CHAPTER 4

DATA ANALYSIS, INTERPRETATION AND FINDINGS

4.0 INTRODUCTION

This chapter is devoted to analyze and interpret the collected data. The major objectives and concern of the present investigation are described in the previous chapter. It is to develop a Computer based Multimedia Instructional Package to teach Biological Sciences to the students of Standard XII, to study the effectiveness of the Package in terms of mean achievement of students in the subject of Biology and to study the effectiveness of the Package in terms of reactions of the students towards Biological Sciences through multimedia software instructional package and also to study the effectiveness of the Package in terms of reactions of the Biology teachers towards the developed Multimedia Software Package to teach Biological Sciences. The data obtained from the study have been analyzed and interpreted with reference to the stated objectives under the following headings:

- By employing the t-test to find out the significance of difference between the mean gain scores of the Experimental and Control Groups.

- Reaction of the students towards Biology through Multimedia Package through Chi-square.

- Reaction of teachers on Multimedia Package to teach Biology will be analyzed through Chi-square.

Employing the t-test to find out the significance of difference between the mean gain scores of the Experimental and Control Groups.

4.1 SCORES OF STUDENTS AT THE PRE-TEST AND POST TEST

Table 1: Scores of Students at the Pre-Test and Post Test (Control Group)

ROLL NO	PRE-TEST (OUT OF 40)	POST-TEST (OUT OF 40)	GAIN SCORES	x	x^2
1	11	24	13	10.63	112.9969
2	17	28	11	14.63	214.0369
3	14	31	17	17.63	310.8169
4	15	30	15	16.63	276.5569
5	17	32	15	18.63	347.0769
6	11	28	17	14.63	214.0369
7	15	29	14	15.63	244.2969
8	13	27	14	13.63	185.7769
9	17	30	13	16.63	276.5569
10	15	28	13	14.63	214.0369
11	15	31	16	17.63	310.8169
13	18	24	06	10.63	112.9969
14	17	30	13	16.63	276.5569
15	20	31	11	17.63	310.8169
16	14	23	09	9.63	92.7369
17	13	29	16	15.63	244.2969
18	19	26	07	12.63	159.5169
19	15	24	09	10.63	112.9969
20	17	30	13	16.63	276.5569
21	18	31	13	17.63	310.8169
22	13	30	17	16.63	276.5569
23	16	31	15	17.63	310.8169
24	18	29	11	15.63	244.2969
25	11	32	21	18.63	347.0769

ROLL NO	PRE-TEST (OUT OF 40)	POST-TEST (OUT OF 40)	GAIN SCORES	x	x^2
26	14	29	15	15.63	244.2969
27	17	31	14	17.63	310.8169
28	20	29	09	15.63	244.2969
30	11	27	16	13.63	185.7769
31	15	30	15	16.63	276.5569
TOTAL	**446** **n_1=29** **MEAN(M1)= 15.37**	**834** **n_1=29** **MEAN(M1)= 28.75**	**388/29** **m_1=13.37**	**446.27**	**7044.79** **7044.79/n-1** **7044.79/28** **V_1=251.59**

m_1=13.37

Table 2. The Following Students Were Absent At One Test or Both the Tests

ROLL NO	PRE-TEST	POST-TEST
12	ABSENT	24
29	18	ABSENT

4.2 SCORES OF STUDENTS AT THE PRE-TEST AND POST TEST

Table 3: Scores of Students at the Pre-Test and Post Test (Experimental Group)

ROLL NO	PRE-TEST (OUT OF 40)	POST-TEST (OUT OF 40)	GAIN SCORES	y	y^2
1	14	37	23	14.03	196.8409
2	12	38	26	15.03	225.9009
3	17	40	23	17.03	290.0209
4	18	36	18	13.03	169.7809
5	13	39	26	16.03	256.9609
6	12	37	25	14.03	196.8409
7	16	38	22	15.03	225.9009

ROLL NO	PRE-TEST (OUT OF 40)	POST-TEST (OUT OF 40)	GAIN SCORES	y	y^2
8	12	36	24	13.03	169.7809
9	18	39	21	16.03	256.9609
10	14	40	26	17.03	290.0209
11	13	37	24	14.03	196.8409
12	12	36	24	13.03	169.7809
13	10	34	24	11.03	121.6609
14	18	38	20	15.03	225.9009
15	14	37	23	14.03	196.8409
16	16	40	24	17.03	290.0209
17	13	38	25	15.03	225.9009
18	10	37	27	14.03	196.8409
19	11	34	23	11.03	121.6609
20	14	33	19	10.03	100.6009
21	18	31	13	8.03	64.4809
22	13	38	25	15.03	225.9009
23	10	37	27	14.03	196.8409
24	16	35	19	12.03	144.7209
25	12	34	22	11.03	121.6609
26	10	36	26	13.03	169.7809
27	15	38	23	15.03	225.9009
28	12	35	23	12.03	144.7209
29	18	38	20	15.03	225.9009
30	16	40	24	17.03	290.0209
TOTAL	**417** $n_1=30$ **MEAN(M_1)=13.9**	**1106** $n_1=30$ **MEAN(M_1)=36.86**	**689/30** $m_2=22.97$	**416.9**	**5934.987/n** **5934.987/30** $V_2=197.83$

$m_2=22.97$

4.3 EMPLOYMENT OF t-TEST

Objective: To find out the significance of difference between the mean gain scores of the Experimental and Control Groups.

Variance 1 $= \frac{\sum x^2}{n-1} = \frac{7044.79}{29-1} = \frac{7044.79}{28} = 251.59$

Therefore $V_1 = 251.59$

Variance 2 $= \frac{\sum y^2}{n} = \frac{5934.987}{n} = \frac{5934.987}{30}$

Therefore $V_2 = 197.83$

Standard Deviation 1 $= \sqrt{V1} = \sqrt{251.59} = 15.86$

Therefore $SD_1 = 15.86$

Standard Deviation 2 $= \sqrt{V2} = \sqrt{197.83} = 14.06$

Therefore $SD_2 = 14.06$

Standard Error of Mean$_1$ $= \frac{SD_1}{\sqrt{n_1}} = \frac{15.86}{\sqrt{29}} = \frac{15.86}{5.38} = 2.947$

Therefore $SEMn_1 = 2.947$

Standard Error of Mean$_2$ $= \frac{SD_2}{\sqrt{n_2}} = \frac{14.06}{\sqrt{30}} = \frac{14.06}{5.47} = 2.57$

Therefore $SEMn_2 = 2.57$

SE (M_2-M_1) = $\sqrt{SEMn_1^2 + SEMn_2^2}$ = $\sqrt{(2.94)^2 + (2.57)^2}$ = $\sqrt{8.64 + 6.60}$

= $\sqrt{15.24}$ = 3.903

Therefore SE (M_2-M_1) = 3.903

t-value = $\frac{m2-m1}{\mathrm{SE}(M_2-M_1)} = \frac{22.97-13.37}{3.903} = \frac{9.6}{3.903}$ = 2.4615

Therefore t-value = 2.4615

Degrees of freedom = n_1+n_{2-2}

= 29 + 30 – 2 = 57

Therefore df = 57

1. t-value against degrees of freedom 57 at 0.01 level = 2.66 and

2. t-value against degrees of freedom 57 at 0.05 level = 2.00.

The computed t-value of 2.46 is lesser than the table t-value of 2.66 at 0.01 level against 57 degrees of freedom. So the null hypothesis that there will be no significant difference between the mean gain scores of the experimental group and control group is not rejected at 0.01 level.

The computed value of 2.46 is greater than the table t-value of 2.00 at 0.05 level against 57 degrees of freedom. So the null hypothesis that there will be no significant difference between the mean gain scores of experimental group and control group is rejected at 0.05 level. So, the mean gain score of experimental group has been found to be significantly

greater than the mean gain score of the control group. Hence, the Multimedia Instructional Software Package treatment has been found to be effective at 0.05 level.

So, we can therefore conclude from the above analysis that the treatment through Multimedia Software Instructional Package to teach Biological Sciences has been found very effective.

4.4 REACTION OF STUDENTS ON TEACHING OF BIOLOGICAL SCIENCES THROUGH MULTIMEDIA PACKAGE IN TERMS OF FREQUENCIES AND CHI- SQUARE ANALYSIS.

Table 4: Reaction of Students on Biological Sciences Through Multimedia Package in Terms of Frequencies and Chi- Square Analysis

Sr. No.	STATEMENTS	SA	A	UD	DA	SD	CHI. SQ.V	LEVEL OF SIGNIFICANCE (with degree of freedom 4) At 0.01 13.277
1.	Content covered in each unit of multimedia software package is sufficient.	25 83.34%	3 10.00%	1 3.34%	1 3.34%	0 0.00%	73.00	*
2.	Concepts are not sufficiently clarified properly through multimedia software teaching.	0 0.00%	1 3.34%	1 3.34%	4 13.34%	24 80.00%	67.83	*
3.	For understanding the concepts clearly time required is less when they are taught through multimedia software package.	26 86.67%	2 6.67%	1 3.34%	1 3.34%	0 0.00%	80.50	*

4.	Illustrations/examples provided in the multimedia software package are not adequate for the purpose.	1 3.34%	1 3.34%	0 0.00%	4 13.34%	24 80.00%	78.83	*
5.	Examples given in the multimedia software package helps in the concept clarity.	25 83.34%	4 13.34%	1 3.34%	0 0.00%	0 0.00%	74.00	*
6.	Illustrations/examples in the multimedia software package are not easy to understand.	0 0.00%	0 0.00%	2 6.67%	25 83.34%	3 10.00%	73.34	*
7.	The language used in the multimedia software package is simple and easy to understand.	27 90.00%	3 10.00%	0 0.00%	0 0.00%	0 0.00%	89.67	*
8.	Teaching points given under each chapter are logically sequenced in the prepared multimedia software package.	20 66.67%	6 20.00%	3 10.00%	1 3.34%	0 0.00%	42.12	*
9.	Diagrams/Figures in the multimedia software package do not help in the clarity of concepts.	0 0.00%	1 3.34%	2 6.67%	8 26.67%	19 63.34%	39.00	*
10.	Concepts presented through multimedia software package are more interesting.	20 66.67%	7 23.34%	1 3.34%	1 3.34%	1 3.34%	83.79	*

11.	For further studies reference links provided in the multimedia software package are not much useful.	0 0.00%	1 3.34%	3 10.00%	5 16.67%	21 70.00%	47.00	*
12.	Diagrams/Figures shown in the multimedia software package are very appropriate.	18 60.00%	8 26.67%	3 10.00%	1 3.34%	0 0.00%	34.12	*
13.	The teaching/learning material provided in the multimedia software package has been prepared from different sources.	25 83.34%	4 13.34%	1 3.34%	0 0.00%	0 0.00%	74.00	*
14.	The information provided in the multimedia packaged is not up to date.	0 0.00%	1 3.34%	4 13.34%	14 46.67%	11 36.67%	23.62	*
15.	The multimedia software package prepared takes into consideration student's previous level of knowledge in the subject.	20 66.67%	6 20.00%	3 10.00%	1 3.33%	0 0.00%	42.12	*
16.	Evaluation pattern in multimedia software package is not proper.	0 0.00%	1 3.34%	2 6.67%	11 36.67%	16 53.34%	31.29	*
17.	Evaluation items are very clear and to the point in multimedia software package.	23 76.67%	5 16.67%	1 3.34%	0 0.00%	1 3.34%	60.00	*

18.	Answer keys given for each evaluation items help in self learning process.	20 66.67%	7 23.34%	1 3.34%	1 3.34%	1 3.34%	42.95	*
19.	Evaluation items do not cover the entire subject matter.	0 0.00%	0 0.00%	3 10.00%	12 40.00%	15 50.00%	31.58	*
20.	The multimedia package helps students to concretize the concepts easily.	19 63.34%	9 30.00%	1 3.34%	1 3.34%	0 0.00%	45.95	*
21.	The numbers of evaluation items are not adequate for providing feedback.	0 0.00%	1 3.34%	2 6.67%	11 36.67%	16 53.34%	31.29	*
22.	The evaluation items are objective in nature, so the evaluation done is very clear.	25 83.34%	4 13.34%	1 3.34%	0 0.00%	0 0.00%	74.00	*
23.	Instructional manual does not contain all information about the usage of multimedia package.	0 0.00%	1 3.34%	2 6.67%	10 33.34%	17 56.67%	33.29	*
24.	Learning through multimedia is very interesting as it is totally a new experience.	25 83.34%	5 13.34%	0 0.00%	0 0.00%	0 0.00%	73.34	*
25.	Instructional manual contains all the necessary information about the usage multimedia package.	18 60.00%	8 26.67%	1 3.34%	2 6.67%	1 3.34%	33.45	*

26.	Learning through Multimedia is certainly more enjoyable than lectures or traditional methods.	26 86.66%	4 13.34%	0 0.00%	0 0.00%	0 0.00%	82.16	*
27.	I like illustrations given in the slides, which actually gave me additional information about the lesson.	25 83.34%	4 13.34%	1 3.34%	0 0.00%	0 0.00%	74.00	*
28.	Illustrations do not help the students to relate what they learn in biology to real life situations.	0 0.00%	1 3.34%	2 6.67%	10 33.34%	17 56.67%	33.29	*
29.	Multimedia instruction is an effective way of presentation because there is little stress on the students in the learning process.	25 83.34%	4 13.34%	1 3.34%	0 0.00%	0 0.00%	74.00	*
30.	I can learn at my own pace with the help of Multimedia instructional package.	26 86.66%	2 6.67%	1 3.33%	0 0.00%	0 0.00%	82.17	*
31.	Multimedia instruction does not provide more freedom in the learning situation.	0 0.00%	1 3.34%	3 10.00%	12 40.00%	14 46.67%	26.12	*
32.	A student can immediately test his/her knowledge through practicing exercises given in the multimedia software package.	21 70.00%	6 20.00%	1 3.34%	0 0.00%	1 3.34%	78.45	*

33.	This method certainly does not give more freedom to the students to learn.	1 3.34%	1 3.34%	2 6.67%	10 33.34%	16 53.34%	28.12	*
34.	Learning Biology is actually more fun when it is taught through Multimedia instructional method.	20 66.67%	8 26.67%	1 3.34%	1 3.34%	0 0.00%	46.08	*
35.	This method is not good in learning biology because students' doubts may not be cleared immediately.	1 3.34%	1 3.34%	4 13.34%	6 20.00%	17 56.67%	27.27	*
36.	Self learning can be promoted through such multimedia software package.	18 60.00%	10 33.34%	1 3.34%	1 3.34%	0 0.00%	38.45	*
37.	Concepts presented through Multimedia instruction are not very clear at all.	0 0.00%	2 6.67%	4 13.34%	9 30.00%	15 50.00%	41.41	*
38.	Multimedia instruction makes the difficult concepts very easy to understand.	19 63.34%	8 26.67%	2 6.67%	1 3.34%	0 0.00%	47.75	*
39.	Animations given in Multimedia instructional package are actually distracting in understanding the concepts.	0 0.00%	1 3.34%	3 10.00%	13 43.34%	13 43.34%	51.25	*

40.	Illustrations given in the multimedia software package are enough to understand the concept clearly.	17 56.67%	11 36.67%	1 3.34%	1 3.34%	0 0.00%	37.79	*
41.	Multimedia instruction took more time to understand the concepts than usual classroom teaching.	0 0.00%	0 0.00%	4 13.34%	12 40.00%	14 46.67%	70.45	*
42.	Concepts presented in Multimedia instruction were logically arranged.	20 66.67%	8 26.67%	1 3.34%	1 3.34%	0 0.00%	45.12	*
43.	Learning through Multimedia instruction was not much of a use to the students.	0 0.00%	1 3.34%	2 6.67%	11 36.67%	16 53.34%	31.29	*
44.	Illustrations given in Multimedia software instruction are related to day today life experiences.	13 43.34%	13 43.34%	3 10.00%	1 3.34%	0 0.00%	25.79	*
45.	Classroom learning is more enjoyable and informative when taught through multimedia software package.	19 63.34%	8 26.67%	2 6.67%	1 3.34%	0 0.00%	39.29	*
46.	The language used in Multimedia instruction is easy and simple to understand.	17 56.67%	10 33.34%	1 3.34%	1 3.34%	1 3.34%	32.95	*
47.	The exercises given in each chapter is adequate.	18 60.00%	9 30.00%	2 6.67%	1 3.34%	0 0.00%	35.95	*

48.	Multimedia instruction takes care of previous knowledge of the subject.	21 70.00%	7 23.34%	1 3.34%	1 3.34%	0 0.00%	49.45	*
49.	Learning Biological concepts through multimedia instructional software package has not increased the enthusiasm for the study of Biology.	1 3.34%	1 3.34%	1 3.34%	14 46.67%	13 43.34%	28.95	*
50.	Video-clippings helped in understanding the chapter in depth.	17 56.67%	9 30.00%	2 6.67%	1 3.34%	1 3.34%	30.45	*

Note: * indicates level of significance at 0.01 level

It is quite evident from the table 4 that the computed values of Chi-square are greater than the table value of Chi-square of 13.277 at 0.01 level against 4 degrees of freedom. So the null hypothesis that there will be no significant difference between the observed frequencies and the frequencies expected against equal probability is rejected against all the 50 statements. The frequency loading is greater on the higher points of the rating scale that is Strongly Agreed (SA) and Agreed (A) against the statements 1, 3, 7, 8, 10, 12, 13, 15, 17, 18, 20, 22, 24, 25, 26, 27, 29, 30, 32, 34, 36, 38, 40, 42, 44, 45, 46, 47, 48 and 50, having positive polarity. Whereas, greater on the lower points of the rating scale that is Strongly Disagreed (SD) and Disagreed (DA) against the statements 2, 4, 6, 9, 11, 14, 16, 19, 21, 23, 28, 31, 33, 35, 37, 39, 41, 43 and 49 having negative polarity. So, the students have been found to have favourable reactions towards Biology through Multimedia Instructional Software Package.

So, we can therefore conclude from the above analysis that the treatment through Multimedia Software Instructional Package in terms of reactions of the students towards

teaching Biological Sciences through Multimedia Instructional Software Package has been found very effective.

4.5 REACTION OF BIOLOGY TEACHERS ON MULTIMEDIA INSTRUCTIONAL SOFTWARE PACKAGE TO TEACH BIOLOGICAL SCIENCES IN TERMS OF FREQUENCIES AND CHI- SQUARE ANALYSIS.

Table 5: Reaction of biology teachers on multimedia software instructional package to teach biological sciences in terms of frequencies and chi- square analysis.

Sr. NO.	STATEMENTS	SA	A	UD	DA	SD	CHI SQ. V	At 0.01 level 13.27
1.	Teaching through Multimedia compared to normal classroom teaching is enjoyable because this method is more interesting for students to understand than lectures or other traditional methods.	18 60.00%	7 23.34%	3 10.00%	1 3.34%	1 3.34%	31.95	*
2.	As a biology teacher, I like the illustrations given in the slides, which actually gives me additional information about the lesson.	20 66.67%	7 23.34%	2 6.67%	1 3.34%	0 0.00%	43.29	*

3.	Illustrations in the multimedia instructional package may not help the students to relate what they learn in biology to real life situations.	1 3.34%	2 6.67%	5 16.67%	13 43.34%	9 30.00%	15.12	*
4.	Multimedia instruction is an effective way of presentation because there is little stress on the students in learning environment.	17 56.67%	9 30.00%	2 6.67%	1 3.34%	1 3.34%	30.45	*
5.	Students can learn at their own pace with such Multimedia instructional package.	19 63.34%	8 26.67%	2 6.67%	0 0.00%	1 3.34%	39.29	*
6.	A teacher can immediately test students' knowledge because there is lot of practice exercises in this multimedia software package.	21 70.00%	6 20.00%	1 3.34%	2 6.67%	0 0.00%	46.62	*
7.	This multimedia instructional approach does not give more freedom to the students to learn.	0 0.00%	0 0.00%	4 13.34%	9 30.00%	17 56.67%	32.12	*
8.	Multimedia instructional approach is very good for the teachers as well as for the students as they can interact with each other very effectively.	0 0.00%	1 3.34%	3 10.00%	10 33.34%	16 53.34%	28.16	*

9.	Learning Biological concepts can be really a fun through this Multimedia instructional method.	24 80.00%	6 20.00%	0 0.00%	0 0.00%	0 0.00%	79.41	*
10.	Multimedia instructional method is not good in learning biological concepts because students' doubts may not be cleared.	0 0.00%	0 0.00%	5 16.67%	12 40.0%	13 43.34%	24.29	*
11.	Through Multimedia instructional approach a student can learn himself/herself (self-study) without the help of others.	23 76.67%	7 23.34%	0 0.00%	0 0.00%	0 0.00%	63.45	*
12.	Biological concepts presented in Multimedia instructional package are not very clear.	0 0.00%	2 6.67%	2 6.67%	8 26.6%	18 60.00%	33.79	*
13.	Multimedia instructional approach makes it much more easier to understand the biological concepts.	26 86.67%	3 10.00%	1 3.34%	0 0.00%	0 0.00%	81.16	*
14.	Animations in the Multimedia instruction may distract the students in understanding the concepts.	1 3.34%	1 3.34%	6 20.00%	10 33.3%	12 40.00%	20.45	*
15.	Illustrations given in Multimedia instruction are more than enough to understand the biological concepts clearly.	20 66.67%	6 20.00%	3 10.00%	1 3.34%	0 0.00%	42.12	*

16.	Multimedia instruction actually took more time to understand the concepts than usual classroom teaching.	1 3.34%	2 6.67%	5 16.67%	12 40.0%	10 33.34%	14.12	*
17.	Learning materials presented in Multimedia instruction are logically arranged in the multimedia software package.	16 53.34%	13 43.34%	1 3.34%	0 0.00%	0 0.00%	38.28	*
18.	Teaching through Multimedia instructional method is additional burden for the teachers as it requires extra work.	1 3.34%	3 10.00%	4 13.34%	10 33.3%	12 40.00%	13.45	*
19.	Illustrations given in Multimedia instructional package are very much related to day today life experiences.	16 53.34%	11 36.67%	1 3.34%	1 3.34%	1 3.34%	30.95	*
20.	Classroom teaching is more enjoyable through multimedia teaching approach.	20 66.67%	9 30.00%	1 3.34%	0 0.00%	0 0.00%	31.62	*
21.	The language used in Multimedia instructional package is easy and simple to understand.	26 86.67%	3 10.00%	1 3.34%	0 0.00%	0 0.00%	81.16	*
22.	Multimedia instruction does not take care of previous knowledge (percentage) needed to understand the present concept.	1 3.34%	1 3.34%	2 6.67%	14 46.6%	12 40.00%	25.45	*

23.	The exercises given in each chapter is adequate to understand the chapter well.	19 63.34%	8 26.67%	2 6.67%	0 0.00%	1 3.34%	40.95	*
24.	Multimedia instructional package takes care of the previous knowledge of the subject.	17 56.67%	9 30.00%	3 10.00%	1 3.34%	0 0.00%	31.62	*
25.	The animations in the multimedia package are not easy to understand the biological concepts.	1 3.34%	3 10.00%	2 6.67%	12 40.0%	12 40.00%	18.45	*
26.	The video-clippings in the multimedia instructional package helped very much in understanding the concepts in depth.	13 43.34%	13 43.34%	2 6.67%	1 3.34%	1 3.34%	25.12	*
27.	Break given in Multimedia package will help the students to refresh their minds.	18 60.00%	8 26.67%	3 10.00%	0 0.00%	1 3.34%	34.12	*
28.	I am feeling tired and bored while going through the slides of multimedia software package.	1 3.34%	1 3.34%	2 6.67%	16 53.3%	10 33.34%	28.12	*
29.	Animations shown in Multimedia instruction are appropriate to help the students in understanding the concepts.	16 53.34%	12 40.00%	1 3.34%	1 3.34%	0 0.00%	34.45	*
30.	Topic is not introduced in the Multimedia instructional package properly.	0 0.00%	1 3.34%	3 10.00%	11 36.6%	15 50.00%	82.16	*

31.	Extra figures and clippings did help me to understand well the biology concepts.	26 86.67%	3 10.00%	1 3.34%	0 0.00%	0 0.00%	81.16	*
32.	Enough revision is not done in this Multimedia instructional package to help the students to understand the concepts in depth.	0 0.00%	0 0.00%	2 6.67%	17 56.6%	11 36.67%	36.45	*
33.	Instruction given in each slide of Multimedia instruction is easy and clear to follow.	18 60.00%	8 26.67%	3 10.00%	1 3.34%	0 0.00%	34.12	*
34.	I had to read the slide many times to understand what is being said as there was no clarity.	0 0.00%	1 3.34%	2 6.67%	14 46.6%	13 43.34%	27.21	*
35.	Multimedia instructional approach alone is not enough in understanding the concepts very clearly.	11 36.67%	12 40.00%	4 13.34%	1 3.34%	2 6.67%	15.95	*
36.	Independent learning without the help of biology teacher is not possible through Multimedia instruction.	0 0.00%	1 3.34%	3 10.00%	12 40.0%	14 46.67%	26.12	*
37.	Evaluation is done objectively (objective questions) so no partiality involved in scoring.	21 70.00	7 23.34%	1 3.34%	1 3.34%	0 0.00%	49.45	*

38.	Remedial (re-teaching the difficult concepts which is not understood by the students) teaching is not done in this multimedia instructional package.	0 0.00%	1 3.34%	5 16.67%	9 30.0%	15 50.00%	23.45	*
39.	Evaluation done at the end of each chapter is a suitable measure to know the learner's understanding about that topic.	20 66.67%	8 26.67%	0 0.00%	1 3.34%	1 3.34%	45.12	*
40.	Recapitulation done at the end of the topics is useful to the teachers as well as the learners.	16 53.34%	12 40.00%	1 3.34%	1 3.34%	0 0.00%	34.45	*
41.	Interaction with Biology teacher to clarify doubts is not possible while using this Multimedia instruction (no face to face interaction).	0 0.00%	0 0.00%	3 10.00%	11 36.6%	16 53.34%	31.16	*
42.	Scores obtained by the students at the end of each chapter gives feedback about student's learning in each chapter through Multimedia instruction.	17 56.67%	10 33.34%	2 6.67%	1 3.34%	0 0.00%	33.29	*
43.	Discussion with biology teacher is very much needed along with Multimedia instruction to clarify doubts.	15 50.00%	12 40.00%	0 0.00%	1 3.34%	2 6.67%	29.95	*

44.	Illustrations/examples given the multimedia package are not easy to understand.	1 3.34%	0 0.00%	4 13.34%	15 50.0%	10 33.34%	24.95	*
45.	Content covered in each unit of the multimedia instructional software is quite sufficient.	13 43.34%	15 50.00%	1 3.34%	1 3.34%	0 0.00%	33.45	*
46.	Concepts are not clarified properly through this multimedia instructional approach.	0 0.00%	0 0.00%	3 10.00%	9 30.0%	18 60.00%	36.62	*
47.	For teaching the biological concepts clearly time required is much less when they are taught through multimedia instruction.	17 56.67%	11 36.67%	1 3.34%	1 3.34%	0 0.00%	36.12	*
48.	Examples given in the multimedia software package very much help in the concept clarity.	19 63.34%	9 30.00%	1 3.34%	1 3.34%	0 0.00%	40.62	*
49.	The language used in the software is easy and lucid to understand the biological concepts.	25 83.34%	3 10.00%	2 6.67%	0 0.00%	0 0.00%	24.95	*
50.	Illustrations/examples provided in the multimedia software package are not adequate for the purpose.	0 0.00%	0 0.00%	3 10.00%	13 43.3%	14 46.67%	29.95	*

Note: * indicates level of significance at 0.01 level

It is quite evident from the table 4 that the computed values of Chi-square are greater than the table value of Chi-square of 13.277 at 0.01 level against 4 degrees of freedom. So the

null hypothesis that there will be no significant difference between the observed frequencies and the frequencies expected against equal probability is rejected against all the 50 statements. The frequency loading is greater on the higher points of the rating scale that is Strongly Agreed (SA) and Agreed (A) against the statements 1, 2, 4, 5, 6, 8, 9, 11, 13, 15, 17, 19, 20, 21, 23, 24, 26, 27, 29, 31, 33, 35, 37, 39, 40, 42, 43, 45, 47, 48 and 49, having positive polarity. Whereas, greater on the lower points of the rating scale that is Strongly Disagreed (SD) and Disagreed (DA) against the statements 3, 7, 10, 12, 14, 16, 18, 22, 25, 28, 30, 32, 34, 36, 38, 41, 44,4 6 and 50 having negative polarity. So, the biology teachers have been found to have favourable reactions towards Multimedia Instructional Software Package to teach Biological Sciences.

So, we can therefore conclude from the above analysis that the treatment through Multimedia Software Instructional Package in terms of reactions of biology teachers towards teaching Biological Sciences through Multimedia Instructional Software Package has been found very effective.

4.6 FINDINGS

The major findings of the study are as follows:

4.6.1 The Multimedia Instructional Software Package was found to be effective in teaching Biological Sciences.

This could be said on the basis of the statistical tool adopted for data analysis: The t-test. The computed t-value of 2.46 is lesser than the table t-value of 2.66 at 0.01 level against 57 degrees of freedom. So, the null hypothesis that there will be no significant difference between the mean gain scores of the experimental group and control group is not rejected at 0.01 level.

The computed value of 2.46 is greater than the table t-value of 2.00 at 0.05 level against 57 degrees of freedom. So, the null hypothesis that there will be no significant difference

between the mean gain scores of experimental group and control group is rejected at 0.05 level. So, the mean gain score of experimental group has been found to be significantly greater than the mean gain score of the control group. Hence, the Multimedia Instructional Software Package treatment has been found to be effective at 0.05 level.

So, we can therefore conclude from the above analysis that the treatment through Multimedia Software Instructional Package in teaching Biological Sciences has been found very effective.

4.6.2 Reaction of Students towards Biology through Multimedia Software Instructional Package in Terms of expected frequencies and observed frequencies against equal probability has been found to be effective.

This could be said on the basis of the tool adopted for data analysis, that is, Reaction of Students on Multimedia Package for teaching Biological Sciences in terms of expected frequencies and observed frequencies against equal probability on various points of the reaction scale of the students.

It is quite evident from the table 4 that the computed values of Chi-square are greater than the table value of Chi-square of 13.277 at 0.01 level against 4 degrees of freedom. So the null hypothesis that there will be no significant difference between the observed frequencies and the frequencies expected against equal probability is rejected against all the 50 statements. The frequency loading is greater on the higher points of the rating scale that is Strongly Agreed (SA) and Agreed (A) against the statements 1, 3, 7, 8, 10, 12, 13, 15, 17, 18, 20, 22, 24, 25, 26, 27, 29, 30, 32, 34, 36, 38, 40, 42, 44, 45, 46, 47, 48 and 50, having positive polarity. Whereas, greater on the lower points of the rating scale that is Strongly Disagreed (SD) and Disagreed (DA) against the statements 2, 4, 6, 9, 11, 14, 16, 19, 21, 23, 28, 31, 33, 35, 37, 39, 41, 43 and 49 having negative polarity. So, the students have been found to have favourable reactions towards Biology through Multimedia Instructional Software Package.

So, we can therefore conclude from the above analysis that the treatment through Multimedia Software Instructional Package in terms of reactions of the students towards teaching Biological Sciences through Multimedia Instructional Software Package has been found very effective.

4.6.3 Reaction of Biology teachers on Multimedia Software Instructional Package in teaching of Biological Sciences in terms of expected frequencies and observed frequencies against equal probability has been found to be effective.

This could be said on the basis of the tool adopted for data analysis, that is, Reaction of Biology teachers on Multimedia Package for teaching Biological Sciences in terms of expected frequencies and observed frequencies against equal probability on various points of the reaction scale of the biology teachers.

It is quite evident from the table 4 that the computed values of Chi-square are greater than the table value of Chi-square of 13.277 at 0.01 level against 4 degrees of freedom. So the null hypothesis that there will be no significant difference between the observed frequencies and the frequencies expected against equal probability is rejected against all the 50 statements. The frequency loading is greater on the higher points of the rating scale that is Strongly Agreed (SA) and Agreed (A) against the statements 1, 2, 4, 5, 6, 8, 9, 11, 13, 15, 17, 19, 20, 21, 23, 24, 26, 27, 29, 31, 33, 35, 37, 39, 40, 42, 43, 45, 47, 48 and 49, having positive polarity. Whereas, greater on the lower points of the rating scale that is Strongly Disagreed (SD) and Disagreed (DA) against the statements 3, 7, 10, 12, 14, 16, 18, 22, 25, 28, 30, 32, 34, 36, 38, 41, 44,4 6 and 50 having negative polarity. So, the biology teachers have been found to have favourable reactions towards Multimedia Instructional Software Package to teach Biological Sciences.

So, we can therefore conclude from the above analysis that the treatment through Multimedia Software Instructional Package in terms of reactions of biology teachers towards teaching Biological Sciences through Multimedia Instructional Software Package has been found very effective.