CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

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INTRODUCTION

This chapter consists of presentation and analysis of data, interpretation of results and discussion. The data collected using various data gathering tools and techniques have been presented and analyzed keeping in mind the objectives of the study. The data were analyzed using the appropriate statistical methods. Both 0.05 and 0.01 level of significance were adopted by the investigator in analyzing the data.

The main objective of this chapter is presentation and analysis of data, interpretation of results and discussion for this purpose researcher collect data from Rajarshi chhatrapati Shahu Maharaj junior college and Maharashtra junior college kolhapur and analyzed it as follows.

The first objective of this research work is to analyze the physics syllabus for selection of units that's why researcher analyze physics syllabus and select units are given as follows

Table No. 1

Selected Units from XIth standard Physics syllabus

Sr. No.	Unit No.	Name of the Unit
1	1	Measurements
2	3	Projectile Motion
3	4	Force

From above table it is observed that the Unit no. 1,3 and 4 are selected from XIth standard Physics syllabus.

The second objective is to find out concepts from these selected units. They are as follows

Table No. 2

Selected Concepts from XIth standard Physics syllabus

Unit No.	Name of the Unit	Selected Concepts
1.	Measurements	Measurement
		Unit and System of Units
		Dimensions
		Errors in Measurements
3.	Projectile Motion	Displacement
		Motion
4.	Force	Types of force
		Law of Conservation of Momentum
		Moment of Force
		Couple and Properties of Couple

It is observed from above table no. 2 that the concepts selected to design concept maps are Measurement, Unit and system of Units, Dimensions, Errors in measurements, Displacement; Motion, Types of force and Law of conservation of Momentum with moment of Force and couple and properties of couple.

After selection of concepts researcher implement concept mapping as a strategy for teaching selected concepts in the physics syllabus

of XI th standard for experimental (RCSMJC)Group only. For this purpose he designed concept maps and they are attached in appendices.

Testing of Hypotheses

The statistical hypothesis which explains that there is no any difference in mean of two groups is null hypothesis.

The rejection or acceptance of a null hypothesis is based on some level of significance as a criterion. In psychological and educational crisis, the 5% level of significance is often used as a standard for rejection. Rejecting a null hypothesis at the 0.05 level indicates that a difference in means as large as that found between the experimental and control group would have resulted from sampling error is less than 5 out of 100 replications of the experiment. This suggests that 95 % of probability that the difference was due to the experimental treatment rather than sampling error.

A more rigorous test of significance is the 1 % level. Rejecting a null hypothesis at the 0.01 level would suggest that a difference in means as large as that found between the experimental and control group would have resulted from sampling error is less than 1 in 100 replications of the experiment.

The main objective of this research work is to study the effectiveness of concept mapping in science on achievement in physics.

For this purpose researcher used concept mapping strategy for experimental group and regular methods for control group. By means of pretest and posttest he collected data and presented it as follows.

Null Hypothesis no. 1

There is no significant difference in the achievement scores of pretest of experimental and control group.

Table No. 3

Use of 't' test to check the difference between pretest scores of control and experimental group

Group	Mean ± Std.Deviation	Calculated 't' Value	Table 't' Value	Level of Significance	Degrees of Freedom
Pretest (C)	8.725±2.6312	1.7	1.980	0.05	79
Pretest (X)	8.0875±2.0808		2.617	0.01	

Observation

It is observed from above table No. 3 that the Mean and Standard deviation of pretest of the control group is 8.725 ± 2.6312 and the Mean and standard deviation of pretest of the experimental group is 8.0875± 2.0808.

Calculated 't' Value is 1.7 which is less than the table value 1.980 at 0.05 level and 2.617 at 0.01 level for the df 79.

Interpretation

It is revealed from the Table No. 3 that there is no significant difference in the pretest scores of control and experimental group.

Hence both groups are identical and hence the null hypothesis no. 1 is accepted.

Null Hypothesis no. 2

There is no significant difference in the achievement scores of pretest and posttest of control group.

Table No. 4

Use of 't' test to check the difference between pretest and posttest scores of control group

Group	Mean ± Std.Deviation	Calculated 't' Value	Table 't' Value	Level of Significance	Degrees of Freedom
Pretest (C)	8.725±2.6312	3.7313	1.980	0.05	79
Posttest (C)	10.30 ±2.708		2.617	0.01	

Observation

It is observed from above table No. 4 that the Mean and Standard deviation of pretest of the control group is 8.725 ± 2.6312 and the Mean and standard deviation of posttest of the control group is 10.30± 2.708.

Calculated 't' Value is 3.7313 which is more than the table value 1.980 at 0.05 level and 2.617 at 0.01 level for the df 79.

Interpretation

It is revealed from the Table No.4 that there is significant difference in the pretest and posttest scores of control group.

Hence the null hypothesis no. 2 is rejected.

Null Hypothesis no.3

There is no significant difference in the achievement scores of pretest and posttest of experimental group.

Table No. 5

Use of 't' test to check the difference between pretest and posttest scores of Experimental group

Group	Mean ± Std.Deviation	Calculated 't' Value	Table 't' Value	Level of Significance	Degrees of Freedom
Pretest (C)	8.0875±2.0808	13.8177	1.980	0.05	79
Posttest (C)	13.75 ±3.018		2.617	0.01	

Observation

It is observed from above table No. 5 that the Mean and Standard deviation of pretest of the experimental group is 8.0875 ± 2.0808 and the Mean and standard deviation of posttest of the experimental group is 13.75± 3.018

Calculated 't' Value is 13.8177 which is much more than the table value 1.980 at 0.05 level and 2.617 at 0.01 level for the df 79.

Interpretation

It is revealed from the Table No.5 that there is significant difference in the pretest and posttest scores of experimental group.

Hence the null hypothesis no. 3 is rejected

Null Hypothesis no. 4

There is no significant difference in the achievement scores of posttest of experimental and control group.

Table No. 6

Use of 't' test to check the effectiveness of Concept mapping technique

Group	Mean ± Std.Deviation	Calculated 't' Value	Table 't' Value	Level of Significance	Degrees of Freedom
Posttest (C)	10.30±2.708	7.9676	1.980	0.05	79
Posttest (X)	13.75±3.018		2.617	0.01	

Observation

It is observed from above table No. 6 that the Mean and Standard deviation of posttest of the control group is 10.30 ± 2.708 and the Mean and standard deviation of posttest of the experimental group is 13.75 ± 3.018 .

Calculated 't' Value is 7.9676 which is more than the table value1.980 at 0.05 level and 2.617 at 0.01 level for the df 79.

Interpretation

It is revealed from the Table No. 6 that there is significant difference in the posttest scores of control and experimental group.

Hence the null hypothesis no. 4 is rejected.

Null Hypothesis no. 5

There is no significant difference in the achievement scores of pretest of Boys and Girls

Table No. 7

Use of 't' test to check the difference between Pretest scores of Boys and Girls

Group	Mean ± Std.Deviation	Calculated 't' Value	Table 't' Value	Level of Significance	Degrees of Freedom
Pretest Boys	8.0435±2.1865	0.8217	2.000	0.05	45
Pretest Girls	8.4118±1.8169		2.660	0.01	33

Observation

It is observed from above table No. 7 that the Mean and Standard deviation of pretest of the Boys group is 8.0435 ± 2.1865 and the Mean and standard deviation of pretest of the Girls group is 8.4118± 1.8169.

Calculated 't' Value is 0.8217 which is less than the table value 2.000 at 0.05 level and 2.660 at 0.01 level for the df 45 and 33 respectively.

Interpretation

It is revealed from the Table no 7 that there is no significant difference in the achievement scores of pretest of Boys and Girls.

Hence both the groups are identical and Hence hypothesis no 5 is accepted.

Null Hypothesis no. 6

There is no significant difference in the achievement scores of posttest of Boys and Girls

Table No. 8

Use of 't' Value to check the difference in achievement scores of posttest of Boys and Girls

Group	Mean ± Std.Deviation	Calculated 't' Value	Table 't' Value	Level of Significance	Degrees of Freedom
Posttest Boys	12.1522±3.2301	0.05724	2.000	0.05	45
Posttest Girls	12.5589±2.5342		2.660	0.01	33

Observation

It is observed from above tableNo.6that the Mean and Standard deviation of posttest of the Boys group is 12.1522±3.2301and the Mean and standard deviation of posttest of the Girls group is 12.5589 ± 2.5342 .

Calculated 't' Value is 0.05724 is more less than table value 2.000 at 0.05 level and 2.660 at0.01 level for the df 45 and 33 respectively.

Interpretation

It is revealed from Table no 8 that there is no significant difference in the posttest scores of Boys and Girls Hence both groups are identical.

Hence the Null Hypothesis no. 6 is accepted.

Table No. 9

Experts opinion about Key concept is dominant / differentiated in the concept map or not ?

Sr. No.	Expert No.	Opinion
1	1	Yes
2	2	Yes
3	3	Yes
4	4	Yes
5	5	Yes

From above table it is revealed that the key concept is dominant / differentiated in the concept maps.

Table No. 10

Experts opinion about Links are given by proper propositions in each concept map or not ?

Sr. No.	Expert No.	Opinion
1	1	Yes
2	2	Yes
3	3	Yes
4	4	Yes
5	5	Yes

From above table it is revealed that Links are given by proper propositions in each concept map.

Table No. 11

Experts opinion about Hierarchical relationship

Sr. No.	Expert No.	Opinion
1	1	Yes
2	2	Yes
3	3	Yes
4	4	Yes
5	5	Yes

From above table it is revealed that hierarchical relationship is shown in the concept map.

Table No. 12

Experts opinion about Geometric arrangement of concept map

Sr. No.	Expert No.	Opinion
1	1	Yes
2	2	Yes
3	3	Yes
4	4	Yes
5	5	Yes

From above table it is revealed that Designed Concept maps are in Geometric arrangement.

Table No. 13

Experts opinion about concept map are they attractive ?

Sr. No.	Expert No.	Opinion
1	1	Yes
2	2	Yes
3	3	Yes
4	4	Yes
5	5	Yes

From above table it is revealed that Designed Concept maps are attractive.

From these tables it is revealed that the designed concept maps are correct.

RESULTS

1.Measurements, Projectile Motion and Force are the units selected for concept mapping.

(Table 1)

2.Measurement, Unit and system of Units, Dimensions, Errors in measurements, Displacement, motion, Types of Force, Law of conservation of Momentum, Moments of Force and Couple and properties of couple are the concepts selected for concept mapping from selected Units. (Table 2)

3.The Mean and standard deviation of control and experimental group is nearly same at the stage of pretest and also calculated 't' value is 1.7which less than table values at 0.05 (1.980) and 0.01 (2.617) level hence no any group is better than any other group i.e. they are identical. Hence null hypothesis no. 1 is accepted (Table 3)

4. The Mean of control group at post test score is more than the Mean of control group at pre test score hence it is revealed that control groups achievement is improving. Calculated 't' value is 3.7313 which is significant because the table values at 0.05 and 0.01 level are 1.980 and 2.617resp. Hence null hypothesis 2 is accepted. (Table 4)

5.The Mean of Experimental group at posttest score is more than the Mean of Experimental group at pretest score hence it is revealed that the experimental groups achievement much better than the control group. The calculated t value is 13.8177 which is significant because the table values at 0.05 and 0.01 level are 1.980 and 2.617resp. Hence null hyothesis no. 3 is rejected.

(Table 5)

6. The mean and standard deviation of experimental group is more than the mean and standard deviation of control group after posttest and the calculated 't' value is 13.8177 which is more than the table values at 0.05 (1.980)and 0.01(2.617) level hence it is clear that achievement of experimental group is more than the control group. Hence null hypothesis 4 is rejected. (Table 6)

5. In case of Boys and Girls group there is negligible difference in mean and standard deviation values and also calculated 't' value (0.8207) implies that there is no any difference in achievement of Boys and Girls after pretest because table values at 0.05 and 0.01 level are 2.000 and 2.600 resp. Hence null hypothesis 5 is accepted.

(Table 7)

6. The Mean of Boys and Girls group is same after posttest and there is slight difference in standard deviation value but the calculated 't' value (0.05724) which is low than the table values at 0.05 (2.000) and 0.01 (2.660)level, it shows that there is no any difference in achievement of Boys and Girls after teaching by concept mapping technique. Hence null hypothesis no. 6 is accepted. (Table 8)