CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

4.0   INTRODUCTION

In the previous chapter, a complete account of the approach to study the main theme of the present investigation was clarified. Both, the process of data collection and the statistical techniques to be applied in analyzing and interpreting the data collected through the research tools were described. This chapter deals with the analysis of collected data and interpretation made on the basis of that. The scientific data analysis is needed to measure the responses of participants and to derive the findings and ultimate conclusions of the research study on the basis of the data analysis. Hence, data analysis and interpretation are very important steps of research to draw out the findings and derive conclusions from the analyzed data.

In the present study, Quasi - experimental research design was used in which data were collected under two phases: Pre-testing (before implementation of the CHEP) and Post-testing (after implementation of the CHEP). Students of Standard IX were selected purposively under the two groups - Experimental and Control. Experimental group was selected to implement the CHEP programme, whereas the control group was not given any treatment. The purpose of the study was to study whether there is any significant difference in mean scores of the knowledge of Culture and Heritage of the students of experimental and control groups, or not. As students were selected purposively, the non-parametric statistics was used for the data analysis. Also for the analysis of reactions of the students', descriptive statistics was used. The objective wise analysis with reference to the related hypotheses has been described in this chapter.

4.1   ANALYSIS OF STUDENTS' ACHIEVEMENT IN CHEP

The analysis of students' achievement score was done mainly to achieve the Objective-3:"To study the effectiveness of Cultural Heritage Education Programme (CHEP) with respect to achievement of Std. IX students related to Cultural Heritage Education." To achieve this objective three hypotheses were tested, which are mentioned as below:

Ho1: There will be no significant difference in the mean achievement scores of the experimental group in pre-test and post-test (i.e. Cultural Heritage Education based Knowledge Test).

Ho2: There will be no significant difference in the mean achievement scores of the control group in pre-test and post-test.

Ho3: There will be no significant difference in the mean achievement scores of the experimental group and the control group in post-test.

For testing the above stated hypothesis, quantitative data analysis was done with the help of non-parametric statistics. Hence, for this purpose the Wilcoxon signed-rank test and Mann – Whitney U test were used.

According to Parekh and Trivedi (2010), the Wilcoxon signed-rank test is designated to test the significance of the difference in the mean achievement score of the single group (either experimental or control group) in pre-test and post-test. It may be considered a useful alternative to the t-test when the parametric assumptions cannot be met and when observations are expressed in at least ordinal scale values.

According to Shah (2009), Mann-Whitney U test is used to study the significance of difference between the two populations by selecting two different samples from the stated populations, randomly. It is a non-parametric test, just like t-test. It is the best alternative to be used in place of t-test, when the parametric assumptions are not fulfilled and when observations are given in ordinal scale. Also it is to be noted that, when any one of the sample size would be more than 20, the distribution of calculated U will follow the normal distribution. Thus really supports the logic behind selection of appropriate statistical techniques for analysis of the data under the study.

4.1.1 Data Analysis for testing Ho1

The Wilcoxon signed rank test was used to test the significance of the difference in the mean achievement scores of pre-test and post-test for the experimental group under Ho1. The z critical value under the same has been calculated and mentioned in the table no. 4.1

Table 4.1

Wilcoxon Signed Rank Test for the testing of Ho1

	N	Mean	SD	Z	Sig. (2-tailed)
Experimental Pre-test	51	41.57	9.69	0.46	0.01
Experimental Post-test	51	46.94	13.33		

It can be revealed from the table no. 4.1 that, there was significant difference in the Mean achievement scores of the experimental group in pre-test (M = 41.57) and post-test (M = 46.94). The calculated z critical value found significant at 0.01level. Hence, it can be interpreted that the implemented CHEP made a significant effect on the achievement of the students related to cultural Heritage Education in the case of experimental group.

4.1.2 Data Analysis for testing Ho2

The Wilcoxon signed rank test was used to test the significance of the difference in the mean achievement scores of pre-test and post-test for the control group under the Ho2. The z critical value under the same has been calculated and mentioned in the table no. 4.2

Table 4.2

Wilcoxon Signed Rank Test for the testing of Ho2

	N	Mean	SD	Z	Sig. (2-tailed)
Control Pre-test	51	43.45	7.65	− 0.73	0.46
Control Post-test	51	44.51	8.03		

It can be revealed from the table no. 4.2 that, there was no significant difference in the Mean achievement scores of the control group in pre-test and post-test. The calculated z critical value was not found significant at 0.05 level. Further, the rank table within the group differences of data has been mentioned in the table no. 4.3.

Table 4.3

Rank Table within the group differences

		N	Mean Rank	Sum of Ranks
Control Group	Negative Ranks	22	23.48	516.50
	Positive Ranks	26	25.37	659.50
	Ties	3		
	Total	51		
Experimental Group	Negative Ranks	16	23.88	382.00
	Positive Ranks	33	25.55	843.00
	Ties	2		
	Total	51		

Table no. 4.3 describes the comparison of achievement scores of pre-test and post-test for the students of both experimental and control groups. In control group, 26 students showed higher achievement scores and 22 students showed lower achievement scores after the regular / traditional way of teaching. Three (03) students showed not any significant difference in their achievement score. In case of the experimental group, 33 students showed higher achievement scores after implementation of CHEP and 16 students showed lower achievement scores after implementation of CHEP. Two (02) students showed not any change in their achievement score.

4.1.3 Data Analysis for testing Ho3

According to Best and Kahn (2014), the Mann-Whitney U test is designated to test the significance of the difference between two sets of samples drawn from the same population. It is a nonparametric equivalent of the parametric t-test. It may be considered a useful alternative to the t-test when the parametric assumptions cannot be met and when the observations are expressed in at least ordinal scale values. Under this when the size of either of the groups is more then 20, the sampling distribution of U rapidly approaches the normal distribution, and the null hypothesis may be tested with the reference to the z critical values of the normal probability table.

The Mann-Whitney U test was used to test the significance of the difference in the mean achievement scores of the experimental group and control group in post-test. The z critical value under the same has been calculated and mentioned in the table no. 4.4.

Table 4.4

Mann - Whitney U Test to test significance of the differences

	N	Mean	SD	Mann-Whitney U	Z	Sig. (2-tailed)
Control Group	51	41.94	13.33	955.00	2.31	0.02
Experimental Group	51	46.95	8.03			

It can be seen from table no. 4.4 that, there was significant difference between the Mean achievement score of the experimental group (M = 46.95) and control group (41.94) in post-test. It can be observed from the above table that the calculated z critical value (for $p = 0.02$, $p < 0.05$) was significant at 0.05 level. Therefore, it can be interpreted that CHEP implementation was found effective in enhancing the knowledge regarding culture and heritage among the students of experimental group.

4.2   ANALYSIS OF STUDENTS' REACTIONS

The analysis of students' reactions was done mainly to achieve the Objective -3: "To study the effectiveness of CHEP with respect to reactions of the students." For this purpose, the investigator has administered a reaction scale with a view to study the reactions of the students regarding the effectiveness of CHEP.

The reaction scale was included 23 statements. Hence, the analysis of the students' reactions with respect to each and every statement was done with the help of Percentage and Intensity Indices. To study the effectiveness of the implemented CHEP, it was necessary to know students' reactions on the individual statement of the reaction scale. Their reactions may be either clearly favourable or clearly unfavourable with respect to each statement. Hence, the hypothesis tested for each statement was 'equal probability hypothesis i.e. whether the reactions given in five categories (namely; **SA**: Strongly Agree, **A**: Agree, **N**: Neutral, **D**: Disagree and

SD: Strongly Disagree) differ significantly or not'. For this, the distribution of students' reactions has been computed to be expected on the equality or null hypothesis. To test the null hypothesis, "There will be no significant difference in favourable and unfavourable reactions of the students of experimental group regarding the implemented CHEP", the data were collected from the sample of the experimental group which was given treatment through implementation of the CHEP. Data were collected through a Likert type five-point reaction scale. Collected data were analyzed using percentage and Intensity Indices, which is given in the table 4.5.

Table 4.5

Students' Reactions Analysis

Sr. No.	Statements under Reaction Scale	Percentage					Intensity Indices
		SA	A	N	D	SD	
1.	The components were sufficient under the implemented CHEP.	49.02	35.29	0	1.96	1.96	3.44
2.	During the implementation of CHEP programme, provided literature based on different components, was sufficient.	47.06	21.57	9.80	0	9.8	3.09
3.	During the implementation of CHEP programme, the contribution of Mentors was effective.	54.9	19.61	5.88	3.92	3.92	3.33
4.	The duration of the CHEP was insufficient.	15.69	21.57	7.84	19.61	23.53	1.84
5.	With the implementation of CHEP, long term educational goals can be achieved.	41.18	23.53	13.73	3.92	5.88	3.02
6.	Other components need to be included in CHEP to make itmore effective.	25.49	29.41	5.88	13.73	13.73	2.44
7.	By implementation of this CHEP, in-depth knowledge regarding culture can be gained.	41.18	37.25	7.84	0	1.96	3.31

No.	Statement						
8.	This programme was correlated with the school curriculum.	35.29	33.33	11.76	3.92	3.92	3.04
9.	We acquired knowledge about *Madhubani paintings* which is about to extinct, through this programme.	47.06	27.45	3.92	9.8	0	3.27
10.	Implementation of this programme was found satisfactory.	37.25	33.33	3.92	7.84	5.88	3.00
11.	Cultural values are developed due to the implementation of this programme.	45.1	21.57	11.76	0	9.8	3.04
12.	We got information about our Cultural Heritage due to the implementation of this programme.	27.45	50.98	1.96	3.92	3.92	3.07
13.	We came to know about the Indian music and classical dances due to the implementation of this programme.	58.82	17.65	5.88	5.88	0	3.47
14.	We are able to know the innovative ideas in Education due to the implementation of this programme.	29.41	43.14	11.76	0	3.92	3.07
15.	At school level, workshops related to this programme should be organized.	54.9	15.69	9.80	5.88	1.96	3.31
16.	This programmes not found effective to develop values related to Indian Culture and Heritage.	11.76	21.57	5.88	19.61	29.41	1.62
17.	We came to know innovative activities in education due to the implementation of this programme.	47.06	29.41	9.80	0	1.96	3.36
18.	We came to know about some arts which are extinct, due to implementation of this programme.	41.18	35.29	3.92	7.84	0	3.24

19.	We did not get information about different languages of India with the implementation of this programme.	13.73	5.88	7.84	41.18	19.61	1.47
20.	We came to know about drama and art due to the implementation of this programme.	49.02	21.57	9.8	0	7.84	3.18
21.	One can't get information about different religious and national festivals with the implementation of this programme.	19.61	5.88	9.80	25.49	27.45	1.6
22.	With the implementation of this programme, we could know about specialty of *Art of puppets*.	43.14	35.29	3.92	1.96	3.92	3.27
23.	This programme is found successful to understand the amalgamation of Education and Culture.	60.78	21.57	0	3.92	1.96	3.53
Overall Reactions							**2.91**

Table no. 4.5 describes intensity indices of statements of the reaction scale. The detailed description for all the statements is given as below:

In terms of the reactions of the students towards the Statement 1:"The components were sufficient under the implemented CHEP.", it can be seen that the higher percentages of students' reactions (i.e. 35.28 % and 49.02 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.44 indicated their favorable reactions towards the given statement. It means, students believed that the coverage of components under the CHEP was sufficient.

For the Statement 2: "During the implementation of CHEP programme, provided literature based on different components, was sufficient.", it can be seen that the higher percentages of students' reactions (i.e. 21.57 % and 47.06 % respectively) were showing their

agreement towards the statement. The calculated value of the Intensity Index 3.09 indicated their favorable reactions towards the given statement. It means according to the students' reactions, the literature received based on different components during the implementation of CHEP were sufficient.

For the Statement 3: "During the implementation of CHEP programme, the contribution of Mentors was effective.", it can be seen that the higher percentages of students' reactions (i.e. 19.61 % and 54.90 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.33 indicated their favorable reactions towards the given statement. It means according to the students' opinion, the contribution of mentors during the implementation of CHEP was found effective.

For the Statement 4: "The duration of the CHEP was insufficient", it can be seen that the higher percentages of students' reactions (i.e. 23.53% and 19.61 % respectively) were showing their disagreement towards the statement. The calculated value of the Intensity Index 1.84 indicated their unfavorable reactions towards the given statement. It means according to the students, the duration of the CHEP was not insufficient. But at the same time quite a good number of students' reactions (i.e. 15.69 % and 21.57 % respectively) showed agreement that the duration of the CHEP was insufficient.

For the Statement 5: "With the implementation of CHEP, long term educational goals can be achieved.", it can be seen that the higher percentages of students' reactions (i.e. 23.53% and 41.18 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.02 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, long term educational goals can be achieved with the help of CHEP.

For the Statement 6: "Other components need to be included in CHEP to make it more effective.", it can be seen that the higher percentages of students' reactions (i.e. 29.41% and 25.49 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 2.44 indicated their unfavorable reactions towards the given statement. It means according to the students' reactions, it is better to include more components to make the CHEP more effective.

For the Statement 7: "By implementation of this CHEP, in-depth knowledge regarding culture can be gained.", it can be seen that the higher percentages of students' reactions (i.e. 37.25% and 41.18 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.31 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, in-depth knowledge regarding culture can be gained through CHEP.

For the Statement 8: "This CHEP was correlated with the school curriculum.", it can be seen that the higher percentages of students' reactions (i.e. 33.33% and 35.29 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.04 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, CHEP was correlated with the school curriculum.

For the Statement 9: "We acquired knowledge about *Madhubani paintings* which is about to extinct, through this programme.", it can be seen that the higher percentages of students' reactions (i.e. 27.45% and 47.06 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.27 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, they acquire the knowledge about *Madhubani paintings* through CHEP.

For the Statement 10: "Implementation of this programme was satisfactory", it can be seen that the higher percentages of students' reactions (i.e. 33.33% and 37.25% respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.00 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, implementation of the CHEP programme was satisfactory.

For the Statement 11: "Cultural values are developed due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 21.57 % and 45.10% respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.04 indicated their favorable reactions towards the given statement. It means according to the students' perspective, the cultural values are developed due to the implementation of CHEP.

For the Statement 12: "We got information about our Cultural Heritage due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 50.98% and 27.45% respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.07 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, the learning of cultural heritage was developed by CHEP.

For the Statement 13: "We came to know about the Indian music and classical dances due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 17.65 % and 58.82% respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.47 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, their knowledge of Indian music and dance was enhanced due to the implemented CHEP.

For the Statement 14: "We are able to know the innovative ideas in Education due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 43.14% and 29.41% respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.07 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, their knowledge about innovative ideas in education was developed due to the implemented CHEP.

For the Statement 15: "At school level, workshops related to this programme should be organized.", it can be seen that the higher percentages of students' reactions (i.e. 15.69 % and 54.90 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.31 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, CHEP related workshops should be organized at school level to facilitate students.

For the Statement 16: "This programme is not found effective to develop values related to Indian Culture and Heritage." it can be seen that the higher percentages of students' reactions (i.e. 29.41 % and 19.61 % respectively) were showing their disagreement towards the statement. The calculated value of the Intensity Index 1.62 indicated their unfavorable reactions towards the given statement. It means according to the students' perspectives, CHEP found effective to develop values related to Indian Culture and Heritage. But at the same time quite a good number of students' reactions (i.e. 11.76 % and 21.57 % respectively) showed their agreement for the given statement.

For the Statement 17: "We came to know innovative activities in education due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 29.41% and 47.06% respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.36 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, their knowledge regarding innovative activities in education was enhanced due to the implemented CHEP.

For the Statement 18: "We came to know about some arts which are extinct, due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 35.29 % and 41.18 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.24 indicated their favorable reactions towards the given statement. It means according to the students' perspectives, their knowledge regarding some arts which are extinct was enhanced due to the implemented CHEP.

For the Statement 19: "We did not get information about different languages of India with the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 19.61 % and 41.18 % respectively) were showing their disagreement towards the statement. The calculated value of the Intensity Index 1.47 indicated their unfavorable reactions towards the given statement. It means according to the students' perspectives, their knowledge regarding different languages of India was enhanced due to the implemented CHEP.

For the Statement 20: "We came to know about drama and art due to the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 21.57 % and 49.02 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.18 indicated their favorable reactions towards the given statement. It means according to the students' opinion, they came to know about drama and art due to the implementation of this programme.

For the Statement 21: "One can't get information about different religious and national festivals with the implementation of this programme.", it can be seen that the higher percentages of students' reactions (i.e. 27.45 % and 25.49 % respectively) were showing their disagreement towards the statement. The calculated value of the Intensity Index 1.60 indicated their

unfavorable reactions towards the given statement. It means according to the students' opinion, they could get information about different religious and national festivals with the implementation of CHEP.

For the Statement 22:"With the implementation of this programme, we could know about specialty of *Art of puppets.*", it can be seen that the higher percentages of students' reactions (i.e. 35.29 % and 43.14 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.27 indicated their favorable reactions towards the given statement. It means according to the students' opinion, they could know about specialty of *Art of puppets* with the implementation of CHEP.

For the Statement 23: "This programme is found successful to understand the amalgamation of Education and Culture.", it can be seen that the higher percentages of students' reactions (i.e. 21.57 % and 60.78 % respectively) were showing their agreement towards the statement. The calculated value of the Intensity Index 3.53 indicated their favourable reactions towards the given statement. It means according to the students' opinion, CHEP was found successful to understand the amalgamation of Education and Culture.

Here the interpretations made on the basis of the favourable or unfavourable reactions of the majority of the students of experimental group. Hence, the overall analysis shows the positive favourable reactions of the students about the effectiveness of CHEP. The overall intensity indices 2.91 also support the above interpretations made and depicted. Thus, it can be said that the students of the experimental group found CHEP effective and interesting in learning process mainly related to the education of culture and heritage.

4.3   CONCLUSION

The present chapter focuses on the quantitative analysis of the data looking to the nature of data and interpretations made on the basis of the analyzed data. The analysis done under this chapter helped the investigator for deriving the findings of the study. Based on this, the major findings and conclusion have been made and discussed in the upcoming chapter.