significant difference between the variability's in performance of the female pupil-teachers from control group in pre over post testing.

The difference between the S.D.s of female pupil-teachers from control group in pre and post test scores was 0.17, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 5.05 and 10.97 for df. 5-5. Hence the null hypothesis is rejected.** It means that female pupil-

teachers from the control group at pre testing differ in their variability as compared with the variability in the post test.

Table V.29

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF SCORES OBTAINED BY THE MALE PUPIL-TEACHERS FROM CONTROL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	S.D. diff.	F	df
6	5.33	1.54	6	14.25	3.78	0.612	2.24	28.68*	5-5

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3.5: There is no significant difference between the variability's in performance of the male pupil-teachers from control group in pre over post testing.

The difference between the S.D.s of male pupil-teachers from control group in pre and post test scores was 2.24, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 5.05 and 10.97 for df. 5-5. Hence the null hypothesis is rejected** which means that male pupil-teachers from the control group at pre testing differ in their variability as compared with the variability in the post test.

Table V.30

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF SCORES OBTAINED BY THE TOTAL PUPIL-TEACHERS FROM CONTROL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	S.D. diff.	F	df
12	5.58	1.96	12	14.62	2.23	0.283	0.27	10.58*	11-11

* Significant at 0.05 and 0.01 levels of significance.

Ho. 3.6: There is no significant difference between the variability's in performance of the total pupil-teachers from control group in pre over post testing.

The difference between the S.D.s of total pupil-teachers from control group in pre and post test scores was 0.27, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df. 11-11. Hence the null hypothesis is rejected** which means that total pupil-teachers from the control group at pre testing differ in their variability as compared with the variability in the post test.

Table V.31

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF SCORES OBTAINED BY THE FEMALE PUPIL-TEACHERS FROM EXPERIMENTAL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	S.D. diff.	F	df
6	6.16	2.35	6	21.33	4.63	- 0.015	2.28	51.25*	5-5

* Significant at 0.05 and 0.01 levels of significance.

Ho. 4.4: There is no significant difference between the variability's in performance of the female pupil-teachers from experimental group in pre over post testing.

The difference between the S.D.s of female pupil-teachers from experimental group in pre and post test scores was 2.28, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 5.05 and 10.97 for df. 5 - 5. Hence the null hypothesis is rejected** which means that female pupil-teachers from the experimental group at pre testing differ in their variability as compared with the variability in the post test.

Table V.32

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF SCORES OBTAINED BY THE MALE PUPIL-TEACHERS FROM EXPERIMENTAL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	S.D. diff.	F	df
6	4.00	1.12	6	20.83	4.46	- 0.015	3.34	80.39*	5 - 5

* Significant at 0.05 and 0.01 levels of significance.

Ho. 4.5: There is no significant difference between the variability's in performance of the male pupil-teachers from experimental group in pre over post testing.

The difference between the S.D.s of male pupil-teachers from experimental group in pre and post test scores was 3.34, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 5.05 and 10.97 for df. 5 - 5. Hence the null hypothesis is rejected** which means that male pupil-teachers from the experimental group at pre testing differ in their variability as compared with the variability in the post test.

Table V.33

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF SCORES OBTAINED BY THE TOTAL PUPIL-TEACHERS FROM EXPERIMENTAL GROUP IN PRE OVER POST TEST

Pre Test			Post test						
N	M	σ	N	M	σ	r	S.D. diff.	F	df
12	5.08	1.90	12	21.08	4.65	0.027	2.75	12.18*	11 - 11

* Significant at 0.05 and 0.01 levels of significance.

Ho. 4.6: There is no significant difference between the variability's in performance of the total pupil-teachers from experimental group in pre over post testing.

The difference between the S.D.s of total pupil-teachers from experimental group in pre and post test scores was 2.75, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df. 11 - 11. Hence the null hypothesis is rejected** which means that total pupil-teachers from the experimental group at pre testing differ in their variability as compared with the variability in the post test.

From the above tables V.22 to V.24 and V.28 to V.30, the analysis and interpretation of the data obtained in pre over post testing for the control group indicate that when the performance in pre and post test of the female pupil-teachers from the control group was compared, the female pupil-teachers significantly achieved more in post test. Same is true with the male pupil-teachers from the control group. When the performance in pre and post test of the total 24 pupil-teachers from control group was compared, the total 24 pupil-teachers from control group significantly achieved more in pos test. So **the null hypothesis Ho.3 is rejected** which indicates that the **Conventional Instructional System (CIS)** helped he female pupil teachers, male pupil-teachers and all 24 pupil-teachers from control group in performing better in pre over post test. The differences between S.D.s were found to be significant for female pupil-teachers, male pupil-teachers and total pupil-teachers who mean that the treatments affected the performances in terms of S.D.s for female, male and total pupil-teachers.

From the tables V.25 to V.27 and V.31 to V.33, the analysis and interpretation of the data obtained in pre over post testing for the experimental group indicates that when the performance in pre and post test of the female pupil-teachers from experimental group was compared, the female pupil-teachers significantly achieved more in post test. Same is true with the male pupil-teachers from the experimental group. When the performance in pre and

post test of the total 24 pupil teachers from experimental group was compared, the total 24 pupil-teachers from experimental group achieved more in post test. So **the null hypothesis Ho.4 is rejected** which indicates that **Developed Multimedia Instructional System (MIS)** helped the female pupil-teachers and all 24 pupil-teachers from experimental group in performing better in pre over post test. The difference between S.D.s were found to he significant for female, male and total pupil teachers which means that treatments affected the performances in terms of S.D.s.

From the above tables, it seems that the t values w.r.t. means for the experimental group are higher than those for control group which indicates that the pupil-teachers from experimental group achieved more than the pupil-teachers from control group.

V.5 ANALYSIS AND INTERPRETATION OF THE GAINS IN ACHIEVEMENT IN TERMS OF SCORES OF THE TWO GROUPS:

From the preceding tables, it is clear that all pupil-teachers from both the groups gained in pre over post test, but which group gained more is not yet answered. Answer to this question can be found in the following paragraphs:

The following was the null hypothesis which is to be tested:

Ho.5 There is no significant difference between the gains in achievement in terms of scores in pre over post test of the pupil-teachers from control and experimental group.

The gains in terms of scores of all individual pupil-teachers were calculated. Mean of gains and S.D.s of gains were also calculated. The significance of difference between the statistical measures was tested by using t test technique.

Table V.34

FREQUENCY DISTRIBUTION TABLE OF THE GAINS IN SCORES OBTAINED BY THE PUPIL TEACHERS OF CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

C.I.	Control Group			Experimental Group		
	F_1	M_1	T_1	F_2	M_2	T_2
17 – 19	0	0	0	3	3	6
14 – 16	1	0	1	1	3	4
11 – 13	2	2	4	2	0	2
8 – 10	1	3	4	0	0	0
5 – 7	2	1	3	0	0	0
Total	**6**	**6**	**12**	**6**	**6**	**12**

The above table is based on the data given in Appendix (P). The means and S.D.s of the scores were calculated and tabulated in the next table.

Fig. V.17 is a comparative graph of the gains of every individual in pre over post test. The bars clearly states that the gains in scores in pre over post test is not equivalent and experimental group achieved more.

Fig. V.18 is frequency distribution graph of gains in pre over post test scores of male pupil-teachers, female pupil-teachers and total 24 pupil-teachers from control group. Female pupil-teachers seem to be superior to male pupil-teachers in gains.

Fig. V.19 is frequency distribution graph of gains in pre over post test scores of male pupil-teachers, female pupil-teachers and total 24 pupil-teachers from experimental group. Male pupil-teachers seem to be superior to female pupil-teachers in gains.

Fig. V.17: GAINS IN SCORE OBTAINED BY EVERY INDIVIDUAL FROM CON. AND EXP. GROUP IN PRE OVER POST TEST

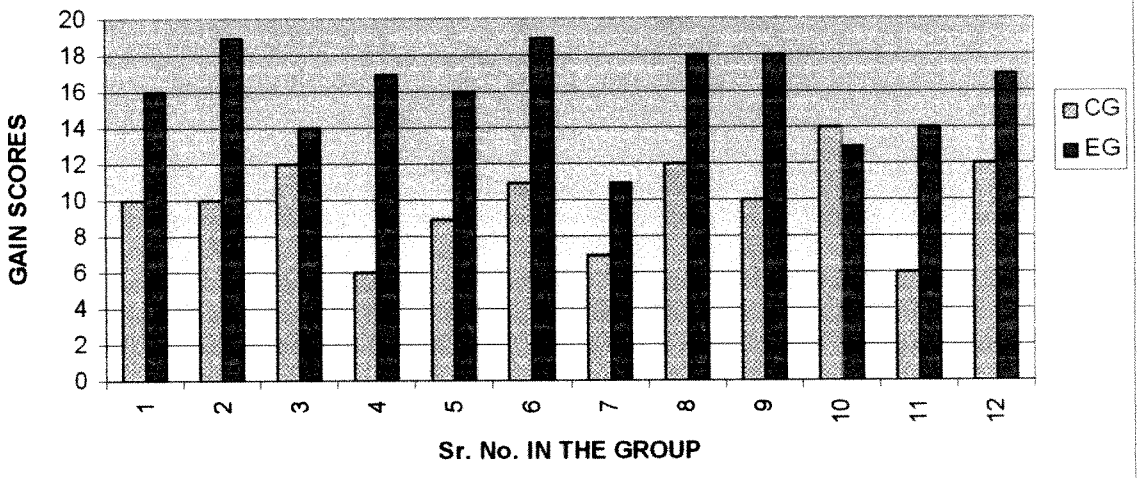


FIG. V.18: FREQUENCY DISTRIBUTION OF GAINS IN PRE OVER POST TEST SCORES OF PUPIL-TEACHERS FROM CON. GROUP

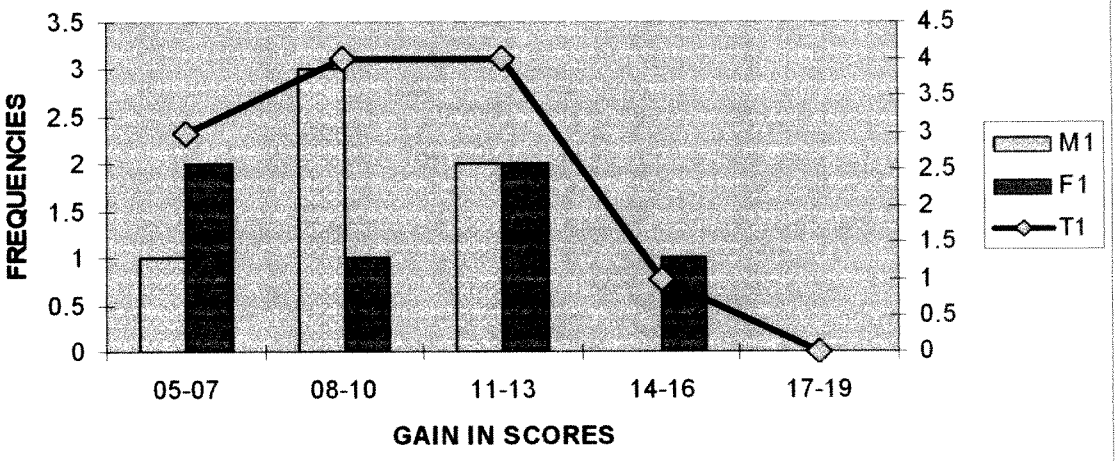


FIG. V.19: FREQUENCY DISTRIBUTION OF GAINS IN PRE OVER POST TEST SCORES OF PUPIL-TEACHERS FROM EXP. GROUP

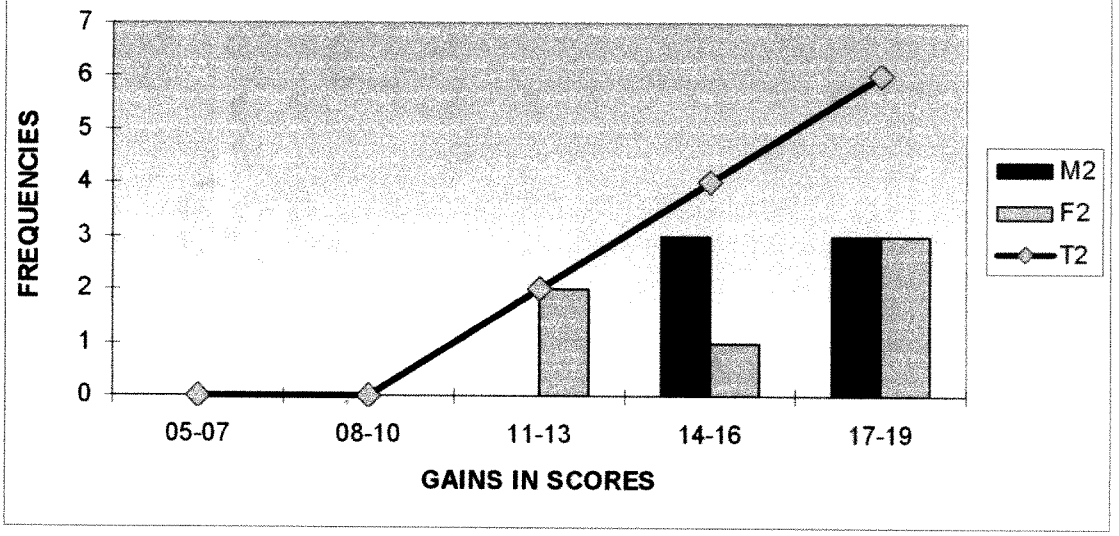


FIG. V.20: FREQUENCY DISTRIBUTION OF GAINS IN SCORES IN PRE OVER POST TEST OF MALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP

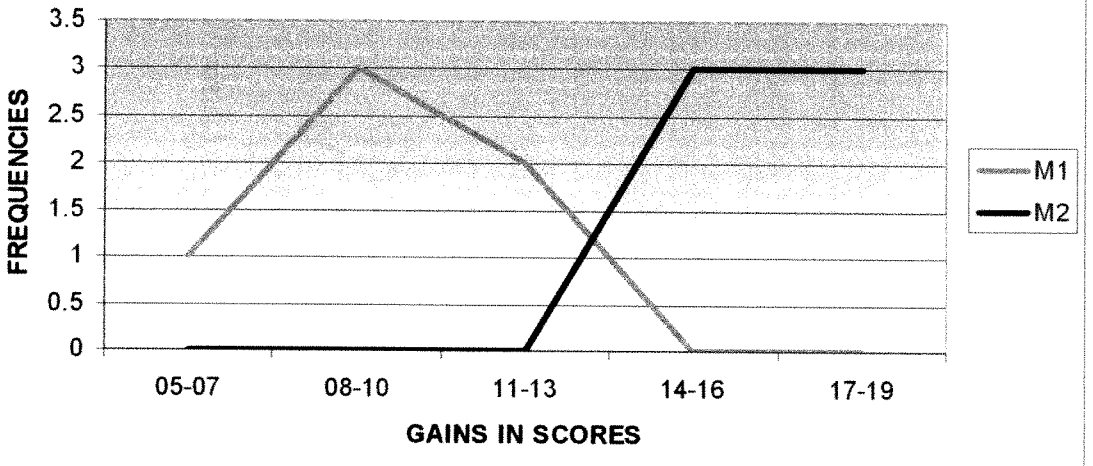


FIG. V.21: FREQUENCY DISTRIBUTION OF GAINS IN SCORES IN PRE OVER POST TEST OF FEMALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP

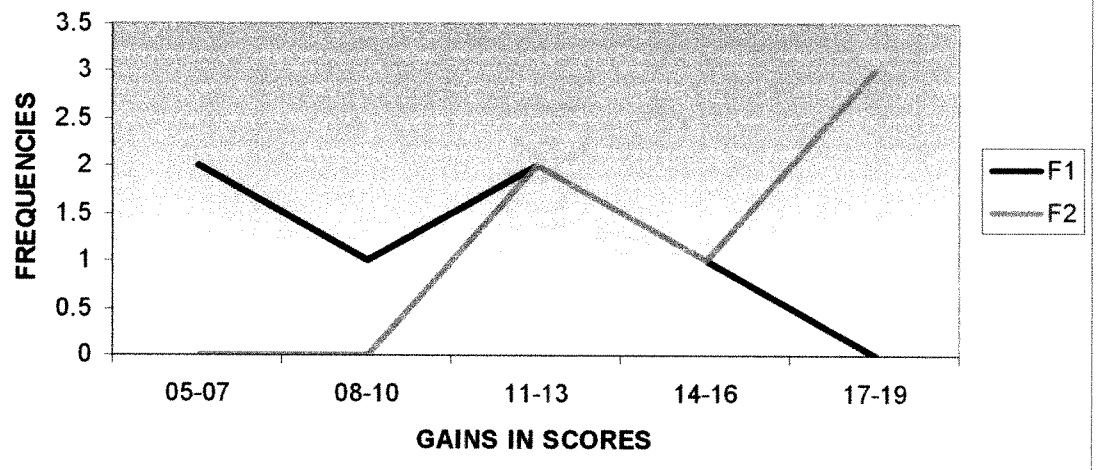


FIG. V.22: COMPARATIVE GRAPH OF THE FREQUENCIES OF GAINS IN PRE OVER POST TEST SCORES OF PUPIL-TEACHERS FROM CON. AND EXP. GROUP

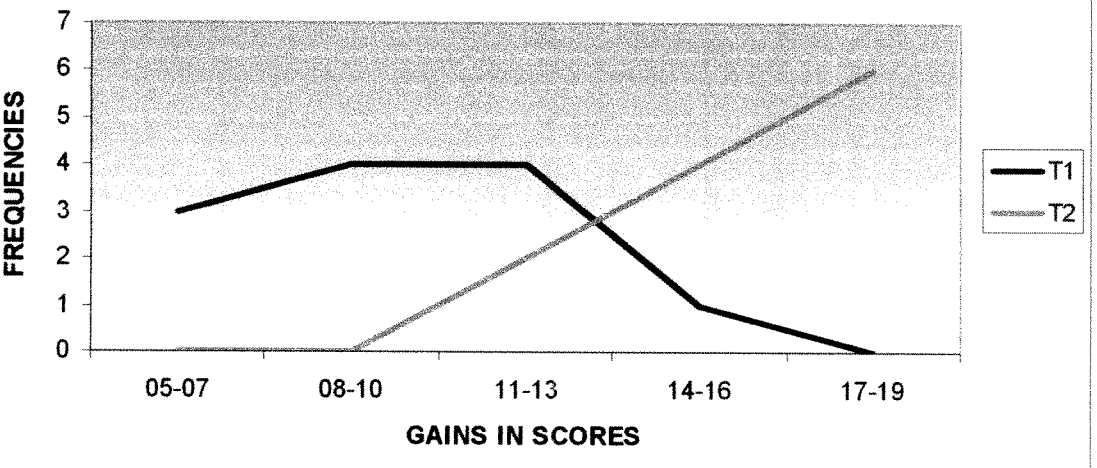


Fig. V.20 is a frequency distribution graph of gains in pre over post test scores of male pupil-teachers, from control group and experimental group. It seems that male pupil-teachers from experimental group achieved more than male pupil-teachers from control group.

Fig. V.21 is a frequency distribution graph of gains in pre over post test scores of female pupil-teachers, from control group and experimental group. It seems that female pupil-teachers from experimental group achieved more than female pupil-teachers from control group.

Fig. V.22 is a frequency distribution graph of gains in pre over post test scores of total 24 pupil-teachers, from control group and experimental group. It seems that pupil-teachers from experimental group achieved more than pupil-teachers from control group.

Table V.35

MEANS AND S.D.S OF THE GAINS IN SCORES OBTAINED BY THE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
N	6	6	12	6	6	12
M	9.66	10.16	9.91	16.83	15.16	16.00
σ	3.075	3.735	3.510	4.371	4.176	3.534

The significance of the difference between the statistical measures were calculated by using t technique and interpreted in the following tables.

Table V.36

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF GAINS OF THE FEMALE PUPIL-TEACHERS AND THE MALE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	6	6	6	6
M	9.66	10.16	16.83	15.16
σ	3.075	3.735	4.371	4.176
D means	0.5		1.67	
t	0.327 (NS)		1.162 (NS)	
df	10		10	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Following null hypotheses were to be tested.

Ho. 5.1: There is no significant difference between the mean of gain in achievement in terms of scores in pre over post test of the female pupil-teachers and male pupil-teachers from control group.

Ho. 5.2: There is no significant difference between the mean of gain in achievement in terms of scores in pre over post test of the female pupil-teachers and male pupil-teachers from experimental group.

The differences between the means of gains of female pupil teachers and male pupil-teachers from control and experimental groups were 0.5 and 1.67 are found to be non-significant at 0.05 and 0.01 levels of significance because **the t values are less than 2.23 and 3.17 for df 10. Hence the null hypotheses are accepted** which means that female pupil-teacher and male pupil teachers from any group do not differ in the gains in their respective groups.

Table V.37

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF GAINS OF THE FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group	Experimental group
	F_1	F_2
N	6	6
M	10.16	15.16
σ	3.735	4.176
D means	5.00	
t	3.87*	
df	10	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 5.3 There is no significant difference between the mean of gain in achievement in terms of scores in pre over post test of the female pupil-teachers from control and experimental group.

The difference between the means of gains of female pupil-teachers from control and experimental groups in post test scores was 5.00, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.23 and 3.17 for df 10. Hence the null hypothesis is rejected** which means that the female pupil teachers from experimental group differ in their performance as compared with the female pupil teachers from the control group in the gains. It means the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the female pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

Table V.38

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF GAINS OF THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	**Control group**	**Experimental group**
	M_1	**M_2**
N	6	6
M	9.66	16.83
σ	3.075	4.371
D means	7.17	
t	6.20*	
df	10	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 5.4: There is no significant difference between the means of gains in achievement in terms of scores in pre over post test of the male pupil-teachers from control and experimental group.

The difference between the means of gains of male pupil-teachers from control and experimental groups in pre over post test scores was 7.17, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.23 and 3.17 for df 10. Hence the null hypothesis is rejected** which means that the male pupil teachers from experimental group differ in their performance as compared with the male pupil teachers from the control group in the gains. It means **the Developed Multimedia Instructional System (MIS)** used in the experimental group favored the male pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

Table V.39

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF GAINS OF THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group	Experimental group
	T_1	T_2
N	12	12
M	9.91	16.00
σ	3.51	3.534
D means	6.09	
t	6.10*	
df	22	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 5.5: There is no significant difference between the mean of gain in achievement in terms of scores in pre over post test of the total pupil-teachers from control and experimental group.

The difference between the means of gains of pupil-teachers from control and experimental groups was 6.09, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df 22. Hence the null hypothesis is rejected** which means that the pupil teachers from experimental group differ in their performance as compared with the pupil teachers from the control group in the gains. It means the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

The significance of difference between the S.D.s of the pupil-teachers was further tested with the help of F test. The details are tabulated in following four tables.

Table V.40

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF GAINS OF THE FEMALE PUPIL-TEACHERS AND THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	6	6	6	6
M	9.66	10.16	16.83	1.516
σ	3.075	3.735	4.371	4.176
D.S.D.s	0.66		0.195	
F	0.064 (NS)		0.457 (NS)	
df	5 – 5		5 - 5	

NS: Not Significant at 0.05 and 0.01 levels of significance.

Ho. 5.6: There is no significant difference between the variability's of gains in achievement in terms of scores in pre over post test of the female pupil-teachers and male pupil-teachers from control group.

Ho. 5.7: There is no significant difference between the variability's of gains in achievement in terms of scores in pre over post test of the female pupil-teachers and male pupil-teachers from experimental group.

The differences between the S.D.s of gains of female pupil teachers and male pupil-teachers from control and experimental groups were 0.66 and 0.195 are found to be non-significant at 0.05 and 0.01 levels of significance because **the F values are less than 5.05 and 10.97 for df 5 - 5. So the null hypotheses are accepted** which means that female pupil-teachers and male pupil teachers from any group do not differ in their variability about the performance in gain.

Table V.41

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF GAINS OF THE FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group	Experimental group
	F_1	F_2
N	6	6
M	10.16	15.16
σ	3.735	4.176
D.S.D.s	0.441	
F	04.78 (NS)	
df	5 - 5	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho. 5.8: There is no significant difference between the variability's of gains in achievement in terms of scores in pre over post test of the female pupil-teachers from control and experimental groups.

The difference between the S.D.s of gains of female pupil teachers from control and experimental groups was 0.441, is found to be non-significant at 0.05 and 0.01 levels of significance because **the F value is less than 5.05 and 10.97 for df 5 - 5. The hypothesis is accepted.** It means that female pupil-teachers from control and experimental groups do not differ in their variability about the performance in gain.

Table V.42

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF GAINS OF THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group	Experimental group
	M_1	M_2
N	6	6
M	9.66	16.83
σ	3.075	4.371
D.S.D.s	1.296	
F	10.99*	
df	5 - 5	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 5.9: There is no significant difference between the variability's of gains in achievement in terms of scores in pre over post test of the male pupil-teachers from control and experimental groups.

The difference between the S.D.s of gains of male pupil teachers from control and experimental groups was 1.296, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 5.05 and 10.97 for df 5 - 5. The null hypothesis is rejected.** It means that male pupil-teachers from control and experimental groups differ in their variability about the performance in gain.

Table V.43

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF GAINS OF THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN PRE OVER POST TEST

Measure	Control group	Experimental group
	T_1	T_2
N	12	12
M	9.91	16.00
σ	3.510	3.534
D.S.D.s	0.024	
F	17.94*	
df	11 - 11	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 5.10: There is no significant difference between the variability's of gains in achievement in terms of scores in pre over post test of the total pupil-teachers from control and experimental groups.

The difference between the S.D.s of gains of pupil teachers from control and experimental groups was 0.024, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df 11 - 11. The null hypothesis is rejected**. It means that pupil-teachers from control and experimental groups differ in their variability about the performance in gains.

From the above tables (V.40 to V.43), it can be confidently interpreted that the differences between the S.D.s were found to be significant for male and total pupil-teachers but not significant for female pupil-teachers are considered. It means that the treatments in the groups when considered as a whole did not affected the variability.

The analysis and interpretation of the data obtained about the gains in scores indicate that the female pupil-teachers and male pupil-teachers from control groups are equally good in performance in their groups, the female pupil-teachers and male pupil-teachers from experimental group are also equally good in the performance. There is no significant difference between the achievement of the female pupil-teachers and male pupil-teachers from any group. When the performance of female pupil-teachers from control group was compared with the female pupil-teachers from experimental group, the female pupil-teachers from experimental group significantly achieved more. The same is true with the male pupil-teachers from experimental group than in control group. When the performance of the total 24 pupil-teachers from control group was compared with the 24 pupil-teachers form experimental group, the experimental group significantly achieved more. Hence **the null hypothesis Ho.5 is rejected**. It indicates that the **Developed Multimedia Instructional System (MIS)** helped the female pupil-teachers, male pupil-teachers and al 24 pupil-teachers in performing and gaining better than the female pupil-teachers, male pupil-teachers and al 24 pupil-teachers from control group. The difference between the S.D.s was found to be non-significant which means that the treatments affected the performances in terms of means but not in terms of S.D.s.

V.6 ANALYSIS AND INTERPRETATION OF THE DATA OBTAINED BY RETENTION TEST:

The investigator completed his experiment and analyzed the data obtained and found that the experimental group was more benefited in terms of achievement **Whether this achievement is retained by the groups?** was a question which is to be answered. The investigator administered a same pre test as retention to obtain retention scores. The retention test was administered on both control and experimental groups after three months of the experimentation. The original scores are given in the Appendix Q.

Table V.44

FREQUENCY DISTRIBUTION TABLE OF THE SCORES OBTAINED BY THE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A RETENTION TEST (SCORES OT OF 25)

C.I.	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
23 – 25	1	1	2	10	8	18
20 – 22	2	1	3	2	3	5
17 – 19	2	1	3	0	1	1
14 – 16	3	4	7	0	0	0
11 – 13	1	1	2	0	0	0
8 – 10	3	4	7	0	0	0
Total	**12**	**12**	**24**	**12**	**12**	**24**

The scores obtained by every pupil-teachers from control and experimental groups are depicted in the Fig. V.23, which indicates that the scores are not equivalent in the groups in a retention test.

Fig. V.24 and Fig. V.25 are the frequency distribution graphs of the frequencies obtained by the female pupil-teachers, male pupil-teachers and the total 24 pupil-teachers from control and experimental groups respectively. The frequencies of female pupil-teachers and male pupil-teachers do not coincide in any group.

Fig. V.26 represents a comparative graph of frequency distribution of male pupil-teachers from control and experimental groups in retention test. The frequencies of male pupil-teachers from both the groups in retention test do not coincide which means that the sub groups M_1 and M_2 are not equivalent in scores in retention test.

Fig. V.23: SCORES OBTAINED BY EVERY INDIVIDUAL FROM CON. AND EXP. GROUP IN RETENTION TEST

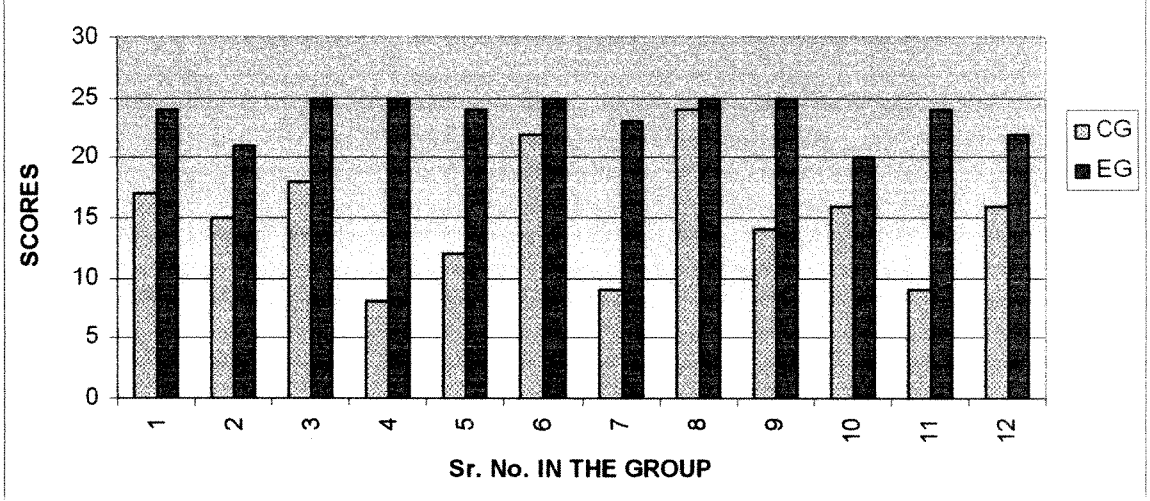


FIG. V.24: FREQUENCY DISTRIBUTION OF PUPIL-TEACHERS FROM CON. GROUP IN RETENTION TEST

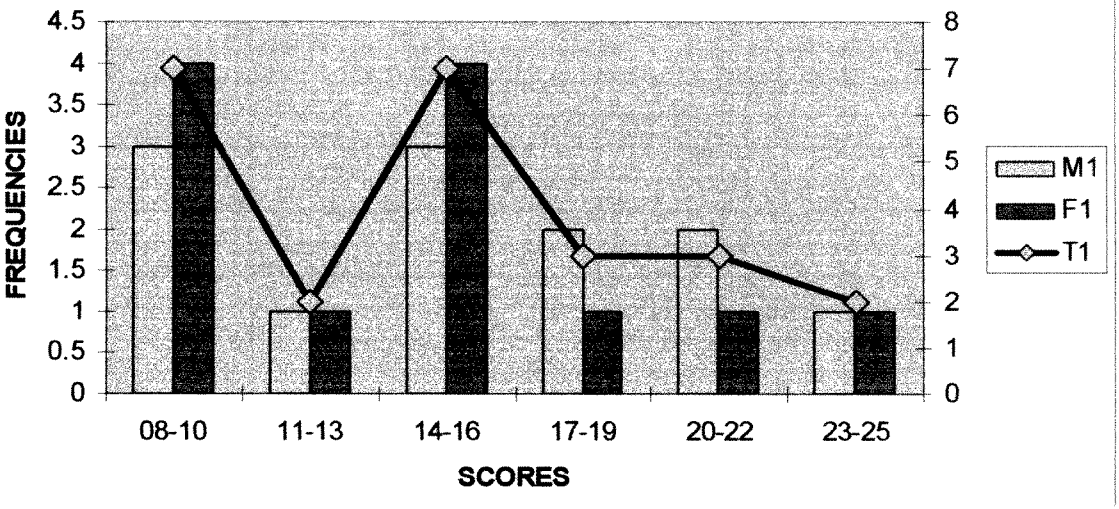


FIG. V.25: FREQUENCY DISTRIBUTION OF PUPIL-TEACHERS FROM EXP. GROUP IN RETENTION TEST

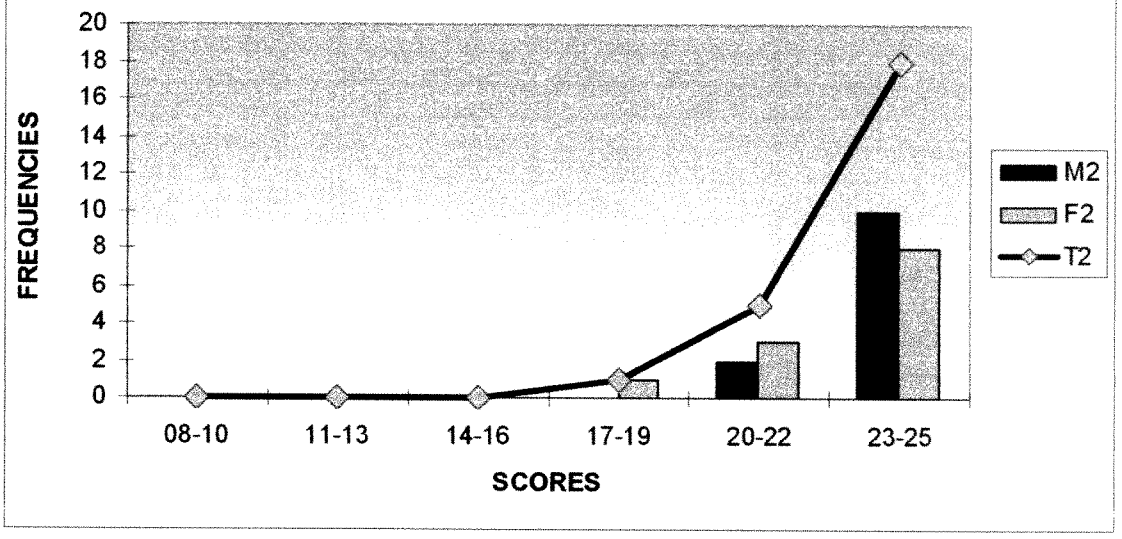


FIG. V.26: FREQUENCY DISTRIBUTION OF MALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN RETENTION TEST

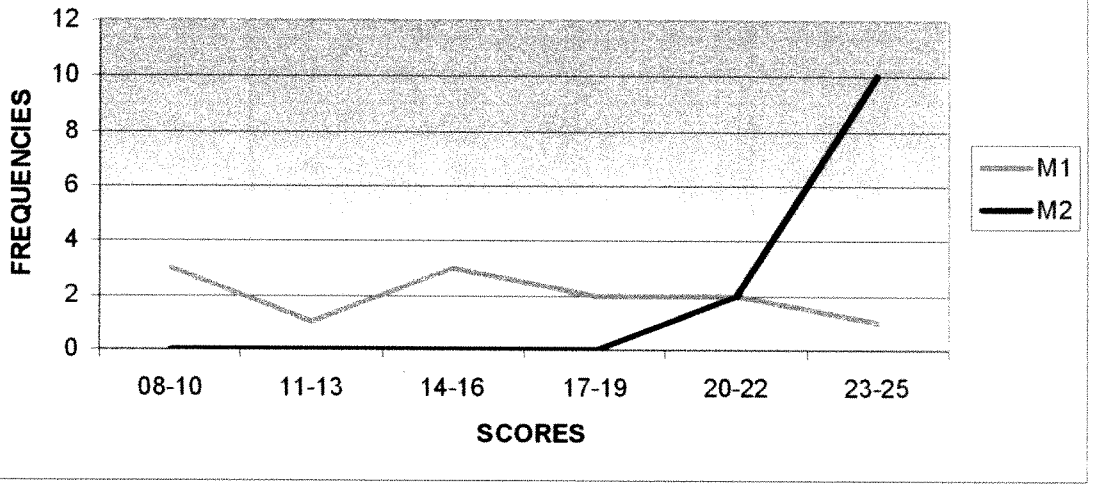


FIG. V.27:FREQUENCY DISTRIBUTION OF FEMALE PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN RETENTION TEST

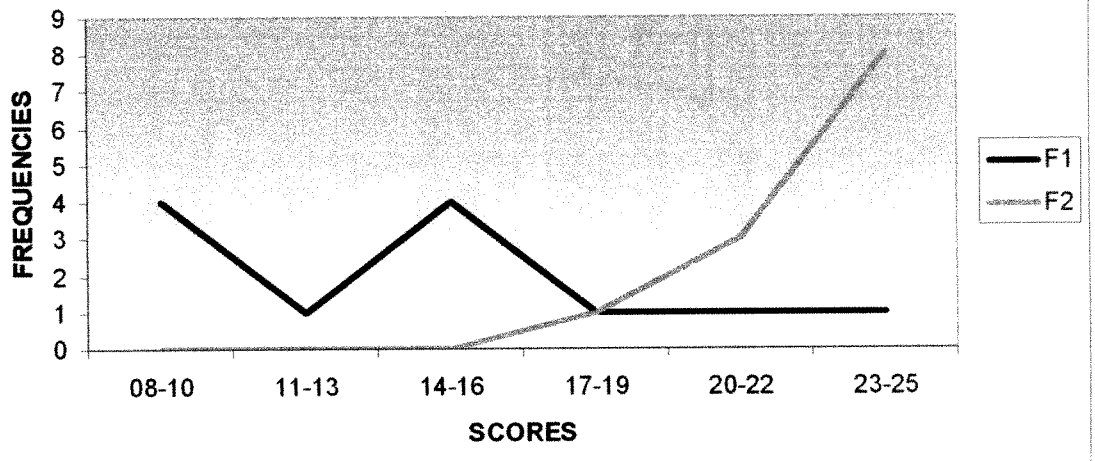


FIG. V.28: COMPARATIVE GRAPH OF THE FREQUENCIES OF PUPIL-TEACHERS FROM CON. AND EXP. GROUP IN RETENTION TEST

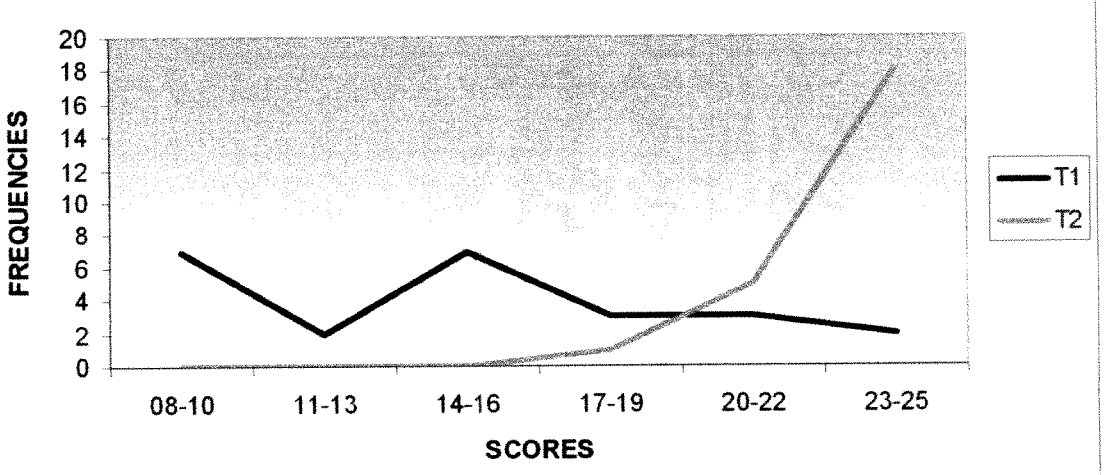


Fig. V.27 represents a comparative graph of frequency distribution of female pupil-teachers from control and experimental groups in retention test. The frequencies of female pupil-teachers from both the groups in retention test do not coincide which means that the sub groups F_1 and F_2 are not equivalent in scores in retention test.

Fig. V.28 represents a comparative graph of frequency distribution of total 24 pupil-teachers from control and experimental groups in retention test. The frequencies of pupil-teachers from both the groups in retention test do not coincide which means that the control and experimental groups are not equivalent in scores in retention test.

Table V.45

CORRELATION BETWEEN THE POST TEST SCORES AND RETENTION TEST SCORES

Measure	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
r	0.837	0.701	0.745	0.03	0.158	0.065

The coefficient of correlation between the scores obtained by each sub-group in post test and retention test was calculated. From the obtained values of r, it can be concluded that there is remarkable high positive correlation between the post test scores and retention test scores for each sub-group M_1, F_1, M_2, F_2 and also for T_1 and T_2. The pupil-teachers for control and experimental groups retained.

Table V.46

MEANS AND S.D.S OF THE SCORES OBTAINED BY THE PUPIL TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A RETENTION TEST

Measure	Control Group			Experimental Group		
	M_1	F_1	T_1	M_2	F_2	T_2
N	12	12	24	12	12	24
M	15.2	14.2	14.7	23.9	22.8	23.3
σ	1.89	4.81	4.86	8.21	7.66	8.11

The significance of the difference between the statistical measures were calculated by using t technique and interpreted in the following tables.

The null hypothesis that to be tested was:

Ho. 6: There is no significant difference between the performance of the pupil-teachers from control and experimental groups in retention test.

Table V.47

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE FEMALE PUPIL-TEACHERS AND THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A RETENTION TEST SCORES

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	12	12	12	12
M	15.2	14.2	23.9	22.8
σ	4.89	4.81	8.21	7.66
D means	1.00		1.1	
t	0.498 (NS)		1.48 (NS)	
df	22		22	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho. 6.1: There is no significant difference between the means in performance of the female pupil-teachers and male pupil-teachers from control group in retention test.

Ho. 6.2: There is no significant difference between the means in performance of the female pupil-teachers and male pupil-teachers from experimental group in retention test.

The differences between the means of female pupil teachers and male pupil-teachers from control and experimental groups in retention test scores were 1.00 and 1.1 are found to be non-significant at 0.05 and 0.01 levels of significance because **the t values are less than 2.07 and 2.82 for df 22. Hence the null hypotheses are accepted** which means that female pupil-teachers and male pupil teachers from any group do not differ in their performance in the retention test.

Table V.48

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A RETENTION TEST SCORES

Measure	**Control group**	**Experimental group**
	F_1	F_2
N	12	12
M	14.2	22.8
σ	4.81	7.66
D means	8.6	
t	5.47*	
df	22	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 6.3 There is no significant difference between the means in performance of the female pupil-teachers from control and experimental groups in retention test.

The difference between the means of female pupil-teachers from control and experimental groups in retention test scores 8.6, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df 22. Hence the null hypothesis is rejected**. It means that the female pupil teachers from experimental group differ in their performance as compared with the female pupil teachers from the control group in the retention test. It indicates that the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the female pupil-teachers in retention in that group than the female pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

Table V.49

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A RETENTION TEST SCORES

Measure	**Control group**	**Experimental group**
	M_1	**M_2**
N	12	12
M	15.2	23.9
σ	4.89	8.21
D means	8.7	
t	5.918*	
df	22	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 6.4 There is no significant difference between the means in performance of the male pupil-teachers from control and experimental groups in retention test.

The difference between the means of male pupil-teachers from control and experimental groups in retention test score was 8.7, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.07 and 2.82 for df 22. Hence the null hypothesis is rejected.** It means that the male pupil teachers from experimental group differ in their performance as compared with the male pupil teachers from the control group in the retention test. It indicates that the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the male pupil-teachers in retention in that group than the male pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

Table V.50

SIGNIFICANCE OF DIFFERENCE BETWEEN THE MEANS OF THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN A RETENTION TEST SCORES

Measure	Control group	Experimental group
	T_1	T_2
N	24	24
M	14.7	23.3
σ	4.86	8.11
D means	8.6	
t	8.128*	
df	46	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 6.5: There is no significant difference between the means in performance of the total pupil-teachers from control and experimental groups in retention test.

The difference between the means of pupil-teachers from control and experimental groups in retention test score was 8.6, is found to be significant at 0.05 and 0.01 levels of significance because **the t value is greater than 2.02 and 2.69 for df 46. Hence the null hypothesis is rejected.** It means that the pupil teachers from experimental group differ in their performance as compared with the pupil teachers from the control group in the retention test. It indicates that the **Developed Multimedia Instructional System (MIS)** used in the experimental group favored the pupil-teachers in retention in that group than the pupil-teachers treated with **Conventional Instructional System (CIS)** in the control group.

From the tables (V.47 to V.50) it can be confidently interpreted that as the differences between the means were significant, both the groups were not equivalent in their achievements w.r.t. means in retention test.

The significance of difference between the S.D.s of the pupil-teachers was further tested with the help of F test. The details are tabulated in following four tables.

Table V.51

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF THE FEMALE PUPIL-TEACHERS AND THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN RETENTION TEST

Measure	Control group		Experimental group	
	M_1	F_1	M_2	F_2
N	12	12	12	12
M	15.2	1.4.2	23.9	22.8
σ	4.89	4.81	8.21	7.66
D.S.D.s	0.08		0.55	
F	0.255 (NS)		0.115 (NS)	
df	11 – 11		11 – 11	

NS: Non Significant at 0.05 and 0.01 levels of significance.

Ho. 6.6: There is no significant difference between the variability's in performance of the female pupil-teachers and male pupil-teachers from control group in retention test.

Ho. 6.7: There is no significant difference between the variability's in performance of the female pupil-teachers and male pupil-teachers from experimental group in retention test.

The differences between the S.D.s of female pupil teachers and male pupil-teachers from control and experimental groups in retention test scores were 0.08 and 0.55 are found to be non-significant at 0.05 and 0.01 levels of significance because **the F values are less than 2.79 and 4.40 for df 11 - 11. Hence the null hypotheses are accepted** which means that female pupil-teacher and male pupil teachers from any group do not differ in their variability about the performance in retention test.

Table V.52

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF THE FEMALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN RETENTION TEST SCORES

Measure	Control group	Experimental group
	F_1	F_2
N	12	12
M	14.2	22.8
σ	4.81	7.66
D.S.D.s	2.850	
F	18.621*	
df	11 – 11	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 6.8 There is no significant difference between the variability's in performance of the female pupil-teachers control and experimental groups in retention test.

The difference between the S.D.s of female pupil teachers control and experimental groups in retention test score was 2.850, is found to be non-significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df 11 - 11. The null hypothesis is rejected** which means that female pupil-teachers from control and experimental groups differ in their variability about the performance in retention test.

Table V.53

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF THE MALE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN RETENTION TEST SCORES

Measure	**Control group**	**Experimental group**
	M_1	**M_2**
N	12	12
M	15.2	23.9
σ	4.89	8.21
D.S.D.s	3.32	
F	9.948*	
df	11 – 11	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 6.9 There is no significant difference between the variability's in performance of the male pupil-teachers control and experimental groups in retention test.

The difference between the S.D.s of male pupil teachers control and experimental groups in retention test score was 3.32, is found to be non-significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.79 and 4.40 for df 11 - 11. Hence the null hypothesis is rejected** which means that male pupil-teachers from control and experimental groups differ in their variability about the performance in retention test.

Table V.54

SIGNIFICANCE OF DIFFERENCE BETWEEN THE S.D.s OF THE PUPIL-TEACHERS FROM CONTROL AND EXPERIMENTAL GROUPS IN RETENTION TEST SCORES

Measure	Control group	Experimental group
	T_1	T_2
N	24	24
M	14.7	23.3
σ	4.86	8.11
D.S.D.s	3.25	
F	19.859*	
df	23 – 23	

* Significant at 0.05 and 0.01 levels of significance.

Ho. 6.10 There is no significant difference between the variability's in performance of the total pupil-teachers control and experimental groups in retention test.

The difference between the S.D.s of pupil teachers control and experimental groups in retention test score was 3.25, is found to be significant at 0.05 and 0.01 levels of significance because **the F value is greater than 2.00 and 2.70**

for df 23 - 23. Hence the null hypothesis is rejected which means that pupil-teachers from control and experimental groups differ in their variability about the performance in retention test.

From the above tables (V.52 to V.54) it can be confidently interpreted that as the differences between the S.D.s were significant both the groups were not equivalent in their achievements w.r.t. S.D.s.

The analysis and interpretation of data obtained in retention test indicated that the female pupil-teachers and male pupil-teachers from control and experimental group are equally good in the performance, the female pupil-teachers and male pupil-teachers from experimental group are also equally good in the performance in retention test. There is no significant difference between the achievement of the female pupil-teachers and male pupil-teachers from any group. When the performance of the female pupil-teachers from control group was compared with the female pupil-teachers from experimental group the female pupil-teachers from experimental group achieved more. Same is true with the male pupil-teachers from experimental group than in control group. When the performance of the total 24 pupil-teachers from control group was compared with the 24 pupil-teachers form experimental group, the experimental group significantly achieved and retained more. **Hence the null hypothesis Ho.6 is rejected.** It indicates that the **Developed Multimedia Instructional System (MIS)** helped the female pupil-teachers, male pupil-teachers and all 24 pupil-teachers in performing and retaining better than the pupil-teachers control group. The difference between the means as well as S.D.s was found to be significant which means that the treatments affected the performances in terms of mean scores and in terms of S.D.s.