

CHAPTER – IV

ANALYSIS OF DATA AND INTERPRETATION OF RESULTS AND FINDINGS

4.0.0 INTRODUCTION

The first chapter deals with the introduction, conceptual framework, rationale of the study, objectives, hypotheses and delimitations of the research. The second chapter deals with the review of related literature. The methodology, sample, design, tools and procedure of data collection and statistical techniques used for the analysis of data have been presented in detail in Chapter – III. The present chapter is devoted to the presentation of data, analysis, results and their interpretations. Objectives-wise results and its interpretations are presented, below, under separate captions.

4.1.0 LEARNING PROGRESSION IN SCIENCE OF CLASS IX STUDENTS

The first objective of the investigation was to study the Learning Progression in Science of class IX students of Balangir District of Odisha. The data related to the Learning Progression in Science were collected with the help of administering the Achievement Test in Science developed by the investigator. The maximum marks of Achievement Test in Science were 100. The data were analysed with the help of Mean, SD, Range and Percentiles. The results are presented in Table 4.1, below.

Table – 4.1: Mean, SD, Range, N and Percentiles for Achievement in Science and Attitude towards Science of Class IX Students of Experimental and Control Group

Sta. Techniques	Achievement in Science	
	Experimental	Control
N	40	40
Mean	65.90	46.65
Std. Deviation	17.00	10.23
Range	58	44

	Percentiles	
P5	40	30
P10	42	34
P20	44.40	36.40
P25	51	38.50
P30	56	40
P40	60.40	44
P50	68	46
P60	74	49.20
P70	77.40	52
P75	81.50	54
P80	84	57
P90	86	59.80
P95	91.80	63.90

Table – 4.1 shows that the mean score of Achievement in Science of Experimental Group and Control Group are 65.90 and 46.65, respectively. The SD for Achievement in Science of Experimental Group and Control Group are 17.90 and 10.23, respectively. The Range for Achievement in Science of Experimental Group and Control Group are 58 and 44, respectively. It signifies that the mean score of Achievement in Science of Experimental Group is higher than the Control Group. The SD for Achievement in Science of Experimental Group is higher than the Control Group. It may be inferred that there was a large deviation of the scores of Achievements in Science of Experimental Group. The Range for Achievement in Science of Experimental Group is higher than the Control Group. It shows that there was large distribution of scores in Achievement in Science among the students of Experimental Group.

The Percentiles for Achievement in Science of Experimental Group demonstrates that 40 marks or below scored by 5% students. It shows that 95% students scored more than 40% marks. Likewise, 51 marks or below scored by 25% students and 68 marks or below scored by 50% students. It also shows that 81.5 marks or below scored by 75% of students and 86 marks or below scored by 90% students. The Table – 4.1 demonstrates that 91.80 marks or below was scored by 95% students of Experimental Group. In other words, it can be said that 91.80% marks are secured by 95% students of Experimental Group. It shows that 5% students scored more than 91.80% marks.

The Percentiles for Achievement in Science of Control Group demonstrates that 30 marks or below scored by 5% students. It shows that 95% students scored more than 30% marks. Likewise, 38.50 marks or below scored by 25% students and 46 marks or below scored by 50% students. It also shows that 54 marks or below scored by 75% of students and 59.80 marks or below scored by 90% students. The Table – 4.1 demonstrates that 63.90 marks or below were scored by 95% students of Control Group. In other words, it can be said that 63.90% marks are secured by 95% students of Control Group. It shows that 5% students scored more than 63.90% marks.

Findings: The Learning Progression of Students of Experimental group is higher than that of Control group students of class IX of Balangir district, Odisha.

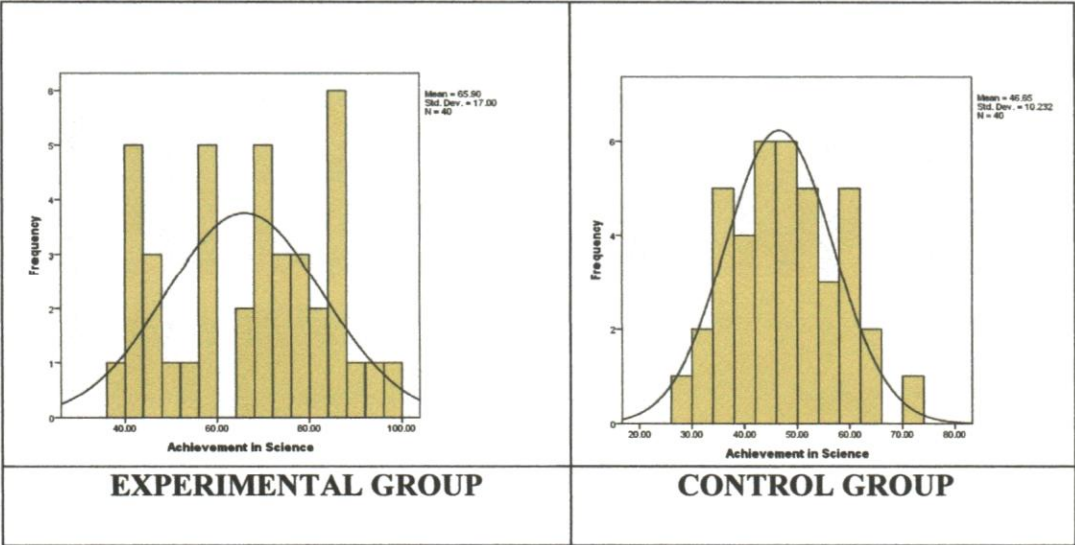


Fig. 4.1: Achievement in Science of Class IX Students of Experimental and Control Group

From the above presentations of the results of the present study, it can be concluded that the students of Experimental Group achieved higher in Science than their counterparts, i.e., the students of Control Group. Therefore, it can be inferred from the result of the present study that Constructivist Approach was more effective than the Traditional Method of Teaching in terms of Achievement in Science. The Learning Progression of students taught through the Constructivist Approach was higher than the students taught through the Traditional Method of Teaching.

4.2.0 ATTITUDE TOWARDS SCIENCE OF CLASS IX STUDENTS

The second objective of the investigation was to study the Attitude towards Science among class IX students of Balangir District of Odisha. The data related to the Attitude towards Science were collected with the help of administering the Attitude towards Science Tool (Grewal 1984). The maximum marks of Attitude towards Science Tool were 80. The data were analysed with the help of Mean, SD, Range and Percentiles. The results are presented in Table 4.2, below.

Table – 4.2: Mean, SD, Range, N and Percentiles for Attitude towards Science of Class IX Students of Experimental and Control Group

Sta. Techniques	Attitude towards Science	
	Experimental	Control
N	40	40
Mean	48.30	48.10
Std. Deviation	8.12	7.64
Range	34	38

Table – 4.1 shows that the mean score of Attitude towards Science of Experimental Group and Control Group are 48.30 and 48.10, respectively. The SD for Attitude towards Science of Experimental Group and Control Group are 8.12 and 7.64, respectively. The Range for Attitude towards Science of Experimental Group and Control Group are 34 and 38, respectively. It signifies that the mean score of Attitude towards Science of Experimental Group is slightly higher than the Control Group. The

SD for Attitude towards Science of Experimental Group is higher than the Control Group. It may be inferred that there was a large deviation of the scores of Attitude towards Science of Experimental Group. The Range for Attitude towards Science of Experimental Group is lower than the Control Group. It shows that there was large distribution of scores in Attitude towards Science among the students of Control Group.

Findings: The Attitude towards Science of Students of Experimental group is nearly Similar to that of Control group students of class IX of Balangir district, Odisha.

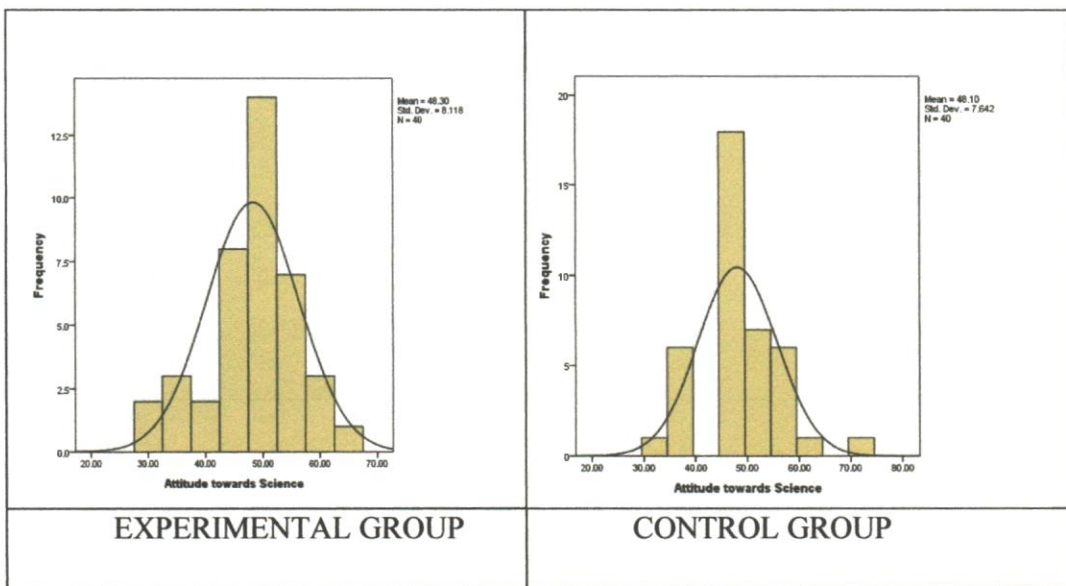


Fig. 4.2: Attitude towards Science of Class IX Students of Experimental and Control Group

From the above presentations of the results of the present study, it can be concluded that the students of Experimental Group achieved slightly higher in Attitude towards Science than their counterparts, i.e., the students of Control Group, which is negligible. Therefore, it can be inferred from the result of the present study that Constructivist Approach was not effective than the Traditional Method of Teaching in terms of Attitude towards Science. The Attitude towards Science of students taught through the Constructivist Approach was nearly similar to the students taught through the Traditional Method of Teaching.

4.3.0 EFFECT OF TREATMENT, GENDER AND THEIR INTERACTION ON ACHIEVEMENT IN SCIENCE OF CLASS IX STUDENTS

The second objective was to study the effect of Treatment, Gender and their interaction on Achievement in Science of Class IX students by taking their previous year Achievement in Science as covariate. Treatment and Gender were two independent variables. Treatment had two levels, namely, Constructivist Approach and Traditional Method of Teaching. Gender had two levels, namely, Boys and Girls. The data related to the Achievement in Science Learning Progression in Science were collected with the help of administering the Achievement Test in Science developed by the investigator. The maximum marks of Achievement Test in Science were 100. The Class VIII Scores of Achievement in Science was collected from the school Register and was designated as previous year Achievement in Science, which was taken as covariate. Thus, the data were analysed with the help of 2 X 2 Factorial Design ANCOVA of Unequal Cell Size. The results, interpretations and findings related to each of these above components are presented under captions 4.2.1, 4.2.2, and 4.2.3. The result has been presented, below, in Table 4.2

Table 4.3: Summary of 2 X 2 Factorial Design ANCOVA for Achievement in Science of Class IX Students by Taking Pre-test Scores of Achievement in Science of as Covariate

Sources of Variance	df	SSy.x	MSSy.x	F-Values	Sig.
Treatment	1	8222.10	8222.10	47.54**	0.000
Gender	1	400.94	400.94	2.32	0.132
Treatment X Gender	1	69.17	69.17	0.40	0.529
Error	75	12971.46	172.90		
Total	78	21663.67			

Table 4.4: Mean and SD for Achievement in Science of Experimental and Control Group

Group	Gender	N	Mean	Std. Deviation
Experimental	Boys	17	69.65	16.496
	Girls	23	63.13	17.192
	Total	40	65.90	17.000
Control	Boys	17	46.94	11.877
	Girls	23	46.43	9.105
	Total	40	46.65	10.232
Total	Boys	34	58.29	18.252
	Girls	46	54.78	16.008
	Total	80	56.27	16.976

4.3.1 Effect of Treatment on Achievement in Science of Class IX Students

From the Table 4.6, it can be seen that the F- value for Treatment is 47.54 which is significant at 0.01 level with df equal to 1/78. It indicates that the adjusted mean scores of Achievements in Science by Constructivist Approach and Traditional Method differ significantly when their previous year Achievement in Science was taken as covariate. So, there was a significant effect of Treatment on Achievement in Science of class IX students by taking their previous year Achievement in Science was taken as covariate. Thus, the null hypothesis, namely, “there is no significant effect of Treatment on Achievement in Science of Class IX students when their previous year score of Achievement in Science was taken as covariate”, is rejected. It is therefore inferred that the treatment produced a significant differential effect on the achievements in the Science subject of students. Thus, it may be concluded that the treatment was effective in terms of achievements in the Science subject of students.

Further, Table 4.7 indicates that the mean score and SD of Achievement in Science by Constructivist Approach Group is 65.90 and 17, respectively. The mean score and the SD of Achievement in Science of group taught through the Traditional Method is 46.65 and 10.23, respectively. It is evident from the table that the mean score of Achievement of experimental group is higher than the Control group. It also shows that the SD of Experimental group was higher than the Control group. It can be concluded that the Constructivist Approach teaching is superior to Traditional Method in terms of improving Achievement.

Finding: There is a significant effect of Treatment (Constructivist Approach) on Achievement in Science of Class IX students as compared to traditional method.

4.3.2 Effect of Gender on Achievement in Science of Class IX Students

Table – 4.3 reveals that the F-value for the Gender is 2.32 is not significant at 0.05 level with df equal to 1/78. It indicates that the Gender did not produce any significant differential effect on the achievement in Science. So, there was no significant effect of gender on achievement in Science of class IX students when their previous year Achievement in Science was taken as covariate. Therefore, the null hypothesis, namely, “there is no significant effect of Gender on Achievement in Science of class IX students when previous years’ Science score is taken as covariate”, is not rejected. It signifies that the achievement in Science is independent of the gender of the students. Further, it can be evident from the Table – 4.4 that the mean of the boys and girls taught through the constructivist approach is 69.65 and 63.13. It signifies that there was minimal difference in the achievement in Science between the boys and the girls. Similarly, in the traditional approach of teaching also, the mean score of achievement of boys and girls were 46.94 and 46.43, respectively. There was no such significant difference in their achievement in Science.

Finding: There is no significant effect of gender on achievement in science of class IX students.

4.3.3 Interaction of Treatment and Gender on Achievement in Science of Class IX Students

Table – 4.3 reveals that the F-value of 0.40 for the interaction of Treatment and Gender is not significant at 0.05 level with df equal to 1/78. It indicates that the interaction of Treatment and Gender did not produce a significant differential effect on the Achievement in Science. In other words, it can be said that there was no interactional effect of Treatment and Gender on the students' Achievement in Science. Therefore, the null hypothesis, namely, "there is no significant interaction of Treatment and Gender on Achievement in Science of class IX students when previous years' Science score is taken as covariate", is not rejected. The students who taught through constructive approach and the students who taught through the traditional approach were benefited in the same way.

The effect of interaction between Treatment and Gender on the measure of achievement in Science was not found significant. The result indicates that the boys and girls were benefited to the same extent in both the modes of teaching. Thus, Gender differential was not noticed in the said interaction on Achievement. But, the mean achievement scores of boys and girls of experimental group were higher than that of the boys and girls of control group. Further, achievement of boys of experimental group was found higher than their girls' counterparts of the same group. Similarly, boys in the control group achieved slightly higher than the girls of the same group. It may, therefore, be said that gender of the pupils did not affected their achievement in Science in both experimental and control group to the same degree.

Finding: There is no significant interactional effect of Treatment and Gender on achievement in Science of class IX students.

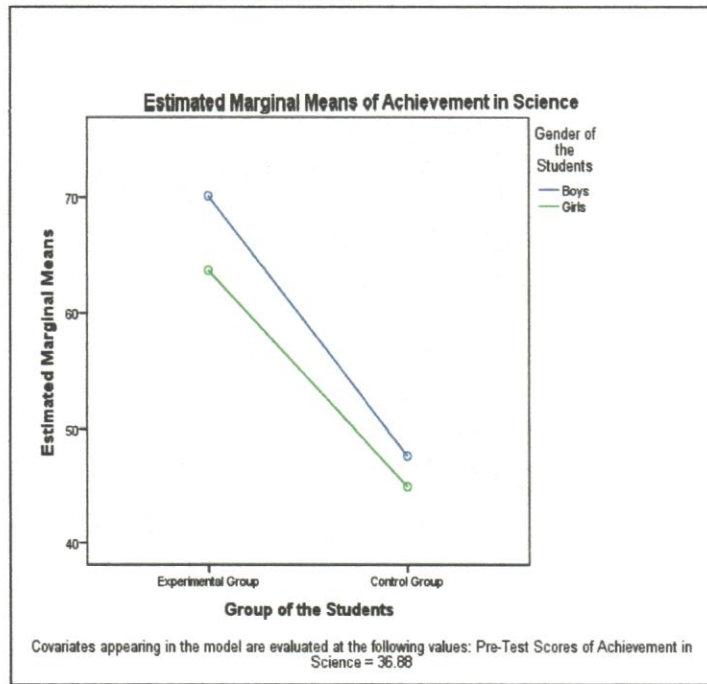


Fig. 4.3: Interaction of Treatment and Gender on Achievement in Science

From the above presentations of the results of the present study, it can be concluded that the students of Experimental Group have high Achievement in Science than their counterparts, i.e., the students of Control Group. Therefore, it can be inferred from the result of the present study that Constructivist Approach was effective than the Traditional Method of Teaching in terms of student's Achievement in Science. But when it comes to Gender, the result shows that there is no significant effect of it on the Achievement in Science of students. If we consider Gender independently, the presentation shows that the Treatment is effective for Boys and Girls individually, i.e., the Boys of Experimental group has high Achievement in Science than those of Control group and the Girls of Experimental group have high achievement rate in Science than those of Control group. Therefore, it may be said that gender of the pupils did not affected their achievement in Science in both experimental and control group to the same degree.