

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 Jajpur 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 Ms. Nayak, 2021. The maximum marks of Achievement Test in Science were 25, which further converted to 100 for analysis. 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 of Class IX Students of Experimental and Control Group

Sta. Techniques	Achievement in Science	
	Experimental	Control
N	30	30
Mean	76	59.33
Std. Deviation	12.43	20.60
Range	48	92
Percentiles		

P5	50.2	21.2
P10	60	36.4
P20	64	44
P25	64	44
P30	69	44
P40	73.6	52
P50	78	56
P60	82.4	60
P70	84	72
P75	84	73
P80	87.2	79.2
P90	91.6	91.6
P95	96	95.6

Table – 4.1 shows that the mean score of Achievement in Science of Experimental Group and Control Group are 76 and 59.33, respectively. The SD for Achievement in Science of Experimental Group and Control Group are 12.22 and 20.60, respectively. The Range for Achievement in Science of Experimental Group and Control Group are 48 and 92 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 lower than the Control Group. It may be inferred that there was a small deviations of the scores of Achievement in Science of Experimental Group. The Range for Achievement in Science of Experimental Group is lower than the Control Group. It shows that there was small distribution of scores in Achievement in Science among the students of Experimental Group.

The Percentiles for Achievement in Science of Experimental Group demonstrates that 50.2 marks or below scored by 5% students. It shows that 95% students scored more than 50.2% marks. Likewise, 64 marks or below scored by 25% students and 78 marks or below scored by 50% students. It also shows that 84 marks or below scored by 75% of students and 91.6 marks or

below scored by 90% students. The Table – 4.1 demonstrates that 96 marks or below were scored by 95% students of Experimental Group. In other words, it can be said that 96% marks are secured by 95% students of Experimental Group. It shows that 5% students scored more than 96% marks.

The Percentiles for Achievement in Science of Control Group demonstrates that 21.2 marks or below scored by 5% students. It shows that 95% students scored more than 21.2% marks. Likewise, 44 marks or below scored by 25% students and 56 marks or below scored by 50% students. It also shows that 73 marks or below scored by 75% of students and 91.6 marks or below scored by 90% students. The Table – 4.1 demonstrates that 95.6 marks or below were scored by 95% students of Control Group. In other words, it can be said that 95.6% marks are secured by 95% students of Control Group. It shows that 5% students scored more than 95.6% marks.

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

EXPERIMENTAL GROUP

CONTROL GROUP

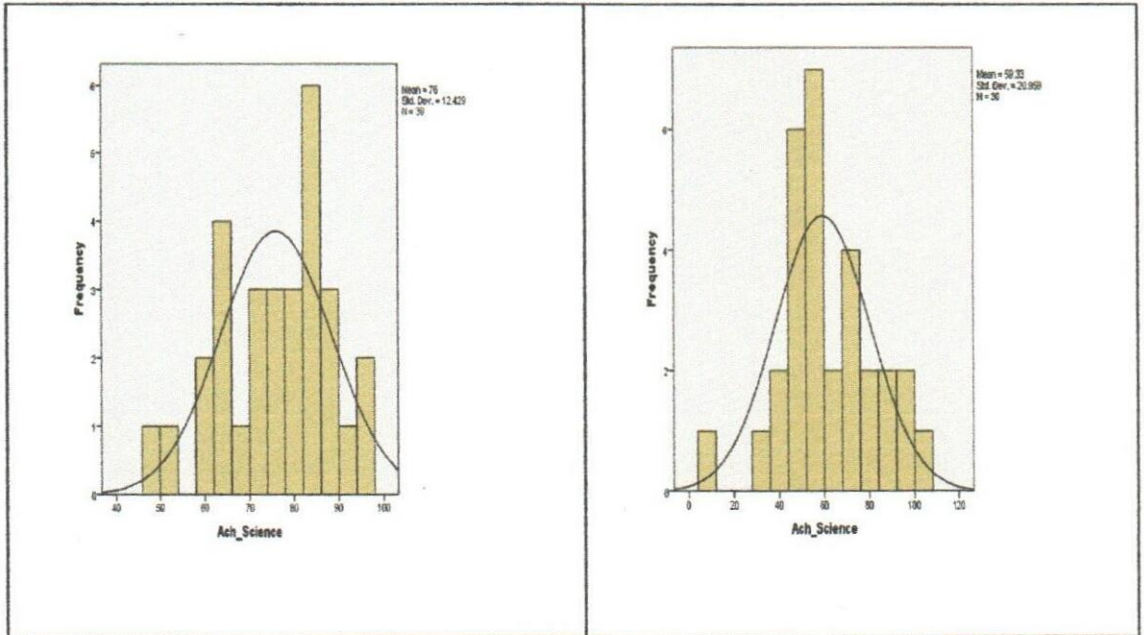


Fig. 4.1: Achievement in Science of Class IX Students of Experimental and Control Group

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 of class 9th students of Jajpur district, Odisha. The data related to the Attitude towards Science were collected with the help of administering the Attitude towards Science Scale developed by Prof. Abinash Grewal, 1978. The maximum score of Attitude Test in Science was 80 and the minimum score was 0. 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	30	30
Mean	45.66	43.86
Std. Deviation	3.92	4.82
Range	16	26

Table – 4.2 shows that the mean score of Attitude towards Science of Experimental Group and Control Group are 45.66 and 43.86, respectively. The SD for Attitude towards Science of Experimental Group and Control Group are 3.92 and 4.82, respectively. The Range for Attitude towards Science of Experimental Group and Control Group are 16 and 26, 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 slightly lower than the Control Group. It may be inferred that there was a small deviations of the scores of Attitude towards Science of Experimental Group as well as Control Group. The Range for Attitude towards Science of Experimental Group is lower than the Control Group. It shows that there was small distribution of scores in Attitude towards Science among the students of Experimental Group.

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

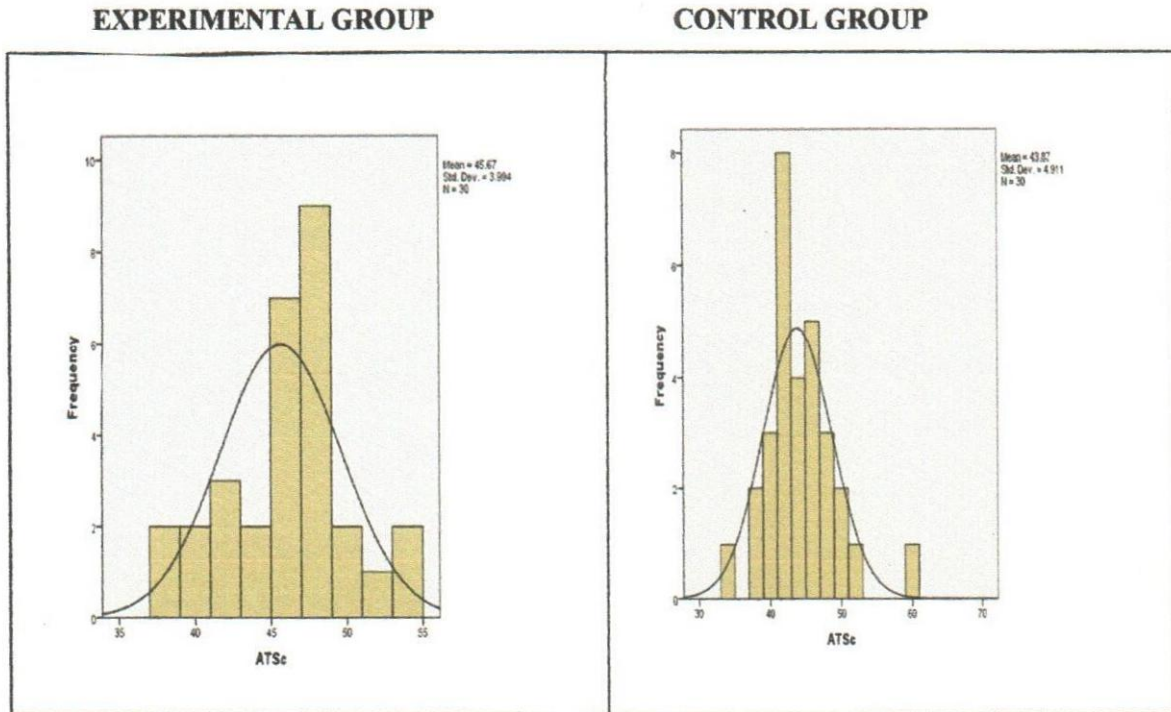


Fig. 4.2: Attitude towards Science of Class IX Students of Experimental and Control Group

From the above presentations of the results of the present study, it can be concluded that the students of Experimental Group slightly higher attitude towards 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 not effective than the Traditional Method of Teaching in terms of student's 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 third objective of the investigation 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.

Science were 100. The Class IX 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. 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 4.4.1, 4.4.2, and 4.4.3. 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	SS _{y.x}	MSS _{y.x}	F-Values	Sig.
Treatment	1	3090.67	3090.67	26.16**	0.000
Gender	1	316.18	316.18	2.676	0.108
TreatmentX Gender	1	51.75	51.75	.438	0.511
Error	55	6497.97	118.14		
Total	58	9956.57			

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

Group	Gender	N	Mean	Std. Deviation
Experimental	Boys	17	73.41	12.24
	Girls	13	79.38	12.31
	Total	30	76	12.43
Control	Boys	20	56	18.07
	Girls	10	66	25.52
	Total	30	59.33	20.96
Total	Boys	37	64	17.79
	Girls	23	73.56	19.88
	Total	60	67.67	19.04

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

From the Table 4.3, it can be seen that the F- value for Treatment is 26.16 which is significant at 0.01 level with df equal to 1/58. It indicates that the adjusted mean scores of Achievement in Science Subject of Experimental Group and Control Group differ significantly when their pre-test scores of Achievements in Science Subject were taken as covariate. It shows that there was a significant effect of Treatment on Achievement in Science Subject of Class IX students when their Pre-test Scores of Achievement in Science Subject was taken as covariate. Thus, the null hypothesis, namely, "there is no significant effect of Treatment on Achievement in Science Subject of Class IX students when their Pre-test Scores of Achievement in Science Subject was taken as covariate", is rejected. It is, therefore, inferred that the Treatment produced a significant differential effect on the Achievements in Science Subject of students. Thus, it may be concluded that the Treatment was effective in terms of Achievements in Science Subject of students.

Further, Table 4.4 indicates that the mean score and SD of Overall Achievement in Science Subject of Experimental Group is 76 and 12.43, respectively. The mean score and the SD of Overall Achievement in Science Subject of Control Group is 59.33 and 20.96, respectively. It is evident from the table that the mean score of Overall Achievement of experimental group is higher than the Control group. It, also, shows that the SD of Experimental group is lower than the Control group. It can be concluded that the Experimental Group was superior to Control Group in terms of improving Achievement in Science subject.

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

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

From the Table 4.3, it can be seen that the F- value for Gender is 2.67 which is not significant at 0.05 level with df equal to 1/58. 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 Subject of Class IX students when their Pre-test Scores of Achievement in Science Subject was taken as covariate. Thus, the null hypothesis, namely, "there is no significant effect of Gender on Achievement in Science Subject of Class IX students when their Pre-test Scores of Achievement in Science Subject was taken as covariate", is not rejected. It signifies that the achievement in Science is independent of the Gender of the students.

Further, Table 4.4 indicates that the mean of the boys and girls taught through the constructivist approach is 73.41 and 79.38. 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 56 and 66, respectively. There was no such significant difference in their achievement in Science.

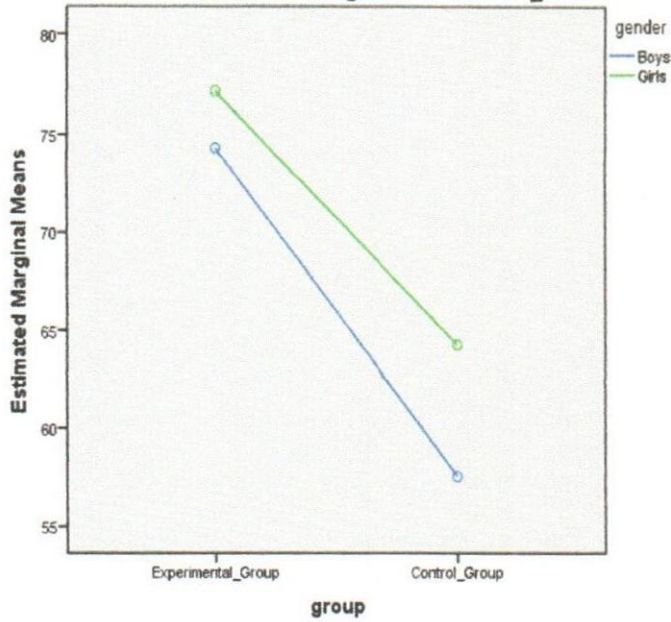
Finding: There is a no significant effect of Gender on Achievement in Science Subject of Class IX students.

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

From the Table 4.3, it can be seen that the F- value for the interaction of Treatment and Gender is 0.43 which 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 Subject of Class IX students when their Pre-test Scores of Achievement in Science Subject was taken as covariate", is not rejected. The students who taught through Constructive Approach and the students who taught through the Traditional Approach were benefitted 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 benefitted 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 girls of experimental group was found higher than their boys' counterparts of the same group. Similarly, girls in the control group achieved higher than the boys 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 interaction effect of Treatment and Gender on Achievement in Science Subject of Class IX students.



Covariates appearing in the model are evaluated at the following values: pre_ach = 55.73

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.