CHAPTER IV

DATA ANALYSIS & RESULTS INTERPRETATION

CHAPTER-IV

ANALYSIS AND INTERPRETATION OF DATA

4.1.0 Introduction

The analysis and interpretation of the data follows the completion of the data collection procedure. This stage is essential for comprehending the final conclusions of a study and offers insights into the correlations, patterns, impacts, and trends present in the collected data.

This section aims to clarify the findings obtained from the study by examining the impact of the Multiple Intelligence-based Instructional Approach on Learning Competency. This analysis attempts to evaluate the effectiveness of the instructional technique in enhancing students' learning outcomes by examining pre-test and post-test scores, along with demographic and potential confounding variables.

This study employs a quantitative analysis of the data. This section is bifurcated into two parts for the analysis and interpretation of quantitative data. The initial section (PART 1) addresses Descriptive analysis, whereas the subsequent section (PART 2) pertains to Inferential analysis.

Descriptive analysis constitutes the initial phase of data examination. It primarily focuses on summarizing and visualizing data to deliver a clear and thorough summary of a dataset's attributes. Inferential Analysis advances by utilizing basic data to formulate predictions, derive conclusions, and generalize about a population.

4.2.0 Analysis and Interpretation of Data:

The analysis and Interpretation of the data gathered from the investigation of the study were done on the basis of the following objectives:

1. To study the effect of the Multiple Intelligence Based Instructional Approach over Traditional Learning Method in achieving overall learning competency in Social Science subject with regard to the pre-test and post-test scores.

2. To study the effect of the Multiple Intelligence Based Instructional Approach over Traditional Learning Method in achieving domain wise learning competency in Social Science subject with regard to the pre-test and post-test scores.

3. To study the effect of Group, Gender and their interaction on overall Learning Competency in Social Science subject by considering the pre-test as covariate.

4. To study the effect of Group, Gender and their interaction on domain wise Learning Competency in Social Science subject by considering their respective domain at pre-test level as covariate.

5. To study the effect of Group, Academic Achievement Level and their interaction on overall Learning Competency in Social Science subject by considering the pre-test as covariate.

6. To study the effect of Group, Academic Achievement Level and their interaction on domain wise Learning Competency in Social Science subject by considering their respective domain at pre-test level as covariate.

4.3.0 Part 1: Descriptive Analysis

Descriptive analysis is the art of transforming the raw data into a clear and comprehensive dataset of meaningful information. It helps in summarising the properties of a dataset into meaningful information through numerical and graphical representations. It is the base for the further complex statistical methods. It involves descriptive statistics like measures of central tendency, variability and distribution. In this section of the study the raw data are arranged in a systematic way and demonstrated into a clear and concise manner with the help of table and graphical representation of the dataset.

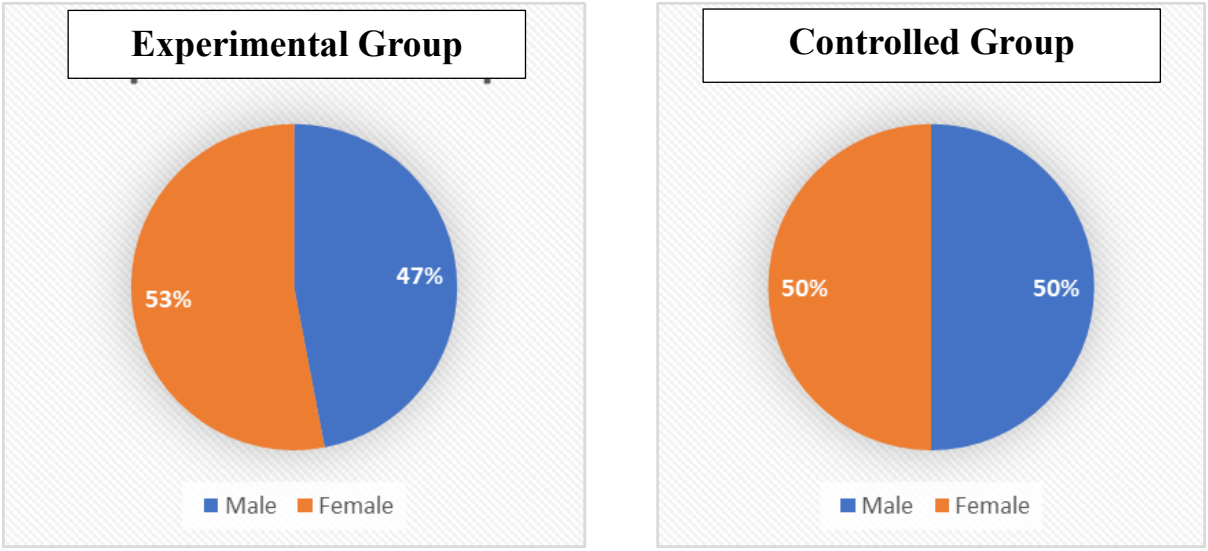
4.3.1 Percentage wise distribution of the sample of the study

a) Distribution on the basis of Gender and Group

Table 4.1.1 Distribution on the basis of Gender and Group

Sl No.	Group	Gender		Percentage		Total No. of Participant
		Male	Female	Male	Female	
1	Controlled	23	23	50%	50%	46
2	Experimental	21	23	47%	53%	44

Figure 4.1.1 Distribution of sample on the basis of Gender and Group



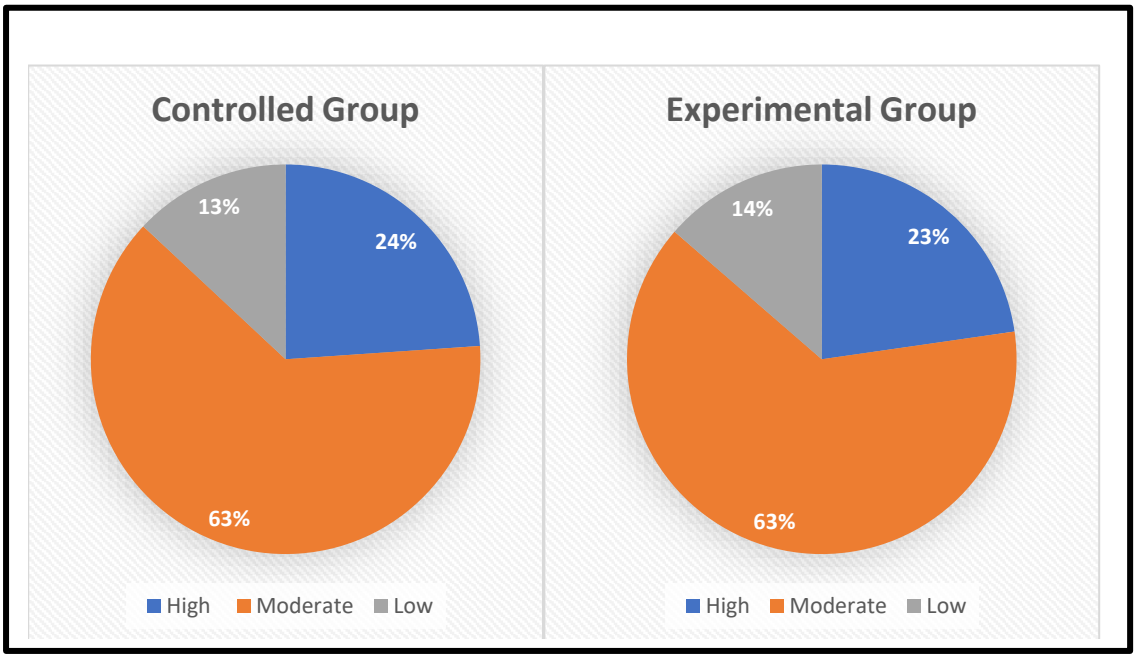
From the above table 4.1.1 and pie chart 4.1.1, it can be observed that the total sample size of 90 students was separated into two distinct groups- experimental group consisting of 44 students & control group consisting of 46 students. These figures also show that in the case of experimental group 47% of students were male and 53% of students were female. On the other hand, in the case of control group it was found that 50% of students were male and 50% of students were female. Thereby, it can be said that for both the groups the percentage number f female students were more in the experimental group than the percentage number of the male students.

b) Distribution on the basis of Academic Achievement level and Group

Table 4.1.2 Distribution on the basis of Academic Achievement level and Group

Achievement level	Group		Total	Percentage
	Experimental	Controlled		
High	10	11	21	23.33%
Moderate	28	29	57	63.33%
Low	6	6	12	13.33%

Figure 4.1.2 Distribution of sample on the basis of Academic Achievement and Group



From the above table 4.1.2 and pie chart 4.1.2, it can be observed that the total sample size of 90 students was separated into two distinct groups- experimental group consisting of 44 students & control group consisting of 46 students. These figures also show that in the case of experimental group 24% of students fall under High Academic Achievement group, 63% under Moderate level Academic Achievement group and 13% of students were under low Academic Achievement group. On the other hand, in the case of control group it was

found that 23% of students falls under High Academic Achievement group, 63% under Moderate level Academic Achievement group and 14% of students were under low Academic Achievement group. Thereby, it can be said that for both the groups the percentage of moderate students were more than the percentage number of the high and low achievement groups. So, it can be said that in both the cases majority of the students are average in their academic achievement level.

4.3.2 Frequency Distribution of Scores

Table 4.1.3

a) Frequency Distribution of Scores of Pre- test on Overall Learning Competency on the basis of group and scores

Group / Level of Scores	Frequency		Percentage of Frequency	
	Experimental	Controlled	Experimental	Controlled
Extremely High	0 0	0	0	0
High	0	0	0	0
Average	30	46	68.18%	100%
Low	14	0	31.81%	0
Extremely Low	0	0	0	0

Figure 4.1.3 Overall Learning Competency on the basis of group and scores

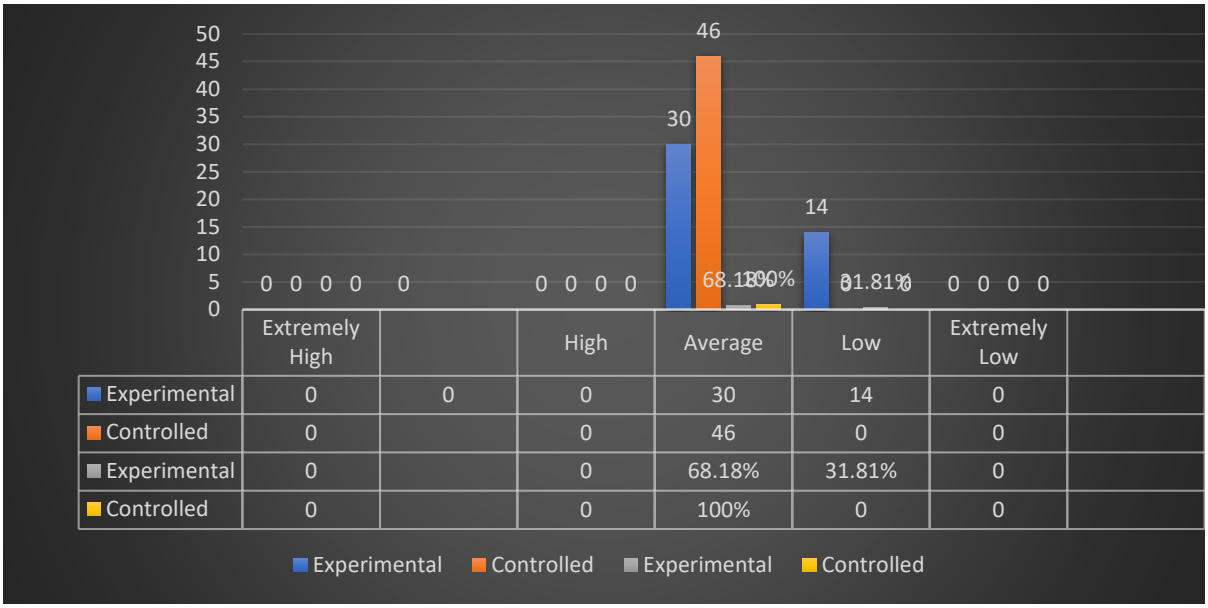
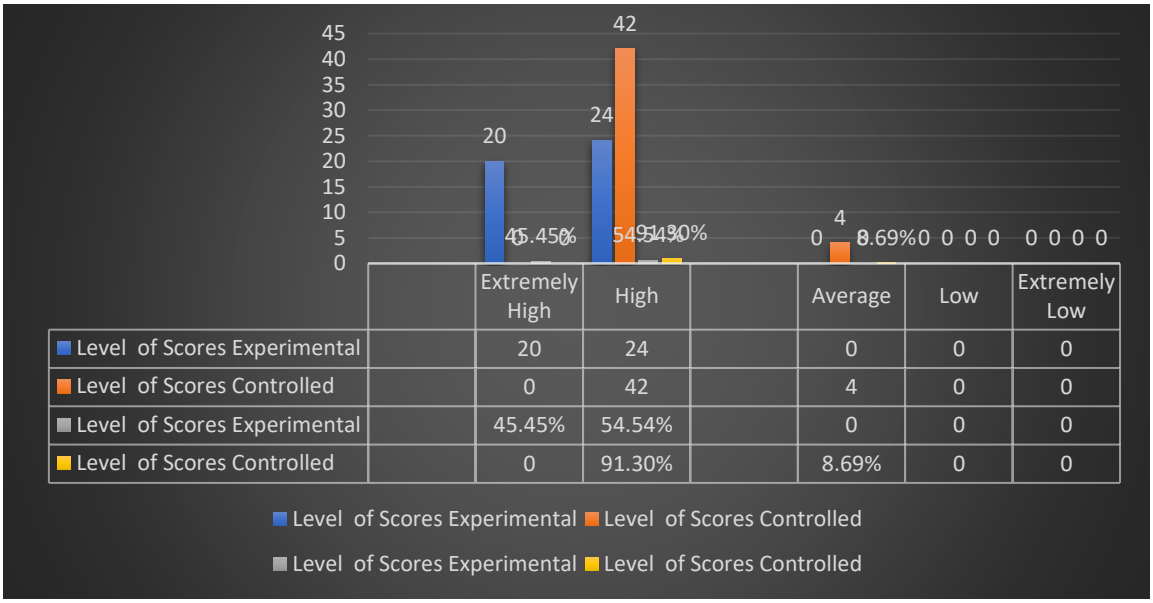


Table 4.1.4

b) Frequency Distribution of Scores of Post- test on Overall Learning Competency on the basis of group and scores

Group / Level of Scores	Frequency		Percentage of Frequency	
	Experimental	**Controlled**	**Experimental**	**Controlled**
Extremely High	20	0	45.45%	0
High	24	42	54.54%	91.30%
Average	0	4	0	8.69%
Low	0	0	0	0
Extremely Low	0	0	0	0

Figure 4.1.4 b. Overall Learning Competency on the basis of group and scores



From the above table 4.1.4 and chart 4.1.4, it was found that in that in case of pre- test in both the group experimental and controlled group, the majority of the students falls under average level of Overall Learning Competency Skill. 30 students of Experimental Pre- test group and 46 students of Controlled Pre- test group falls under the Average level. And in case of Experimental pre-test group 14 students falls under low level. Whereas no students in either group of Pre-test falls in the category of Extremely High, High or Extremely Low level.

In case of Post-test in both the group 20 students of Experimental group falls under Extremely High level and 24 students falls under the category of extremely High level. No students fall under the category of Average, Low and Below Average group in Experimental group. In case of Controlled Post -test group, 42 students fall High level and 4 students falls under the category of Average level. No students fall under the category of Extremely High, Low and Extremely Low group in Controlled group.

So, from the both pre-test and post-test results it can be said that in both the group that is Experimental and Controlled group, the performance level of the students increased in post-test stage. And majority of the students' performance level increases in case of Experimental Group than in Controlled group.

Table 4.1.5

c) Frequency Distribution of the Pre-test Score of the Overall Learning Competency on the basis of Gender and Group.

Group / Level of Scores	Frequency				Percentage of Frequency			
	Experimental		Controlled		Experimental		Controlled	
	Male	Female	Male	Female	Male	Female	Male	Female
Extremely High	0	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0	0
Average	17	13	23	23	80.95%	56.52%	100%	100%
Low	4	10	0	0	19.04%	43.47%	0	0
Extremely Low	0	0	0	0	0	0	0	0

Figure 4.1.5

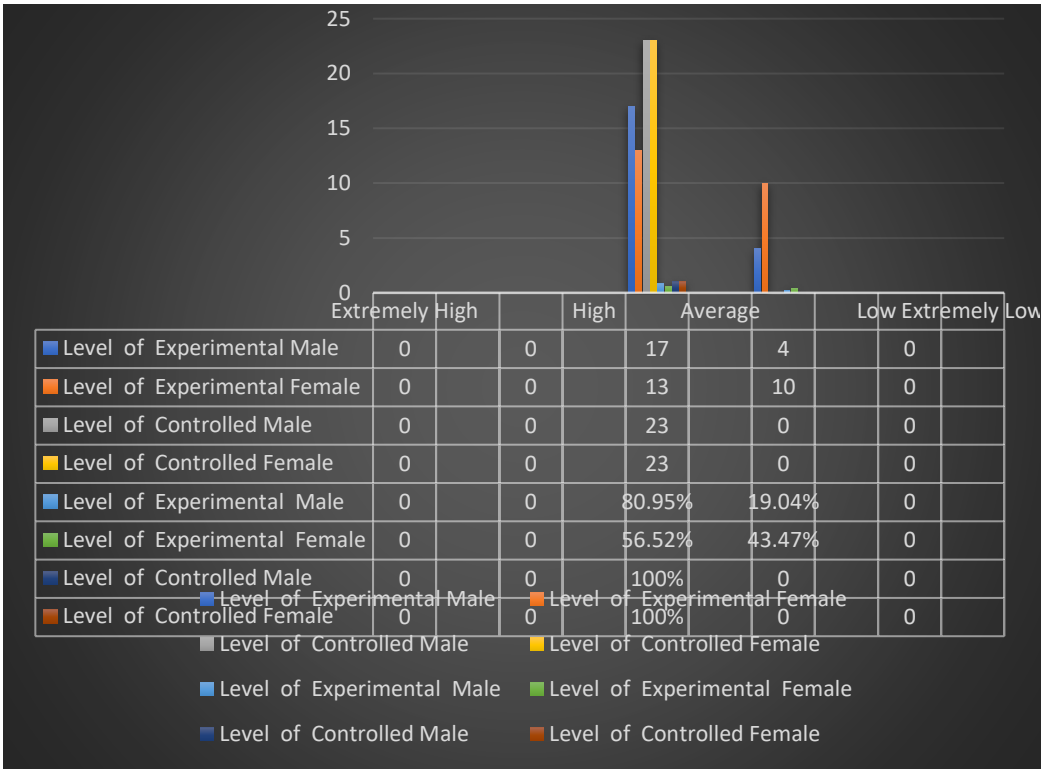
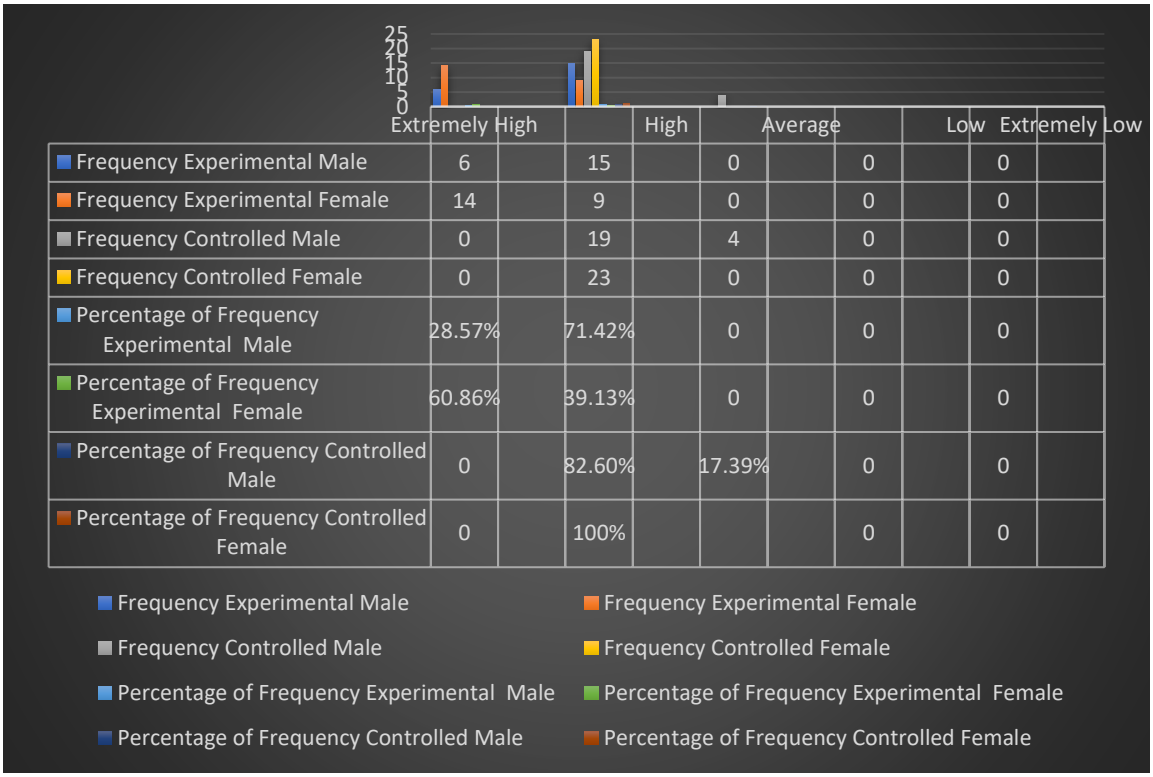


Table 4.1.6

d) Frequency Distribution of the Post-test Score of the Overall Learning Competency on the basis of Gender and Group.

Group / Level of Scores	Frequency				Percentage of Frequency			
	Experimental		Controlled		Experimental		Controlled	
	Male	Female	Male	Female	Male	Female	Male	Female
Extremely High	6	14	0	0	28.57%	60.86%	0	0
High	15	9	19	23	71.42%	39.13%	82.60%	100%
Average	0	0	4	0	0	0	17.39%	
Low	0	0	0	0	0	0	0	0
Extremely Low	0	0	0	0	0	0	0	0

Figure 4.1.6



From the above table 4.1.6 and chart 4.1.6, it was found that in case of pre- test in both the group experimental and controlled group, the majority of the students falls under average level of Overall Learning Competency Skill. And in case of gender in the experimental group, 17 male students and 13 female students falls under the Average level and 4 male students and 10 female students falls under the category of Low level of Overall Learning Competency Test. No one of the male students fall under the category of Extremely High, High, and Extremely Low level of categories. Again, in case of female students no students fall under any one of the four level of Overall Learning Competency Test except Average Level. In case of Controlled group of pre-test test 100% that is all the 46 students, 23 male and 23 females fall under the Average Level of Overall Learning Competency Test.

30 students of Experimental Pre- test group and 46 students of Controlled Pre- test group falls under the Average level. And in case of Experimental pre-test group 14 students falls under low level. Whereas no students in either group of Pre-test falls in the category of Extremely High, High or Extremely Low level. So, it can be said from the explanation that most of the students from both the gender of both of the group falls under Average level of Learning Competency Test in case of Pre-test result.

If we analyse the result of post- test then in case of Post-test it was found that in case of pre- test in both the group experimental and controlled group, the majority of the students falls under High level of Overall Learning Competency Test. And in case of gender in the experimental group, 6 male students and 14 female students falls under the Extremely High level of Overall Learning Competency Test. And 15 male students and 9 female students falls under the category of High level of Overall Learning Competency Test. No one of the male students fall under the category of Average, Low and Extremely Low level of categories. Again, in case of female students no students fall under any one of the four level of Overall Learning Competency Test except High Level. In case of Controlled group of post-test test 19 male students and all the 23 female students falls under the category of High level of Overall Learning Competency Test. And only 4 male students fall under the Average category of Overall Learning Competency Test. No male students fall under the category of Extremely High, Low and Extremely low category in Controlled group. And in case of female no students fall under any one of the four level of Overall Learning Competency Test except High Level.

So, from the both pre-test and post-test results it can be said that in both the group that is Experimental and Controlled group, the performance level of the students increased in post-test stage. And majority of the students' performance level increases in case of Experimental Group than in Controlled group.

4.4.0 Part 2: Inferential Statistics

Within the field of statistics, inferential statistics enables researchers to draw conclusions or generalizations about a population from a sample of data. It offers methods and resources for conducting hypothesis tests, forecasting, and analysing sample data in order to derive conclusions about a broader group. These techniques enable inferential statistics to be used as a valuable tool in a variety of sectors, including psychology, health, economics, and engineering, by assisting researchers in drawing inferences that go beyond the immediate data. In the present study the research has used inferential statistics of Parametric domain such as One-Way ANOVA and ANCOVA in order to test the hypotheses of the study. This section is again divided into 2 parts-

i) Fulfilling the assumptions of the Parametric statistics

ii) Testing the Hypothesis using the selective statistical technique with the help of IBM SPSS 20 Package.

Let's discuss the two parts in details as below:

4.4.1 Fulfilling the Assumptions of the Parametric Test

Parametric tests are a type of statistical test that is based on assumptions about the distribution of the population from which the sample was collected. These assumptions are crucial because they ensure that test results are accurate and reliable. Fulfilling these criteria enables precise predictions regarding population parameters. Here are the key assumptions that were fulfilled before applying the Parametric Statistical Methods.

1) Test the Normality: In this study the normality of the distributed data is tested in two forms.

    a) Statistical Test: For statistical test the researcher has employed Kolmogorov-Smirnov test and Shapiro-Wilk test.

b) Visual Form: And visual forms like Histogram and Q-Q plots were used to interpret the normality of the data.

Statistical Test: The result of the Kolmogorov-Smirnov test and Shapiro-Wilk test are discussed through the tables below-

- Normality Test for Overall Learning Competency Test Controlled Group

Table 4.1.7

Tests of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pre- Overall Learning Competency	Control	.099	46	.200*	.975	46	.405
	Experimental	.103	44	.200*	.985	44	.830
Pre – Cognitive Domain	Control	.096	46	.200*	.968	46	.225
	Experimental	.122	44	.099	.970	44	.298
Pre – Affective Domain	Control	.120	46	.093	.961	46	.129
	Experimental	.127	44	.072	.958	44	.109
Pre – Psychomotor Domain	Control	.107	46	.200*	.970	46	.268
	Experimental	.110	44	.200*	.957	44	.101

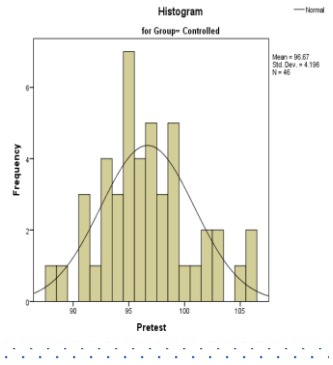
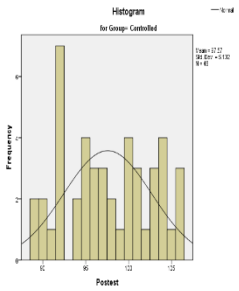
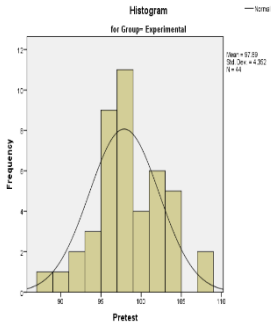
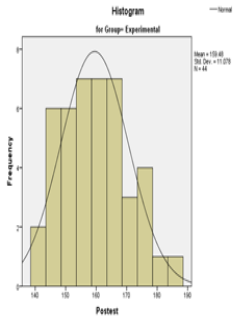
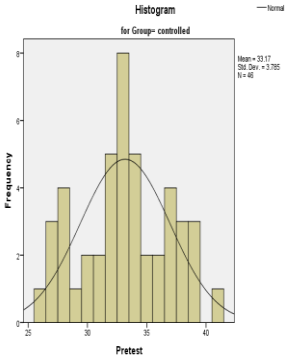
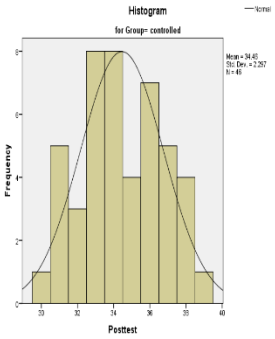
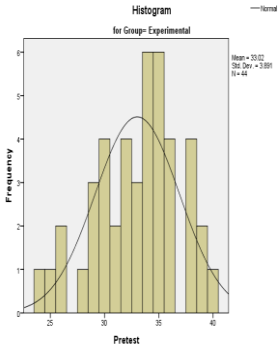
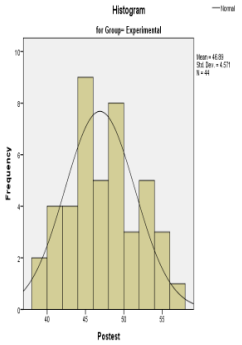
Post - Overall Learning Competency	Control	.092	46	.200*	.969	46	.264
	Experimental	.068	44	.200*	.977	44	.503
Post – Cognitive Domain	Control	.122	46	.082	.962	46	.136
	Experimental	.092	44	.200*	.973	44	.388
Post – Affective Domain	Control	.109	46	.200*	.967	46	.208
	Experimental	.115	44	.170	.967	44	.228
Post – Psychomotor Domain	Control	.101	46	.200*	.967	46	.223
	Experimental	.108	44	.200*	.963	44	.167

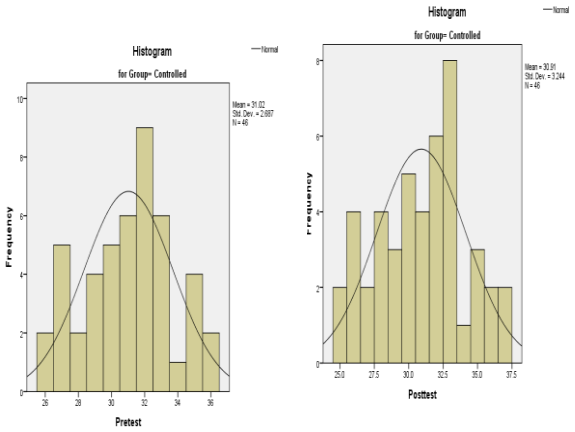
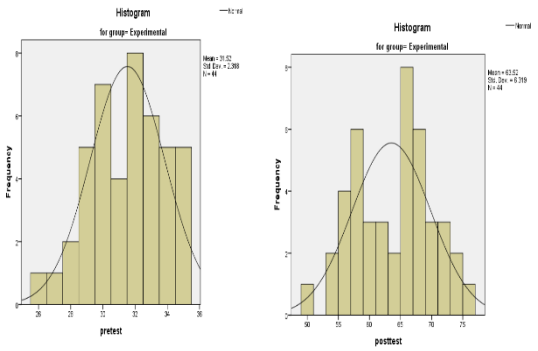
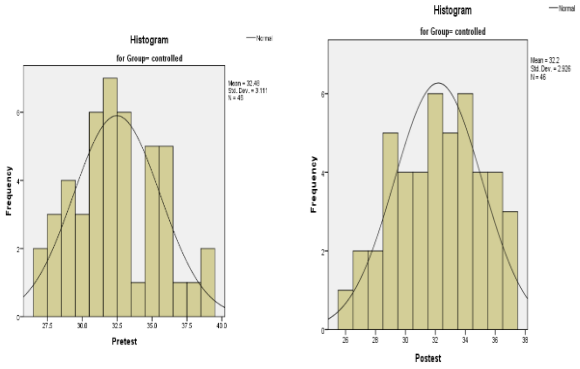
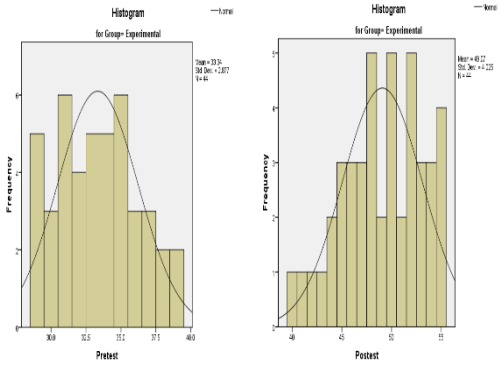
From the above tables the pre-test and post-test results showed significant values greater than 0.05. Therefore, it can be said the data follows a normal distribution.

Visual Form: For visual forms Histogram and Q-Q plot is used to interpret the normality of the data.

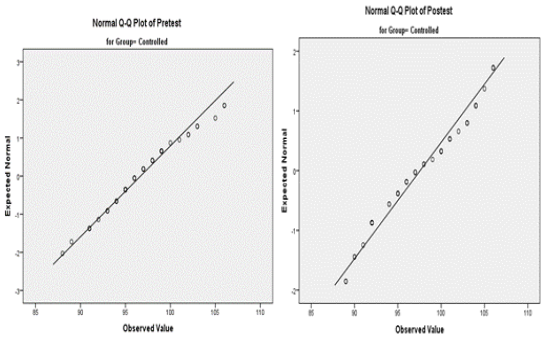
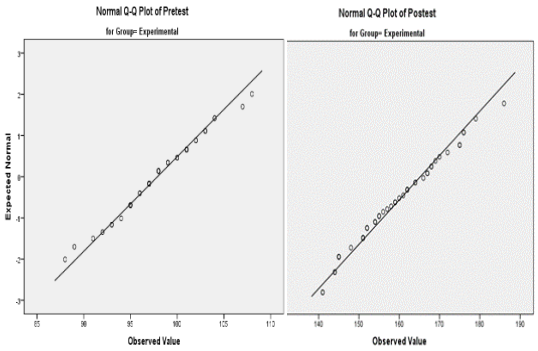
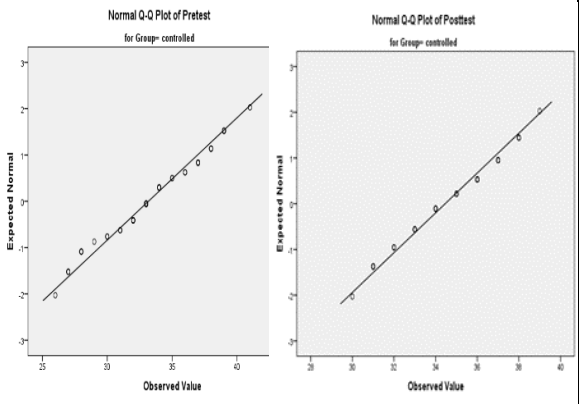
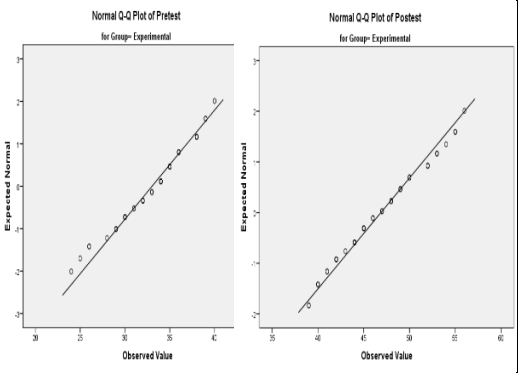
a) Histogram

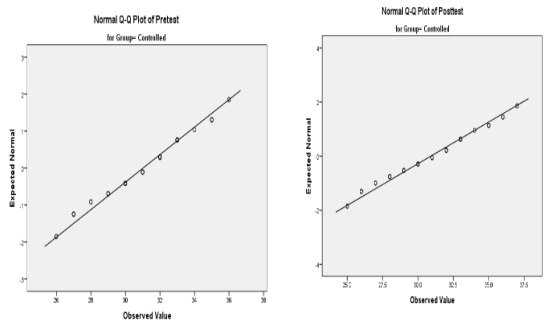
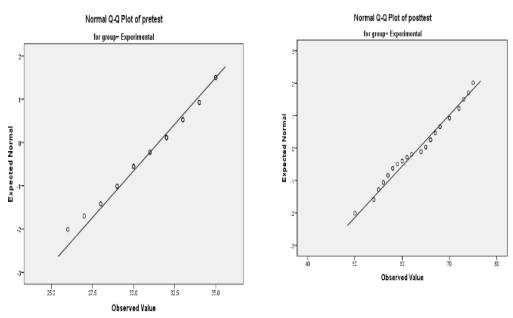
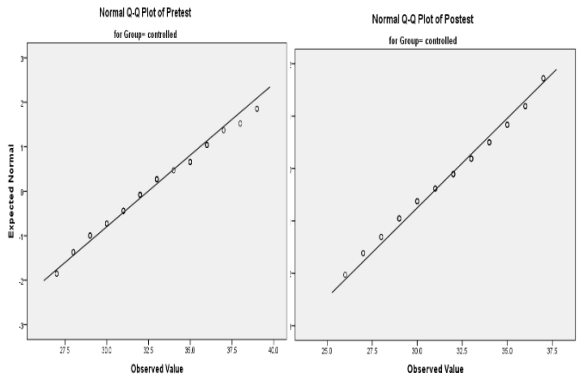
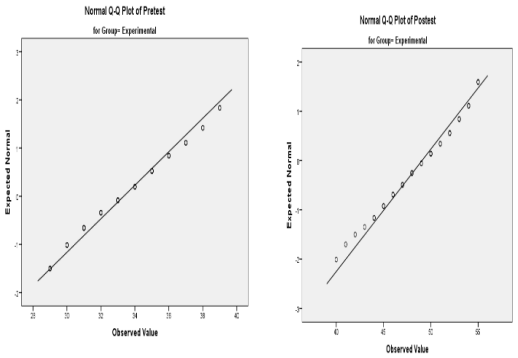
	Figure 4.1.7			
	Controlled Group		**Experimental Group**	
	Pre- Test	**Post- Test**	**Pre- Test**	**Post- Test**

Overall Learning Compe-Tency	 	 
Cognitive Domain	 	 

Affective Domain		
Psycho-Motor Domain		

b) Q – Q Plot

	Figure 4.1.8			
Categories	Controlled Group		Experimental Group	
	Pre- Test	Post- Test	Pre- Test	Post- Test
Overall Learning Compe- Tency				
Cognitive Domain				

Affective Domain		
Psycho-Motor Domain		

Again, we can see from the Histogram and Q- Q plot diagrams mentioned above that all the Histograms are in bell shaped form which means all the scores are equally distributed. Also, in case of Q – Q plot we can see the normality of the distribution. Therefore, in case of visual form also the data are normally distributed.

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.

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. The researcher collected quantitative data on Learning Competency as dependent variable of the study. So, the data point values were for numerical/ continuous variables to be measured.

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, MIBIA and TLM for performing one-way ANCOVA. While Gender and Academic Achievement Level two categorical variables were employed as independent variables each of them having two and three levels (Male/Female, High, Moderate, Low) 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.

4.5.0 Testing the Null Hypothesis

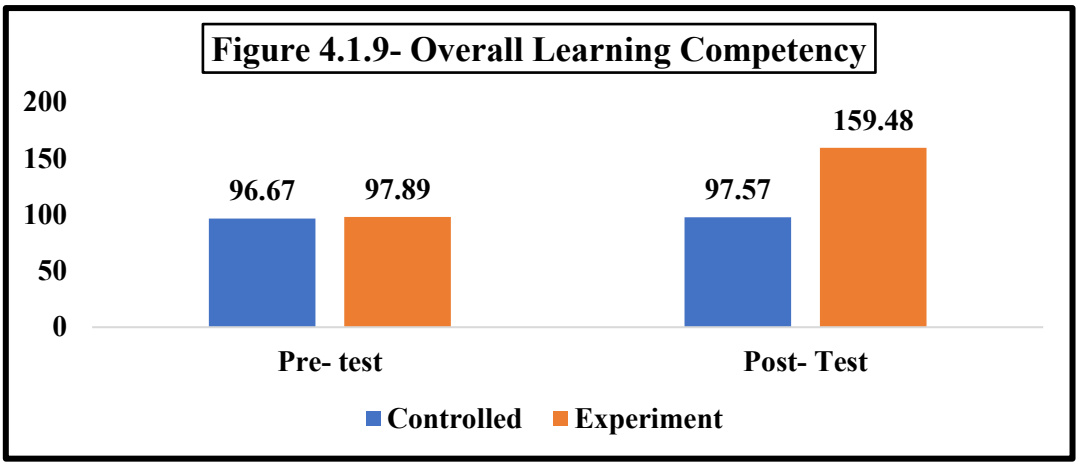
1. TO STUDY THE EFFECT OF THE MULTIPLE INTELLIGENCE BASED INSTRUCTIONAL APPROACH OVER TRADITIONAL LEARNING METHOD IN ACHIEVING OVERALL LEARNING COMPETENCY IN SOCIAL SCIENCE SUBJECT WITH REGARD TO THE PRE-TEST AND POST-TEST SCORES.

In order to test the first hypothesis, research data were analysed using One Way ANOVA. The first null hypothesis says that there was no significant difference between the mean scores of the overall Learning Competency Test based on Multiple Intelligence Approach and the mean scores of the same Test instilled through Traditional Learning Method in the Social Science subject. The following tables present the SPSS for ANOVA outputs:

Table 4.1.8

Descriptive Statistics for Overall Learning Competency Test

		N	Mean	Std. Deviation
Pretest	Controlled	46	96.67	4.196
	Experimental	44	97.89	4.352
	Total	90	97.27	4.292
Post-test	Controlled	46	97.57	5.132
	Experimental	44	159.48	11.078
	Total	90	127.83	32.267



The above Bar graph represents the result of the comparison between the mean level performances of control group & experimental group in both pre-test post – test level that indicates the enhancement of overall Learning competency in Social Science.

Table 4.1.9

ANOVA summary for Overall Learning Competency Test in Social Science

		Sum of Squares	Df	Mean Square	F	Sig.
Pre-test	Between Groups	33.059	1	33.059	1.811	.182
	Within Groups	1606.541	88	18.256		
	Total	1639.600	89			
Post-test	Between Groups	86202.218	1	86202.218	1173.857	.000
	Within Groups	6462.282	88	73.435		
	Total	92664.500	89			

Interpretation of the ANOVA Results:

From the above-described tables, a summary of the findings is taken to understand the studied the data. Multiple Intelligence Based Instructional Approach (MIBIA) vs. Traditional Lecture Method (TLM): Table 4.1.9 shows how the (MIBIA) approach improves overall Learning Competency in Social Science based on the results of the pre- and post-tests. Its main goal is to calculate the F' value, which shows how (MIBIA), as opposed to TLM, improved students' overall Learning Competency in terms of both pre- and post-test results.

Analysis of the pre-test scores of both the groups, as shown in the Table 4.1.9, 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 1.811 which was not significant. In this case the null hypothesis was not rejected.

Thereby, it can be concluded that no significant difference existed between the mean score (96.67) of the control group's overall Learning Competency test and the mean score (97.89) of the experimental group's overall Learning Competency test at the initial stage of treatment. The analysis of the post-test results for both groups, as presented in table 4.1.9, confirmed a substantial difference between the post-test scores of the control group and the experimental group.

The calculated F-ratio for the post-test results of the control group compared to those of the experimental group was 1173.857, which was significant at both the 0.05 and 0.01 levels. The null hypothesis, which asserted that there was no significant difference between the mean scores of overall Learning Competencies developed through MIBIA and the mean scores of the overall Learning Competency Test developed through TLM in the Social Science subject concerning pre-test and post-test scores, was rejected.

Therefore, a significant difference was observed between the mean scores of the overall Learning Competency Test for the control group and the experimental group at the final stage of the treatment. The mean score of the total Learning Competency Test for the experimental group at the post-test level was 159.48, greatly surpassing the control group's mean score of 97.57. Consequently, it can be concluded that students instructed by MIBIA shown greater success in attaining Learning Competency skills in the subject compared to those taught through TLM.

In summary, Table 4.1.9 indicates that no significant differences were observed between the groups at the pre-testing level; however, a significant difference was identified in the mean scores of the Overall Learning Competency test in the Social Science subject between the experimental and control groups at the post-testing level. The researcher had to consider that in this quasi-experimental approach, random allocation of groups was impractical. The experimental group and the control group were not balanced before the intervention. Under these circumstances, the discrepancies seen at the conclusion of the experiment cannot be deemed sufficiently valid to support any conclusions.

Therefore, even if ANOVA revealed that there was a notable difference between control group results and experimental group results at the post-test level, it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group results occurred only because of the treatment effect while pre-test level results showed no such difference. The researcher must use analysis of covariance (ANCOVA) to bypass this restriction since it let her statistically equate the treatment groups. To thus control the pre-existing variations upon dependable variable at the first stage of the experiment, the researcher used pre-test scores as the covariate. Therefore, by means of this analysis of covariance technique, the post-test results were covariated with the pre-test data so enabling reliable inference concerning the treatment effect.

Table No 4.1.10
Dependent Variable: Post-test Learning Competency Test

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlled	97.815[a]	1.249	95.334	100.297
Experimental	159.216[a]	1.277	156.678	161.754

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.

Table 4.1.11
Effect of MIBIA over TLM in Achieving Learning Competency in Social Science subject by taking pre-test as co-variate.

Sources of Variation	Sum of Squares	Df	Mean Square	F	Sig.

Contrast	83074.016	1	83074.016	1170.196	.000
Error	6176.263	87	70.992		

Interpretation of the ANCOVA Results:

The above Table 4.1.11 illustrates the impact of MIBIA on TLM in attaining Learning Competency in the Social Science field, referencing the covariation between pre-test and post-test scores, as detailed in the ANCOVA results. Table 4.1.11 indicates that after adjusting the post-test results in relation to the pre-test data, the adjusted F-value was determined to be 1170.196, which was significant at both the 0.05 and 0.01 levels with df = 1/84. The adjusted mean values of the Learning Competency Test in the Social Science topic for students in the control and experimental groups exhibited significant differences when the pre-test was employed as a covariate. The null hypothesis, which posited that there was no significant difference between the adjusted average scores of Overall Learning Competency developed through MIBIA and those developed through TLM in the Social Science subject, considering their pre-test as a covariate, was rejected.

Therefore, it can be concluded that the Learning Competency of students instructed using MIBIA was significantly superior to that of TLM when both groups were comparable in terms of their pre-test results. Finally, the researcher arrived at the conclusion that MIBIA was highly effective over the TLM in facilitating the development of Learning Competency in Social Science subject among learners at secondary school level.

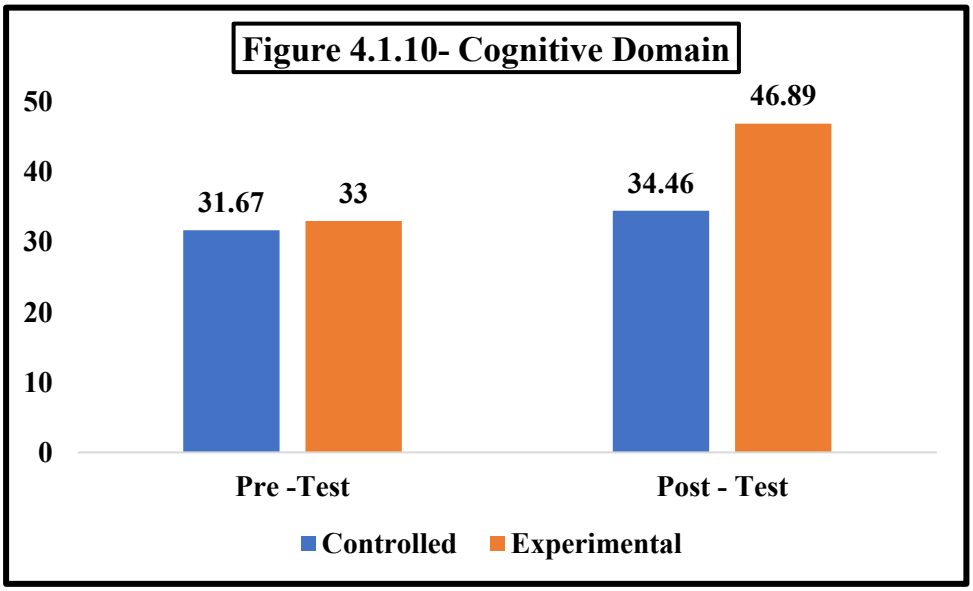
2. TO STUDY THE EFFECT OF THE MULTIPLE INTELLIGENCE BASED INSTRUCTIONAL APPROACH OVER TRADITIONAL LEARNING METHOD IN ACHIEVING DOMAIN WISE LEARNING COMPETENCY IN SOCIAL SCIENCE SUBJECT WITH REGARD TO THE PRE-TEST AND POST-TEST SCORES.

To test the next hypothesis, research data were analysed using One Way ANOVA. The second null hypothesis says that there was no significant difference between the mean scores of the domain wise Learning Competency Test based on Multiple Intelligence Approach and the mean scores of the same Test instilled through Traditional Learning Method in the Social Science subject. The following tables present the SPSS for ANOVA outputs:

a) **Study of the effect of MIBIA over TLM on the enhancement of cognitive domain competency in social science subject in regard to the pre-test and post-test outcomes.**

Table 4.1.12
Descriptive Statistics for Cognitive Domain Performance

		N	Mean	Std. Deviation
Pre-test	Controlled	46	31.67	1.506
	Experimental	44	33.00	6.149
	Total	90	32.32	4.457
Post- test	Controlled	46	34.46	2.297
	Experimental	44	46.89	4.571
	Total	90	40.53	7.197



The above Bar graph represents the result of the comparison between the mean level performances of control group & experimental group in both pre-test post – test level that indicates the enhancement of Cognitive Level Learning competency in Social Science.

Table 4.1.13
ANOVA Result of Cognitive Domain

		Sum of Squares	Df	Mean Square	F	Sig.
Pre-test	Between Groups	39.547	1	39.547	2.014	.159
	Within Groups	1728.109	88	19.638		
	Total	1767.656	89			
Post-test	Between Groups	3474.555	1	3474.555	269.192	.000
	Within Groups	1135.845	88	12.907		
	Total	4610.400	89			

From the above-described tables, a summary of the findings is taken to understand the studied the data. Multiple Intelligence Based Instructional Approach (MIBIA) vs. Traditional Lecture Method (TLM): Table 4.1.13 shows how the (MIBIA) approach improves cognitive domain Competency in Social Science based on the results of the pre- and post-tests. Its main goal is to calculate the F' value, which shows how (MIBIA), as opposed to TLM, improved students' cognitive domain Competency in terms of both pre- and post-test results.

The analysis of the pre-test scores for both groups, as presented in Table 4.1.13, indicated that there was no significant difference between the pre-test scores of the control group and the experimental group. The calculated F-ratio between the pre-test results of the control group and the experimental group was 2.014, which was not statistically significant. The null hypothesis was not rejected in this instance. Consequently, it can be concluded that no significant difference existed between the mean score (31.67) of the overall Learning Competency exam for the control group and the mean score (33.00) of the Cognitive level test for the experimental group at the initial stage of treatment.

The analysis of the post-test results for both groups, as presented in Table 4.1.13, confirmed a substantial difference between the post-test scores of the control group and the experimental group. The calculated F-ratio for the post-test results of the control group and the experimental group was 269.192, which was significant at both the 0.05 and 0.01 levels. The null hypothesis, which asserted that there was no significant difference between the mean scores of Cognitive Level Learning Competencies developed through MIBIA and those developed through TLM in the Social Science subject concerning pre-test and post-test scores, was rejected.

Therefore, it can be concluded that a significant difference was observed between the mean score of the Cogntive Level Learning Competency Test of the control group and the mean score of the Cognitive Level Learning Competency of the experimental group at the conclusion of the treatment. Furthermore, the experimental group's mean score on the Cognitive Learning Competency Test at the post-test level was (46.89), which was substantially higher than that of the control group, which had a mean score of (34.46).

Therefore, it may be inferred that students who were taught through MIBIA were found to be successful in achieving Cognitive Learning Competency skill then subject when compared to the students who were taught through TLM.

In summary, Table 4.1.13 indicates that no significant differences were observed between the groups at the pre-testing level; however, significant differences emerged in the mean scores of the Cognitive Level Learning Competency test in the Social Science subject between the experimental and control groups at the post-testing level. The researcher had to consider that in this quasi-experimental approach, random allocation of groups was impractical. The experimental group and the control group were not standardized before the intervention. Under these circumstances, the differences seen at the conclusion of the experiment cannot be deemed sufficiently valid to support any inferences.

Therefore, even if ANOVA revealed that there was a notable difference between control group results and experimental group results at the post-test level, it cannot be inferred with determination that the significant difference between the post-test outcomes of control group & the experimental group results occurred only because of the treatment effect while pre-test level results showed no such difference. To address this restriction, the researcher utilized analysis of covariance (ANCOVA) to statistically equate the treatment groups. Consequently, the researcher employed pre-test scores as the covariate to account for pre-existing differences in the dependent variable at the experiment's outset. Thus, by use of this analysis of covariance technique, the post-test findings were covariate with the pre-test results so that valid inference concerning the treatment effect can be obtained.

Table No 4.1.14
Dependent Variable: Post-test Cognitive Level Learning Competency Test

Group	Mean	Std. Error	95% Confidence Interval

			Lower Bound	Upper Bound
Controlled	34.508[a]	.533	33.448	35.568
Experimental	46.833[a]	.545	45.749	47.916

a. Covariates appearing in the model are evaluated at the following values: Pretest = 32.32.

Table 4.1.15
Effect of MIBIA over TLM in Achieving Cognitive Level Learning Competency in Social Science subject by taking pre-test as co-variate.

Sources of Variation	Sum of Squares	Df	Mean Square	F	Sig.
Contrast	3339.668	1	3339.668	258.266	.000
Error	1125.008	87	12.931		

Interpretation of the ANCOVA Results:

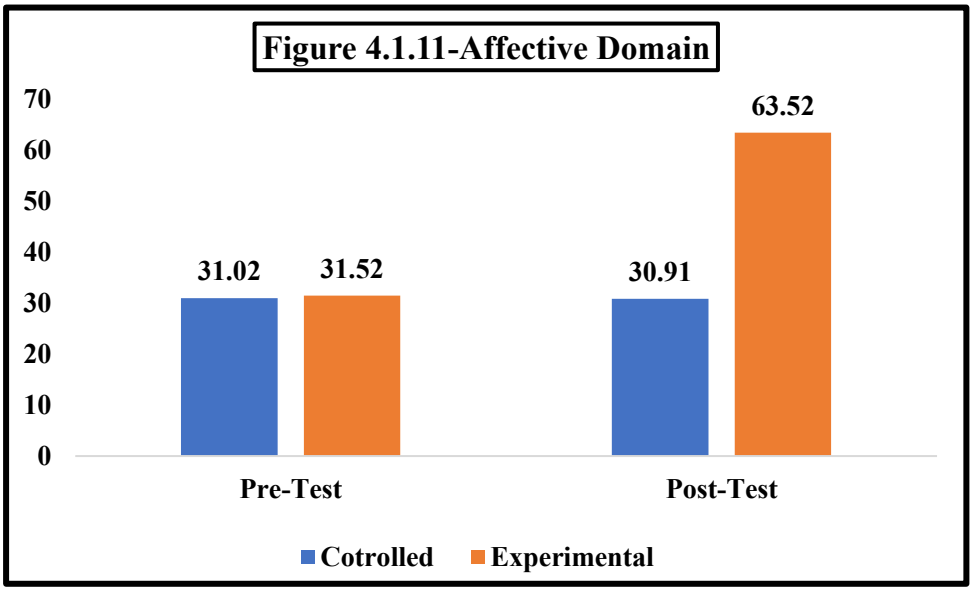
Table 4.1.15 illustrates the impact of MIBIA on TLM in attaining Cognitive Level Learning Competency in the Social Science field, as evidenced by the covariation of pre-test and post-test scores, supported by the ANCOVA results. Table 4.1.15 clearly indicates that after comparing the post-test findings with the pre-test data, the adjusted F-value was determined to be 258.266, which was significant at both the 0.05 and 0.01 levels with df = 1/87. The adjusted mean values of the Cognitive Level Learning Competency Test in the Social Science topic for students in the control and experimental groups exhibited significant differences when the pre-test was employed as a covariate.

Accordingly, the null hypothesis which stated that there was no significant difference between the adjusted average scores of Cognitive Level Learning Competency developed through MIBIA and the adjusted average scores of Cognitive Level Learning Competency developed through TLM in Social Science subject by considering their pre- test as covariate was rejected. Therefore, it can be concluded that the Cognitive Level Learning Competency of students instructed via MIBIA was significantly superior to that of TLM when both groups were compared based on their pre-test results. The researcher ultimately concluded that MIBIA significantly outperformed TLM in promoting Cognitive Level Learning Competency in the Social Science topic among secondary school students.

b) Study of the effect of MIBIA over TLM on the enhancement of affective domain competency in social science subject in regard to the pre-test and post-test outcomes.

Table 4.1.16
Descriptive Statistics for Affective Domain Performance

		N	Mean	Std. Deviation
Pre-test	Controlled	46	31.02	2.687
	Experimental	44	31.52	2.318
	Total	90	31.27	2.512
Post-test	Controlled	46	30.91	3.244
	Experimental	44	63.52	6.319
	Total	90	46.86	17.126



The above Bar graph represents the result of the comparison between the mean level performances of control group & experimental group in both pre-test post - test level that indicates the enhancement of Affective Level Learning competency in Social Science.

Table 4.1.17
ANOVA Result of Affective Domain

		Sum of Squares	Df	Mean Square	F	Sig.
Pre-test	Between Groups	5.644	1	5.644	.893	.347
	Within Groups	555.956	88	6.318		
	Total	561.600	89			
Post-test	Between Groups	23914.493	1	23914.493	960.672	.000
	Within Groups	2190.629	88	24.894		
	Total	26105.122	89			

From the above-described tables, a summary of the findings is taken to understand the studied the data. Multiple Intelligence Based Instructional Approach (MIBIA) vs. Traditional Lecture Method (TLM): Table 4.1.17 shows how the (MIBIA) approach improves affective domain Competency in Social Science based on the results of the pre- and post-tests. Its main goal is to calculate the F' value, which shows how (MIBIA), as opposed to TLM, improved students' affective domain Competency in terms of both pre- and post-test results.

Analysis of the pre-test scores of both the groups, as shown in the Table 4.1.17, 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 (.893) which was not significant. In this case the null hypothesis was not rejected. Thereby, it can be determined that there is no significant difference existed between the mean score (31.02) of Affective Level Learning Competency test of the control group & mean score (31.52) of Affective level test of the experimental group at the initial stage of treatment. Analysis of the post-test outcomes of both the groups, as shown in Table 4.1.17, 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 (960.672) which was significant at both 0.05 and 0.01 level.

The null hypothesis, which asserted that there was no significant difference between the mean scores of Affective Level Learning Competencies developed through MIBIA and

those developed through TLM in the Social Science subject concerning pre-test and post-test scores, was rejected. Thus, a significant difference was seen between the mean scores of the Affective Level Learning Competency Test for the control group and the experimental group at the final stage of the treatment.

Furthermore, the experimental group's mean score on the Affective Learning Competency Test at the post-test level was (63.52), which was substantially higher than that of the control group, which had a mean score of (30.91). Therefore, it may be inferred that students who were taught through MIBIA were found to be successful in achieving Affective Learning Competency skill then subject when compared to the students who were taught through TLM. In summary, Table 4.1.17 indicates that there were no significant differences between the experimental and control groups at the pre-testing level. However, a significant difference was observed between the mean scores of the Affective Level Learning Competency test in the Social Science subject across the two groups at the post-testing level. The researcher was required to consider that it was impractical to randomly assign groups in this quasi-experimental design. 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, in order to mitigate the pre-existing disparities in the dependable variable at the outset of the experiment, the researcher implemented pre-test scores as the covariate. Thus, the post-test results were covariated with the pre-test results using this covariance analysis technique, allowing for the drawing of a valid inference regarding the treatment effect.

Table No 4.1.18
Dependent Variable: Post-test Affective Level Learning Competency Test

Group	Mean	Std. Error	95% Confidence Interval

			Lower Bound	Upper Bound
Controlled	30.958[a]	.738	29.491	32.426
Experimental	63.475[a]	.755	61.974	64.976
a. Covariates appearing in the model are evaluated at the following values: Pretest = 31.27				

Table 4.1.19
Effect of MIBIA over TLM in Achieving Affective Level Learning Competency in Social Science subject by taking pre-test as co-variate.

Sources of Variation	Sum of Squares	Df	Mean Square	F	Sig.
Contrast	23539.477	1	23539.477	943.087	.000
Error	2171.523	87	24.960		

Interpretation of the ANCOVA Results:

The effect of MIBIA over TLM in achieving Affective Level Learning Competency in the Social Science subject is illustrated in Table 4.1.19 by describing the results of ANCOVA in relation to the covariation of the pre-test scores with post-test scores. It was evident from Table 4.1.15 that the adjusted F-value was 943.087, which was significant at both the 0.05 and 0.01 levels with df = 1/87, after adjusting or correlating the post-test results with the pre-test ones. It suggests that the adjusted mean values of the Affective Level Learning Competency Test in Social Science subject of students in the control and experimental groups differed significantly when the pre-test was used as a covariate.

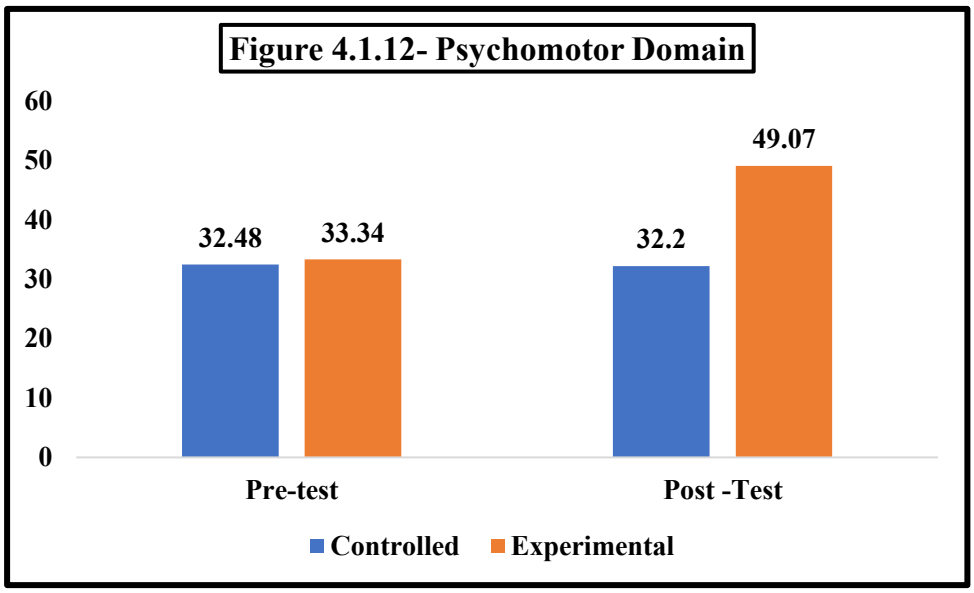
Accordingly, the null hypothesis which stated that there was no significant difference between the adjusted average scores of Affective Level Learning Competency developed through MIBIA and the adjusted average scores of Affective Level Learning Competency developed through TLM in Social Science subject by considering their pre- test as covariate was rejected. Therefore, it can be inferred that the Affective Level Learning Competency of students treated through MIBIA was evidently superior to TLM when both the groups were matched in respect of their pre- test scores. Finally, the researcher arrived at the conclusion that MIBIA was highly effective over the TLM in facilitating the

development of Affective Level Learning Competency in Social Science subject among learners at secondary school level.

c) Study of the effect of MIBIA over TLM on the enhancement of psychomotor domain competency in social science subject in regard to the pre-test and post-test outcomes.

Table 4.1.20
Descriptive Statistics for Psychomotor Domain Performance

		N	Mean	Std. Deviation
Pre-test	Controlled	46	32.48	3.111
	Experimental	44	33.34	2.877
	Total	90	32.90	3.013
Post- test	Controlled	46	32.20	2.926
	Experimental	44	49.07	4.025
	Total	90	40.44	9.170



The above Bar graph represents the result of the comparison between the mean level performances of control group & experimental group in both pre-test post - test level that indicates the enhancement of Psychomotor Level Learning competency in Social Science.

Table 4.1.21
ANOVA Result of Psychomotor Domain

		Sum of Squares	Df	Mean Square	F	Sig.
Pre-test	Between Groups	16.735	1	16.735	1.861	.176
	Within Groups	791.365	88	8.993		
	Total	808.100	89			
Post-test	Between Groups	6402.188	1	6402.188	520.679	.000
	Within Groups	1082.035	88	12.296		
	Total	7484.222	89			

From the above described tables, a summary of the findings is taken to understand the studied the data. Multiple Intelligence Based Instructional Approach (MIBIA) vs. Traditional Lecture Method (TLM): Table 4.1.21 shows how the (MIBIA) approach improves psychomotor domain Competency in Social Science based on the results of the pre- and post-tests. Its main goal is to calculate the F' value, which shows how (MIBIA), as opposed to TLM, improved students' psychomotor domain Competency in terms of both pre- and post-test results.

Analysis of the pre-test scores of both the groups, as shown in the Table 4.1.21 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 (1.861) which was not significant. In this case the null hypothesis was not rejected. Thereby, it can be determined that there is no significant difference existed between the mean score (32.48) of Psychomotor Level Learning Competency test of the control group & mean score (33.34) of Psychomotor level test of the experimental group at the initial stage of treatment.

Analysis of the post-test outcomes of both the groups, as shown in Table 4.1.21, 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 (520.679) which was significant at both 0.05 and 0.01 level. In this case the null hypothesis which proclaimed that there was no significant difference between the mean scores of Psychomotor level Leaning Competencies developed through MIBIA & the mean scores of Psychomotor Level Learning Competency Test developed through TLM in Social

Science 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 Psychomotor Level Leaning Competency Test of the control group & mean score of Psychomotor Level Learning Competency of the experimental group at the final stage of treatment. Further, the mean value of Psychomotor Learning Competency Test of the experimental group at post-test level was (49.07) which was significantly superior to that of the control group whose mean score of Psychomotor Level Learning Competency Test was (32.20). Therefore, it may be inferred that students who were taught through MIBIA were found to be successful in achieving Psychomotor Learning Competency skill then subject when compared to the students who were taught through TLM. To summarise briefly it can be said that Table 4.1.21 showed that at pre-testing level, no significant differences were found in both the group while in post testing levels significant difference was found between the mean scores of Psychomotor Level Learning Competency test in Social Science subject of both the groups- experimental and the control group. 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.

Table 4.1.22 Dependent Variable: Post-test Psychomotor Level Learning Competency Test				
Group	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
Controlled	32.220[a]	.522	31.182	33.258
Experimental	49.043[a]	.534	47.982	50.104
a. Covariates appearing in the model are evaluated at the following values: Pre- test = 32.90.				

Table 4.1.23 Effect of MIBIA over TLM in Achieving Psychomotor Level Learning Competency in Social Science subject by taking pre-test as co-variate.					
Sources of Variation	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Contrast	6232.656	1	6232.656	502.355	.000
Error	1079.399	87	12.407		

Interpretation of the ANCOVA Results:

The effect of MIBIA over TLM in achieving Psychomotor Level Learning Competency in the Social Science subject is illustrated in the aforementioned Table 4.1.23 by describing the results of ANCOVA in relation to the covariation of the pre-test scores with post-test scores. It was evident from Table 4.1.23 that the adjusted F-value was 502.355, which was significant at both the 0.05 and 0.01 levels with df = 1/87, after adjusting or correlating the post-test results with the pre-test values. It suggests that the adjusted mean values of the Psychomotor Level Learning Competency Test in Social Science subject of students in the control and experimental groups differed significantly when the pre-test was taken into account as a covariate.

The null hypothesis, which posited no significant difference between the adjusted average scores of Psychomotor Level Learning Competency developed through MIBIA and those developed through TLM in the Social Science subject, while accounting for the pre-test as a covariate, was rejected. Consequently, it can be deduced that the Psychomotor Level Learning Competency of students instructed via MIBIA was significantly superior to that of TLM when both groups were matched based on their pre-test scores.

Finally, the researcher arrived at the conclusion that MIBIA was highly effective over the TLM in facilitating the development of Psychomotor Level Learning Competency in Social Science subject among learners at secondary school level.

3. TO STUDY THE EFFECT OF GROUP, GENDER AND THEIR INTERACTION ON OVERALL LEARNING COMPETENCY IN SOCIAL SCIENCE SUBJECT BY CONSIDERING THE PRE-TEST AS COVARIATE.

The third objective of the study aims to study the effect of Group, Gender and their interaction on Overall Learning Competency in Social Science Subject by considering the pre-test result as covariate. For this objective the researcher adopted Analysis of Covariance. As it was impossible to assign the treatment groups (Experimental and Controlled Group randomly, so the groups were not equated before the implementation of the treatment. So, in such case, in order to statistically equate the two treatment groups and controlling the effect of other confounding variables, the researcher adopted Two-way ANCOVA to test hypothesis. Here Post -test score of Overall Learning Competency was considered as the depended variable while pre- test score of the Overall Learning Competency was the covariate.

The result gathered from SPSS regarding the Outcome of the Overall Learning Competency are discussed as follows:

Table 4.1.24

Descriptive statistics for Overall Learning Competency in Social Science Subject

Group	Gender	N	Mean	SD
Controlled Group	Male	23	95.74	4.901
	Female	23	99.39	4.784
	Total	46	97.57	5.132
Experimental Group	Male	21	155.38	9.902
	Female	23	163.22	10.958
	Total	44	159.48	11.078
Total	Male	44	124.20	31.080
	Female	46	131.30	33.331
	Total	90	127.83	32.267

Table 4.1.25

Group wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test				
Group	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
Controlled	97.816[a]	1.175	95.479	100.153
Experimental	159.038[a]	1.203	156.645	161.430

a. Covariates appearing in the model are evaluated at the following values: Pre- test = 97.27.

Table 4.1.26

Gender wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test				
Gender	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
Male	125.547[a]	1.197	123.167	127.927
Female	131.307[a]	1.170	128.981	133.632

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.

Table 4.1.27

Group - Gender wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test					
Group	**Gender**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	**Upper Bound**
Controlled	Male	95.962[a]	1.657	92.667	99.257
	Female	99.669[a]	1.659	96.371	102.968
Experimental	Male	155.132[a]	1.735	151.682	158.581
	Female	162.944[a]	1.659	159.646	166.243

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.

Table 4.1.28 Tests of Between-Subjects Effects						
Dependent Variable: Post-test						
Source	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**	**Remarks**
Group	82510.361	1	82510.361	1311.365	.000	
Gender	745.337	1	745.337	11.846	.001	
Group * Gender	94.654	1	94.654	1.504	.223	
Error	5348.154	85	62.919			
Total	1563387.000	90				
Corrected Total	92664.500	89				
a. R Squared = .942 (Adjusted R Squared = .940)						

Interpretation of Two- Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, gender wise and their interaction wise comparison of the adjusted mean scores of the Overall Learning Competency in Social Science subject is given below:

Explanation of the effect of Group on Overall Learning Competency by considering Pre- Test result as covariate.

The F-value presented in Table No. 4.1.28 indicates that the F-value for the Group is 1311.365, which is significant at the 0.05 level. The study identified a significant difference in the adjusted mean scores of Overall Learning Competency in Social Science between the two treatment groups, with the pre-test considered as a covariate. Consequently, the null hypothesis, which posited that the Group does not significantly affect the adjusted mean scores of overall learning competency in the social science topic when the pre-test was utilized as a covariate, was rejected.

And female students score more than male students in post-test. Therefore, it can be concluded that MIBIA significantly improved students' overall learning competencies as compared to TLM when pre-test result was compared. And also, the female students were found to score more than the male students.

Explanation of the effect of Gender on Overall Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.28 it is evident that the F - value for Gender was 11.846 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of Overall Learning Competency in Social Science between both the treatment groups considering pre- test as a covariate. Consequently, the null hypothesis, which posited that gender has no significant effect on the adjusted mean scores of overall learning competency in the social science topic when the pre-test was utilized as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' overall learning competencies as compared to TLM when both the gender was compared with their pre-test result.

Effect of Interaction between Group and Gender on Overall Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the Table No. 4.1.28 it is evident that the F - value for the interaction between Group and Gender was 1.504 which is not significant at both 0.05 and 0.01 levels. This study demonstrated no significant change in the adjusted mean scores of Overall Learning Competency in Social Science between the two treatment groups, with the pre-test considered as a covariate. Consequently, the null hypothesis, which posited that gender has no significant effect on the adjusted mean scores of overall learning competency in the social science topic when the pre-test was utilized as a covariate, was not rejected. Therefore, it can be concluded that MIBIA was found to be independent of interaction between Group and Gender when pre-test result of the overall Learning Competency was compared.

4. TO STUDY THE EFFECT OF GROUP, GENDER AND THEIR INTERACTION ON DOMAIN WISE LEARNING COMPETENCY IN SOCIAL SCIENCE SUBJECT BY CONSIDERING THEIR RESPECTIVE DOMAIN AT PRE-TEST LEVEL AS COVARIATE.

The fourth objective of the study aims to study the effect of Group, Academic Achievement and their interaction on category wise Learning Competency in Social Science Subject by considering the pre-test result as covariate. For this objective the researcher adopted Analysis of Covariance. As it was impossible to assign the treatment

groups (Experimental and Controlled Group randomly, so the groups were not equated before the implementation of the treatment. So, in such case, in order to statistically equate the two treatment groups and controlling the effect of other confounding variables, the researcher adopted Two-way ANCOVA to test hypothesis. Here Post -test score of each category wise Learning Competency was considered as the depended variable while pre- test score of each category wise Learning Competency was the covariate.

The result gathered from SPSS regarding the Outcome of each category of Learning Competency are discussed as follows:

a) To study the effect of Group, Gender and their interaction on cognitive domain of the students by considering Pre- Test result as covariate.

For this sub objective ANCOVA was conducted in order to test the null hypothesis that state that here is no significant difference between the mean scores of cognitive domain developed through MIA and the mean scores of cognitive ability developed through TLM in social science subject with regard to pre-test and post-test scores. The outcome of this objective from SPSS are as follows:

Table 4.1.29

Descriptive statistics for Overall Learning Competency in Social Science Subject

Group	Gender	N	Mean	SD
Controlled Group	Male	23	34.04	2.383
	Female	23	34.87	2.181
	Total	46	34.46	2.297
Experimental Group	Male	21	46.76	4.403
	Female	23	47.00	4.815
	Total	44	46.89	4.571
Total	Male	44	40.11	7.295
	Female	46	40.93	7.160
	Total	90	40.53	7.197

Table 4.1.30

Group wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlled	34.510[a]	.537	33.442	35.579
Experimental	46.821[a]	.551	45.726	47.915

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.32.

Table 4.1.31

Gender wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	40.362[a]	.548	39.272	41.453
Female	40.969[a]	.535	39.904	42.033

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.

Table 4.1.32

Group and Gender wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test

Group	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Controlled	Male	34.113[a]	.759	32.604	35.623
	Female	34.907[a]	.757	33.403	36.411
Experimental	Male	46.611[a]	.807	45.007	48.215
	Female	47.030[a]	.756	45.527	48.534

a. Covariates appearing in the model are evaluated at the following values: Pre- test = 32.32.

Interpretation of Two Way ANCOVA

Table 4.1.33 Tests of Between-Subjects Effects						
Dependent Variable: Post-test						
Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Group	3320.109	1	3320.109	252.908	.000	.748
Gender	8.176	1	8.176	.623	.432	.007
Group * Gender	.769	1	.769	.059	.809	.001
Error	1115.858	85	13.128			
Total	152476.000	90				
Corrected Total	4610.400	89				
a. R Squared = .758 (Adjusted R Squared = .747)						

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, gender wise and their interaction wise comparison of the adjusted mean scores of the Cognitive Domain of Learning Competency in Social Science subject is given below:

Explanation of the effect of Group on Cognitive Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.33 it is evident that the F - value for Group was 252.908 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of cognitive domain learning competency in Social Science between both the treatment groups considering pre-test as a covariate. Consequently, the null hypothesis, which posited that the Group has no significant effect on the adjusted mean scores of cognitive domain learning competency in the social science topic when the pre-test was utilized as a covariate, was rejected. Consequently, it can be inferred that MIBIA markedly enhanced students' cognitive domain learning competencies in comparison to TLM when the pre-test results were analysed.

Explanation of the effect of Gender on Cognitive Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.33 it is evident that the F - value for Gender was .623 which is neither significant in 0.05 level nor in 0.01 levels. So, it can be said that the study found no significant difference in adjusted mean scores of cognitive domain learning competency in Social Science between both the gender i.e. male and female considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that Gender has no significant influence on the adjusted mean scores of overall learning competency in social science subject when their pre-test was used as a covariate, was accepted. Therefore, it can be concluded that cognitive domain learning competency is independent of their Gender when pre-test result was regarded as covariate.

Effect of Interaction between Group and Gender on Cognitive Domain Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the Table No.4.1.33 it is evident that the F - value for the interaction between Group and Gender was .059 which is not significant at both 0.05 and 0.01 levels. So, it can be said that in this study no significant difference was found in adjusted mean scores of the cognitive domain learning competency in Social Science subject of the students both male and female belonging to both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that there is no significant effect of Group, Gender and their interaction on cognitive domain learning competency of the students by considering their pre- test as covariate was accepted. Therefore, it can be concluded that MIBIA was found to be independent of interaction between Group and Gender when pre-test result of the cognitive domain Learning Competency was compared.

b) To study the effect of Group, Gender and their interaction on affective domain of the students by considering Pre- Test result as covariate.

For this sub objective ANCOVA was conducted in order to test the null hypothesis that state that here is no significant difference between the mean scores of affective domain learning competency developed through MIA and the mean scores of affective domain learning competency developed through TLM in social science subject with regard to pre-test and post-test scores. The outcome of this objective from SPSS are as follows:

Table 4.1.34

Descriptive statistics for Affective Domain Learning Competency in Social Science Subject

Group	Gender	N	Mean	SD
Controlled Group	Male	23	29.87	3.634
	Female	23	31.96	2.458
	Total	46	30.91	3.244
Experimental Group	Male	21	61.19	5.618
	Female	23	65.65	6.278
	Total	44	63.52	6.319
Total	Male	44	44.82	16.489
	Female	46	48.80	17.674
	Total	90	46.86	17.126

Table 4.1.35

Group wise distribution of Adjusted mean score of Affective Domain Learning Competency

Dependent Variable: Post-test

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlled	30.955[a]	.700	29.563	32.346
Experimental	63.377[a]	.717	61.953	64.802

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.36

Gender wise distribution of Adjusted mean score of Affective Domain Learning Competency

Dependent Variable: Post-test

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	45.549[a]	.715	44.127	46.971
Female	48.783[a]	.699	47.394	50.172

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27

Table 4.1.37

Group and Gender wise distribution of Adjusted mean score of Affective domain Learning Competency

Dependent Variable: Post-test

Group	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Controlled	Male	29.959[a]	.993	27.985	31.934
	Female	31.950[a]	.987	29.987	33.913
Experimental	Male	61.139[a]	1.035	59.080	63.197
	Female	65.616[a]	.988	63.651	67.581

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.38

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared

Group	23375.152	1	23375.152	1042.440	.000	.925
Gender	234.443	1	234.443	10.455	.002	.110
Group * Gender	34.582	1	34.582	1.542	.218	.018
Error	1905.998	85	22.424			
Total	223695.000	90				
Corrected Total	26105.122	89				
a. R Squared = .927 (Adjusted R Squared = .924)						

Interpretation of Two Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, gender wise and their interaction wise comparison of the adjusted mean scores of the Affective Domain of Learning Competency in Social Science subject is given below:

Explanation of the effect of Group on Affective Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.38 it is evident that the F - value for Group was 1042.440 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of affective domain learning competency in Social Science between both the treatment groups considering pre-test as a covariate. As a consequence, the null hypothesis, which indicated that Group has no significant influence on the adjusted mean scores of affective domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' affective domain learning competencies as compared to TLM when both the groups were matched in respect of their pre-test result.

Explanation of the effect of Gender on Affective Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.38 it is evident that the F - value for Gender was 10.455 which is significant at 0.05 level. So, it can be said that the study found no significant difference in adjusted mean scores of affective domain learning competency in Social Science between both the gender i.e. male and female considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that Gender has no significant influence on the adjusted mean scores of affective domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' affective domain learning competencies as compared to TLM when both the genders were matched in respect of their pre-test result.

Effect of Interaction between Group and Gender on Affective Domain Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the Table No.4.1.38 it is evident that the F - value for the interaction between Group and Gender was 1.542 which is not significant at both 0.05 and 0.01 levels. So, it can be said that in this study no significant difference was found in adjusted mean scores of the affective domain learning competency in Social Science subject of the students both male and female belonging to both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that there is no significant effect of Group, Gender and their interaction on affective domain learning competency of the students by considering their pre- test as covariate was accepted. Therefore, it can be concluded that MIBIA was found to be independent of interaction between Group and Gender when pre-test result of the affective domain learning competency was compared.

c) To study the effect of Group, Gender and their interaction on psychomotor domain of the students by considering Pre- Test result as covariate.

For this sub objective ANCOVA was conducted in order to test the null hypothesis that state that here is no significant difference between the mean scores of psychomotor domain learning competency developed through MIA and the mean scores of psychomotor domain

learning competency developed through TLM in social science subject with regard to pre-test and post-test scores. The outcome of this objective from SPSS are as follows:

Table 4.1.39

Descriptive statistics for Psychomotor Domain Learning Competency in Social Science Subject

Group	Gender	N	Mean	SD
Controlled Group	Male	23	29.87	3.634
	Female	23	31.96	2.458
	Total	46	30.91	3.244
Experimental Group	Male	21	61.19	5.618
	Female	23	65.65	6.278
	Total	44	63.52	6.319
Total	Male	44	44.82	16.489
	Female	46	48.80	17.674
	Total	90	46.86	17.126

Table 4.1.40

Group wise distribution of Adjusted mean score of Psychomotor Domain Learning Competency

Dependent Variable: Post-test

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlled	30.955[a]	.700	29.563	32.346
Experimental	63.377[a]	.717	61.953	64.802

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.41

Gender wise distribution of Adjusted mean score of Psychomotor Domain Learning Competency

Dependent Variable: Post-test

Gender	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	45.549[a]	.715	44.127	46.971
Female	48.783[a]	.699	47.394	50.172

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27

Table 4.1.42

Group and Gender wise distribution of Adjusted mean score of Psychomotor domain Learning Competency

Dependent Variable: Post-test

Group	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Controlled	Male	29.959[a]	.993	27.985	31.934
	Female	31.950[a]	.987	29.987	33.913
Experimental	Male	61.139[a]	1.035	59.080	63.197
	Female	65.616[a]	.988	63.651	67.581

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.43

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	23375.152	1	23375.152	1042.440	.000	.925
Gender	234.443	1	234.443	10.455	.002	.110
Group * Gender	34.582	1	34.582	1.542	.218	.018
Error	1905.998	85	22.424			
Total	223695.000	90				
Corrected Total	26105.122	89				

a. R Squared = .927 (Adjusted R Squared = .924)

Interpretation of Two Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, gender wise and their interaction wise comparison of the adjusted mean scores of the Psychomotor Domain of Learning Competency in Social Science subject is given below:

Explanation of the effect of Group on Psychomotor Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.43 it is evident that the F - value for Group was 1042.440 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of psychomotor domain learning competency in Social Science between both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that Group has no significant influence on the adjusted mean scores of psychomotor domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' psychomotor domain learning competencies as compared to TLM when both the groups were matched in respect of their pre-test result.

Explanation of the effect of Gender on Psychomotor Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.43 it is evident that the F - value for Gender was 10.455 which is significant at 0.05 level. So, it can be said that the study found no significant difference in adjusted mean scores of psychomotor domain learning competency in Social Science between both the gender i.e. male and female considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that Gender has no significant influence on the adjusted mean scores of psychomotor domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' psychomotor domain learning competencies as compared to TLM when both the genders were matched in respect of their pre-test result.

Effect of Interaction between Group and Gender on Psychomotor Domain Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the Table No.4.1.43 it is evident that the F - value for the interaction between Group and Gender was 1.542 which is not significant at both 0.05 and 0.01 levels. So, it can be said that in this study no significant difference was found in adjusted mean scores of the psychomotor domain learning competency in Social Science subject of the students both male and female belonging to both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that there is no significant effect of Group, Gender and their interaction on psychomotor

domain learning competency of the students by considering their pre- test as covariate was accepted. Therefore, it can be concluded that MIBIA was found to be independent of interaction between Group and Gender when pre-test result of the psychomotor domain learning competency was compared.

5. TO STUDY THE EFFECT OF GROUP, ACADEMIC ACHIEVEMENT LEVEL AND THEIR INTERACTION ON OVERALL LEARNING COMPETENCY IN SOCIAL SCIENCE SUBJECT BY CONSIDERING THE PRE-TEST AS COVARIATE.

The fifth objective of the study aims to study the effect of Group, Academic Achievement Level and their interaction on Overall Learning Competency in Social Science Subject by considering the pre-test result as covariate. For this objective the researcher adopted Analysis of Covariance. As it was impossible to assign the treatment groups (Experimental and Controlled Group randomly, so the groups were not equated before the implementation of the treatment. So, in such case, in order to statistically equate the two treatment groups and controlling the effect of other confounding variables, the researcher adopted Two-way ANCOVA to test hypothesis. Here Post -test score of Overall Learning Competency was considered as the depended variable while pre- test score of the Overall Learning Competency was the covariate.

The result gathered from SPSS regarding the Outcome of the Overall Learning Competency are discussed as follows:

Table 4.1.44

Descriptive statistics for Overall Learning Competency in Social Science Subject

Dependent Variable: Post-test

Group	Academic Achievement Level	N	Mean	SD
Controlled	High	11	99.64	5.124

	Moderate	29	96.79	5.240
	Low	6	97.50	4.231
	Total	46	97.57	5.132
Experimental	High	10	172.70	7.959
	Moderate	28	156.18	8.840
	Low	6	152.83	7.468
	Total	44	159.48	11.078
Total	High	21	134.43	37.944
	Moderate	57	125.96	30.798
	Low	12	125.17	29.471
	Total	90	127.83	32.267

Table 4.1.45

Group wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test

Group	Mean	Std. Error	95% Confidence Interval

			Lower Bound	Upper Bound
Controlled	97.996[a]	1.244	95.521	100.470
Experimental	160.290[a]	1.278	157.748	162.832
a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.				

Table 4.1.46

Academic Achievement wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test				
Academic Achievement Level	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
High	135.756[a]	1.531	132.711	138.801
Moderate	126.666[a]	.922	124.832	128.499
Low	125.007[a]	1.996	121.037	128.978
a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.				

Table 4.1.47

Group - Academic Achievement wise distribution of Adjusted mean score of Overall Learning Competency

Dependent Variable: Post-test

Group	Academic Achievement Level	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Controlled	High	99.328[a]	2.091	95.168	103.487
	Moderate	97.178[a]	1.305	94.583	99.774
	Low	97.481[a]	2.819	91.873	103.089
Experimental	High	172.184[a]	2.208	167.793	176.576
	Moderate	156.153[a]	1.305	153.557	158.749
	Low	152.533[a]	2.826	146.913	158.154

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 97.27.

Table 4.1.48

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Sum of Squares	Df	Mean Square	F	Sig.	Remarks
Group	58101.021	1	58101.021	1218.171	.000	.936
Achievement	1396.840	2	698.420	14.643	.000	.261
Group * Achievement	889.645	2	444.823	9.326	.000	.183
Error	3958.709	83	47.695			
Total	1563387.000	90				
Corrected Total	92664.500	89				
a. R Squared = .957 (Adjusted R Squared = .954)						

Interpretation of Two- Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, academic achievement level wise and their interaction wise comparison of the adjusted mean scores of the Overall Learning Competency in Social Science subject is given below:

Explanation of the effect of Group on Overall Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No. 4.1.48 it is evident that the F–value for Group was 1218.171 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of Overall Learning Competency in Social Science between both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that Group has no

significant influence on the adjusted mean scores of overall learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' overall learning competencies as compared to TLM when compared with both the group in respect to their pre-test result.

Explanation of the effect of Academic Achievement Level on Overall Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No. 4.1.48 it is evident that the F - value for Academic Achievement Level was 14.643 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of Overall Learning Competency in Social Science among the students with high, moderate and low academic achievement level considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that Academic Achievement Level has no significant influence on the adjusted mean scores of overall learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' overall learning competencies as compared to TLM when all the three academic achievement level were compared in respect of their pre-test result.

Effect of Interaction between Group and Academic Achievement Level on Overall Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the Table No. 4.1.48 it is evident that the F - value for the interaction between Group and Academic Achievement Level was 9.326 which is significant at both 0.05 and 0.01 levels. So, it can be said that there is a significant difference found in adjusted mean scores of Overall Learning Competency in Social Science between both the treatment groups as well as Academic Achievement Level considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that there is no significant effect of Group, Academic Achievement Level and their interaction on Overall learning competency of the students by considering their pre- test as covariate was rejected. Therefore, it can be concluded that MIBIA was found to have a positive effect of interaction between Group and Academic Achievement Level when pre-test result of the Overall Learning Competency was compared.

6. TO STUDY THE EFFECT OF GROUP, ACADEMIC ACHIEVEMENT LEVEL AND THEIR INTERACTION ON DOMAIN WISE LEARNING COMPETENCY IN SOCIAL SCIENCE SUBJECT BY CONSIDERING THEIR RESPECTIVE DOMAIN AT PRE-TEST LEVEL AS COVARIATE.

The sixth objective of the study aims to study the effect of Group, Academic Achievement and their interaction on category wise Learning Competency in Social Science Subject by considering the pre-test result as covariate. For this objective the researcher adopted Analysis of Covariance. As it was impossible to assign the treatment groups (Experimental and Controlled Group randomly, so the groups were not equated before the implementation of the treatment. So, in such case, in order to statistically equate the two treatment groups and controlling the effect of other confounding variables, the researcher adopted Two-way ANCOVA to test hypothesis. Here post-test score of each category wise Learning Competency was considered as the depended variable while pre- test score of each category wise Learning Competency was the covariate.

The result gathered from SPSS regarding the Outcome of each category of Learning Competency are discussed as follows:

a) To study the effect of Group, Academic Achievement Level and their interaction on cognitive domain of the students by considering Pre- Test result as covariate.

For this sub objective ANCOVA was conducted in order to test the null hypothesis that state that here is no significant difference between the mean scores of cognitive domain developed through MIA and the mean scores of cognitive ability developed through TLM in social science subject with regard to pre-test and post-test scores. The outcome of this objective from SPSS are as follows:

Table 4.1.49

Descriptive statistics for Cognitive Domain Learning Competency in Social Science Subject

Dependent Variable: Post-test

Group	Academic Achievement Level	N	Mean	SD
Controlled	High	11	35.45	2.296
	Moderate	29	34.45	2.277
	Low	6	32.67	1.366
	Total	46	34.46	2.297
Experimental	High	10	53.20	1.814
	Moderate	28	46.07	2.538
	Low	6	40.17	1.169
	Total	44	46.89	4.571
Total	High	21	43.90	9.305
	Moderate	57	40.16	6.330
	Low	12	36.42	4.100
	Total	90	40.53	7.197

Table 4.1.50

Group wise distribution of Adjusted mean score of Cognitive Domain Learning Competency

Dependent Variable: Post-test				
Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlled	34.244[a]	.402	33.444	35.044
Experimental	46.396[a]	.412	45.576	47.216
a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.32.				

Table 4.1.51

Academic Achievement wise distribution of Adjusted mean score of Cognitive Domain Learning Competency

Dependent Variable: Post-test				
Academic Achievement Level	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
High	44.259[a]	.488	43.288	45.230
Moderate	40.284[a]	.295	39.698	40.871
Low	36.416[a]	.641	35.141	37.691
a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.32.				

Table 4.1.52

Group – Academic Achievement wise distribution of Adjusted mean scores of Cognitive Domain Learning Competency

Dependent Variable: Post-test

Group	Academic Achievement Level	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Controlled	High	35.407[a]	.671	34.073	36.741
	Moderate	34.507[a]	.415	33.682	35.332
	Low	32.817[a]	.914	30.999	34.635
Experimental	High	53.111[a]	.706	51.707	54.515
	Moderate	46.062[a]	.420	45.227	46.896
	Low	40.015[a]	.914	38.196	41.833

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.32.

Table 4.1.53

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Sum of Squares	Df	Mean Square	F	Sig.	Remarks
Group	2159.625	1	2159.625	437.832	.000	.841
Achievement	491.663	2	245.832	49.839	.000	.546
Group * Achievement	236.378	2	118.189	23.961	.000	.366
Error	409.401	83	4.933			
Total	152476.000	90				
Corrected Total	4610.400	89				

a. R Squared = .911 (Adjusted R Squared = .905)

Interpretation of Two Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, academic achievement level wise and their interaction wise comparison of the adjusted mean scores of the cognitive domain of learning competency in Social Science subject is given below:

Explanation of the effect of Group on Cognitive Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No. 4.1.53 it is evident that the F - value for Group was 437.832 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of cognitive domain learning competency in Social Science between both the treatment groups considering pre-test as a covariate. As a consequence, the null hypothesis, which indicated that Group has no significant influence on the adjusted mean scores of cognitive domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' cognitive domain learning competencies as compared to TLM when both the groups were compared in respect of their pre-test result.

Explanation of the effect of Academic Achievement Level on Cognitive Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No. 4.1.53 it is evident that the F - value for Academic Achievement Level was 49.839 which is significant at both 0.045 level nor in 0.01 levels. So, it can be said that the study found significant difference in adjusted mean scores of cognitive domain learning competency in Social Science among the three categories of academic achievement level i.e. high, moderate and low considering pre- test as a covariate. as a consequence, the null hypothesis, which indicated that academic achievement level has no significant influence on the adjusted mean scores of overall learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' cognitive domain learning competencies as compared to TLM when compared to all the three levels of academic achievement in respect to their pre-test result.

Effect of Interaction between Group and Gender on Cognitive Domain Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the Table No. 4.1.53 it is evident that the F - value for the interaction between Group and Academic Achievement Level was 23.961 which is significant at both 0.05 and 0.01 levels. So, it can be said that in this study there is significant difference in adjusted mean scores of the cognitive domain learning

competency in Social Science subject of the students of all the three levels of academic achievement belonging to both the treatment groups considering pre- test as a covariate. as a consequence, the null hypothesis, which indicated that there is no significant effect of group, academic achievement level and their interaction on cognitive domain learning competency of the students by considering their pre- test as covariate was accepted. Therefore, it can be concluded that MIBIA was found to have a positive effect of interaction between group and academic achievement level when pre-test result of the cognitive domain learning competency was compared.

b) To study the effect of Group, Academic Achievement Level and their interaction on affective domain of the students by considering Pre- Test result as covariate.

For this sub objective ANCOVA was conducted in order to test the null hypothesis that state that here is no significant difference between the mean scores of affective domain learning competency developed through MIA and the mean scores of affective domain learning competency developed through TLM in social science subject with regard to pre-test and post-test scores. The outcome of this objective from SPSS are as follows:

Table 4.1.54

Descriptive statistics for Affective Domain Learning Competency in Social Science Subject

Dependent Variable: Post-test

Group	Academic Achievement Level	N	Mean	SD
Controlled	High	11	31.27	3.524
	Moderate	29	30.62	3.310
	Low	6	31.67	2.658
	Total	46	30.91	3.244

Experimental	High	10	65.80	6.647
	Moderate	28	62.36	6.087
	Low	6	65.17	6.524
	Total	44	63.52	6.319
Total	High	21	47.71	18.393
	Moderate	57	46.21	16.720
	Low	12	48.42	18.128
	Total	90	46.86	17.126

Table 4.1.55

Group wise distribution of Adjusted mean score of Affective Domain Learning Competency

Dependent Variable: Post-test

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Controlled	31.240[a]	.898	29.454	33.026
Experimental	64.413[a]	.912	62.599	66.228

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.56

Academic Achievement wise distribution of Adjusted mean score of Affective Domain Learning Competency

Dependent Variable: Post-test

Academic Achievement Level	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
High	48.531[a]	1.087	46.370	50.693
Moderate	46.478[a]	.659	45.167	47.789
Low	48.471[a]	1.437	45.613	51.330

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.57

Group - Academic Achievement wise distribution of Adjusted mean scores of Affective Domain Learning Competency

Dependent Variable: Post-test

Group		Mean	Std. Error	95% Confidence Interval

	Academic Achievement Level			Lower Bound	Upper Bound
Controlled	High	31.290[a]	1.500	28.307	34.274
	Moderate	30.675[a]	.925	28.834	32.516
	Low	31.755[a]	2.033	27.712	35.799
Experimental	High	65.773[a]	1.573	62.643	68.902
	Moderate	62.280[a]	.943	60.404	64.157
	Low	65.187[a]	2.031	61.148	69.227

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 31.27.

Table 4.1.58

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Sum of Squares	Df	Mean Square	F	Sig.	Remarks
Group	16589.438	1	16589.438	670.353	.000	.890
Achievment	86.158	2	43.079	1.741	.182	.040

Group * Achievment	34.550	2	17.275	.698	.500	.017
Error	2054.028	83	24.747			
Total	223695.000	90				
Corrected Total	26105.122	89				
a. R Squared = .921 (Adjusted R Squared = .916)						

Interpretation of Two Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, academic achievement level wise and their interaction wise comparison of the adjusted mean scores of the Affective Domain Learning Competency in Social Science subject is given below:

Explanation of the effect of Group on Affective Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No.4.1.58 it is evident that the F - value for Group was 670.353 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of affective domain learning competency in Social Science between both the treatment groups considering pre-test as a covariate. As a consequence, the null hypothesis, which indicated that Group has significant influence on the adjusted mean scores of affective domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' affective domain learning competencies as compared to TLM when pre-test result was compared.

Explanation of the effect of Academic Achievement Level on Affective Domain Learning Competency by considering Pre- Test result as covariate.

if we observe the f - value mentioned in the table no.4.1.58 it is evident that the f - value for academic achievement level was 1.741 which is neither significant at both 0.05 level nor in 0.01 levels. so, it can be said that the study found no significant difference in adjusted mean scores of affective domain learning competency in social science among the three categories of academic achievement level i.e. high, moderate and low considering pre- test as a covariate. as a consequence, the null hypothesis, which indicated that academic achievement level has no significant influence on the adjusted mean scores of overall learning competency in social science subject when their pre-test was used as a covariate, was accepted. therefore, it can be concluded that there was no significant effect of academic achievement level on affective domain learning competency while considering pre- test result as covariate and hence students of all the academic achievement level seems to have the same significant level in the affective domain learning competencies when pre-test result was regarded as covariate.

Effect of Interaction between Group and Gender on Affective Domain Learning Competencies by considering Pre- Test as covariate.

if we observe the f - value mentioned in the table no.4.1.58 it is evident that the f - value for the interaction between group and academic achievement level was .698 which is not significant at both 0.05 and 0.01 levels. so, it can be said that in this study there is no significant difference in adjusted mean scores of the affective domain learning competency in Social Science subject of the students of all the three levels of academic achievement belonging to both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that there is no significant effect of group, academic achievement level and their interaction on affective domain learning competency of the students by considering their pre- test as covariate was accepted. therefore, it can be concluded that MIBIA was found to be independent of interaction between group and academic achievement level when pre-test result of the affective domain learning competency was compared.

c) To study the effect of Group, Academic Achievement Level and their interaction on Psychomotor domain of the students by considering Pre- Test result as covariate.

For this sub objective ANCOVA was conducted in order to test the null hypothesis that state that here is no significant difference between the mean scores of psychomotor domain learning competency developed through MIA and the mean scores of psychomotor domain learning competency developed through TLM in social science subject with regard to pre-test and post-test scores. The outcome of this objective from SPSS are as follows:

Table 4.1.59
Descriptive statistics for Psychomotor Domain Learning Competency in Social Science Subject

Dependent Variable: Post-test				
Group	**Academic Achievement Level**	**N**	**Mean**	**SD**
Controlled	High	11	32.91	3.300
	Moderate	29	31.72	2.763
	Low	6	33.17	2.994
	Total	46	32.20	2.926
Experimental	High	10	53.70	1.160
	Moderate	28	47.75	3.787
	Low	6	47.50	1.975
	Total	44	49.07	4.025
Total	High	21	42.81	10.921
	Moderate	57	39.60	8.722
	Low	12	40.33	7.866
	Total	90	40.44	9.170

Table 4.1.60
Group wise distribution of Adjusted mean score of Psychomotor Domain Learning Competency

Dependent Variable: Post-test				
Group	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
Controlled	32.616[a]	.555	31.512	33.719
Experimental	49.647[a]	.564	48.526	50.768
a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.90.				

Table 4.1.61

Academic Achievement wise distribution of Adjusted mean score of Psychomotor Domain Learning Competency

Dependent Variable: Post-test				
Academic Achievement Level	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
High	43.266[a]	.677	41.920	44.612
Moderate	39.739[a]	.407	38.929	40.549
Low	40.388[a]	.896	38.607	42.170

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.90.

Table 4.1.62

Group - Academic Achievement wise distribution of Adjusted mean scores of Psychomotor Domain Learning Competency

Dependent Variable: Post-test					
Group	**Academic Achievement Level**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	**Upper Bound**
Controlled	High	32.848[a]	.937	30.985	34.711
	Moderate	31.769[a]	.579	30.617	32.921
	Low	33.230[a]	1.263	30.719	35.742
Experimental	High	53.685[a]	.973	51.750	55.619
	Moderate	47.710[a]	.588	46.541	48.879
	Low	47.546[a]	1.259	45.042	50.051

a. Covariates appearing in the model are evaluated at the following values: Pre-test = 32.90.

Table 4.1.63

Tests of Between-Subjects Effects

Dependent Variable: Post-test					
Source	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Group	4379.950	1	4379.950	463.442	.000

Achievement	188.659	2	94.330	9.981	.000
Group * Achievement	111.891	2	55.946	5.920	.004
Error	784.426	83	9.451		
Total	154702.000	90			
Corrected Total	7484.222	89			
a. R Squared = .895 (Adjusted R Squared = .888)					

Interpretation of Two Way ANCOVA

The above-mentioned tables show the results of the analysis of the data with the help of Two Way ANCOVA. Here the explanation of the group wise, academic achievement level wise and their interaction wise comparison of the adjusted mean scores of the psychomotor domain learning competency in Social Science subject is given below:

Explanation of the effect of Group on Psychomotor Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No. 4.1.63 it is evident that the F - value for Group was 463.442 which is significant at both 0.05 and 0.01 levels. So, it can be said that the study found a significant difference in adjusted mean scores of psychomotor domain learning competency in Social Science between both the treatment groups considering pre- test as a covariate. As a consequence, the null hypothesis, which indicated that group has significant influence on the adjusted mean scores of psychomotor domain learning competency in Social Science subject when their pre-test was used as a covariate, was rejected. Therefore, it can be concluded that MIBIA significantly improved students' psychomotor domain learning competencies as compared to TLM when both the group were compared in respect of their pre-test result.

Explanation of the effect of Academic Achievement Level on Psychomotor Domain Learning Competency by considering Pre- Test result as covariate.

If we observe the F - value mentioned in the Table No. 4.1.63 it is evident that the F - value for Academic Achievement Level was 9.981 which is significant at both 0.05 level nor in 0.01 levels. So, it can be said that the study found significant difference in adjusted mean scores of psychomotor domain learning competency in Social Science among the three categories of Academic Achievement Level i.e. high, moderate and low considering pre-test as a covariate. As a consequence, the null hypothesis, which indicated that academic

achievement level has no significant influence on the adjusted mean scores of psychomotor domain learning competency in social science subject when their pre-test was used as a covariate, was rejected. and it was also observed that the mean score of the experimental group is higher than the controlled group mean score. therefore, it can be concluded that students of all the academic achievement level have enhanced their psychomotor domain through MIBIA then through TLM when pre-test result was regarded as covariate.

Effect of Interaction between Group and Gender on Psychomotor Domain Learning Competencies by considering Pre- Test as covariate.

If we observe the F - value mentioned in the table no. 4.1.63 it is evident that the f - value for the interaction between group and academic achievement level was 5.920 which is not significant at both 0.05. so, it can be said that in this study there is no significant difference in adjusted mean scores of the psychomotor domain learning competency in social science subject of the students of all the three levels of academic achievement belonging to both the treatment groups considering pre- test as a covariate. as a consequence, the null hypothesis, which indicated that there is no significant effect of group, academic achievement level and their interaction on psychomotor domain learning competency of the students by considering their pre- test as covariate was accepted. therefore, it can be concluded that MIBIA was found to be independent of interaction between Group and academic achievement level when pre-test result of the psychomotor domain learning competency was compared.