Chapter 4

Statement of Result, Analysis and Interpretation

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The analysis and interpretation of data are presented in this chapter. Analysis of data is the heart of the research report (Best 2001). It is an extensive and comprehensive process intended to study the underlying relationship among various factors. This chapter reports and interprets the findings of this study. Each of the objectives is addressed by analyzing data and then determining whether the hypotheses for that objective are supported or not. As described in Chapter 3, the majority of this study was based on quantitative data collected by using an objective test. The data obtained by objective test which helped in understanding the effectiveness of virtual laboratories.

Interpretation of data is an extremely important and useful branch of science of statistics. Statistical facts by themselves have no utility, but interpretation makes it possible to utilize the collected data in various fields of activity. The usefulness of collected data lies in its proper interpretation. In the present study, the following prerequisites are kept in mind for the scientific interpretation of data collected through relevant tools.

4.1 Statistics used in the study

(a). Mean

To denote average

(b). standard deviation

To measure variability

(c). level of significance

It is a measure of the strength of the evidence that sample before you will reject the null hypothesis and conclude that the effect is statistically significant. The researcher determines the significance level before conducting the experiment

In this research the level of significance was 0.05.

(d). t test:-

To determine the significance of difference between two means

4.2 General Descriptions of the students:-

General description of the students is given below in the tables:

Table 4.1 description of the all students

S.No.	College Level	No Of Colleges	Number Of All Students
01.	Intermediate	08	150
02.	Undergraduate	02	41

Table 4.2 Detailed descriptions of Intermediate college students

S.No.	Based on Gender	Based on Locale	Based on Language
01.	Male (95)	Urban (73)	Hindi (126)
02.	Female (55)	Rural (77)	English (24)
Total	150	150	150

4.3 Frequency Distribution of the Students based on obtained scores:

Frequency distribution of the students based on obtained scores is given below in the tables:

Table 4.3 Frequency distribution of the students according to obtained score

S.No.	Class Interval	Frequency distribution	Percentage
01.	0-4	2	1.33 %
02	05-08	30	20 %
03	09-12	63	42 %
04	13-16	44	29.33 %

05	17-20	11	7.33 %
	Total	150	100 %

Table 4.4 Frequency distribution of the male/female students according to obtained score

S.No.	Class Interval	Male	Percentage	Female	Percentage
01.	0-4	2	2.1 %	0	0 %
02	05-08	25	26.31 %	5	9.09 %
03	09-12	42	44.21 %	21	38.18 %
04	13-16	17	17.89 %	27	49.09 %
05	17-20	9	9.47 %	2	3.63 %
	Total	95		55	

Table 4.5 Frequency distribution of the rural/urban students according to obtained score

S.No.	Class Interval	Urban	Percentage	Rural	Percentage
01.	0-4	0	0	2	2.59 %
02	05-08	12	16.43 %	18	23.37 %
03	09-12	34	46.57 %	29	37.66 %
04	13-16	17	23.28 %	27	35.06 %
05	17-20	10	13.69 %	1	1.29 %
	Total	73		77	

Table 4.6 Frequency distribution of the Hindi/English students according to obtained score

S.No.	Class Interval	Hindi	Percentage	English	Percentage
01.	0-04	2	3.5%	0	0
02	05-08	20	15.87 %	10	41.67 %

03	09-12	55	43.65 %	8	33.33 %
04	13-16	39	30.95 %	5	20.83 %
05	17-20	10	7.93 %	1	4.16 %
	Total	**126**		**24**	

4.4 Mean and standard deviation for data variables:-

Mean and standard deviation for data variables is given below in the following tables:

Table 4.7 Mean and standard deviation of total sample

S. No.	Total students (N)	Mean	Standard deviation
01.	150	11.28667	3.3304305

Table 4.8 Mean and standard deviation of male/female students

S. No.	Variable	Number (N)	Mean	Standard deviation
01.	Male	95	10.84211	3.666651
02.	Female	55	12.05455	2.710871

Table 4.9 Mean and standard deviation of Hindi/English medium students

S. No.	Variable	Number (N)	Mean	Standard deviation
01.	Hindi	126	11.56349	3.282672
02.	English	24	9.833333	3.265986

Table 4.10 Mean and standard deviation of Rural/Urban students

S. No.	Variable	Number (N)	Mean	Standard deviation

| 01. | Rural | 77 | 10.74026 | 3.083925 |
| 02. | Urban | 73 | 11.86301 | 3.501250 |

Table 4.11 Mean and standard deviation of Intermediate College and undergraduate college students

S.No.	Variable	Number (N)	Mean	Standard deviation
01.	Intermediate college	150	11.28667	3.3304305
02.	Undergraduate college	41	14	3.8406697

4.5 data analysis based on mean difference

Table 4.12 Significance of difference between mean score of understanding of scores of male and female students

Gender (N)	Degree of freedom	Mean	Standard Deviation	SE	t value	P score	Level of significance
Male(95) Female(55)	148	10.842 12.054	3.666 2.710	0.376 0.365	2.366	0.0343	Statistically significant

A reference to the table 4.12 shows that the obtained t score is higher than P score, it means that mean difference of groups was significant at 0.05 level of significance for df= 148. Therefore on the basis of available evidences we can conclude that male and female students differ significantly from each other in their biological science concept and understanding. Female are having more knowledge in comparison of boys.

Table 4.13 Significance of difference between mean score of understanding of scores of rural and urban students

Locale (N)	Degree of freedom	Mean	Standard Deviation	SE	t value	P score	Level of significance
Rural(95) Female(55)	148	10.740 11.863	3.083 3.501	0.3514 0.4097	2.0868	0.0386	Statistically significant

A reference to the table 4.13 shows that the obtained t score is higher than P score. it means that mean difference of groups was significant at 0.05 level of significance for df= 148. Therefore on the basis of available evidences we can conclude that urban and rural students differ significantly from each other in their biological science concept and understanding. Students belonging to urban areas are having more knowledge in comparison of rural students.

Table 4.14 Significance of difference between mean score of understanding of scores of Hindi and English medium students

Language (N)	Degree of freedom	Mean	Standard Deviation	SE	t value	P score	Level of significance
Hindi(126) English(24)	148	11.563 09.833	3.2826 3.2659	0.29280 0.66666	2.3659	0.0193	Statistically significant

A reference to the table 4.14 shows that the obtained t score is higher than P score, it means that mean difference of groups was significant at 0.05 level of significance for df= 148. Therefore on the basis of available evidences we can conclude that Hindi and English medium students differ significantly from each other in their biological science concept and understanding. Students belonging to Hindi medium are having more knowledge in comparison of English medium students based on available evidences.

Table 4.15 Significance of difference between mean score of understanding of scores of intermediate and under graduate college level students

Level (N)	Degree of freedom	Mean	Standard Deviation	SE	t value	P score	Level of significance
Intermediate	148	11.286	3.330	0.2719	4.4696	Less than 0.0001	extremely statistically significant
UG level		14	3.840	0.5998			

A reference to the table 4.15 shows that the obtained t score is higher than P score, it means that mean difference of groups was significant at 0.05 level of significance for df = 189. Therefore on the basis of available evidences we can conclude that intermediate and undergraduate level students differ extremely significant from each other in their biological science concept and understanding. This was not a surprising result; undergraduate students have deep knowledge due to their extra syllabus.

4.6 Data Analysis Based On Frequency Distribution

Table 4.16 Frequency Distribution In Terms Of Percentage of All Students

S.No.	Frequency distribution In terms of obtained scores	Frequency distribution In terms of obtained percentage	No of students	No of students in percentage
01.	0-4	0-20	2	1.33
02.	05-08	21-40	30	20
03.	09-12	41-60	63	42
04.	13-16	61-80	44	29.33
05.	17-20	81-100	11	7.33

Conclusion: A reference to table 4.16 shows that 36.66 % students scored more than 60 % and 42 percent students got marks between 41 to 60 percentages. Maximum students are in average category. Therefore researcher

concluded that maximum students are in average for conceptual understanding of biological science.

Table 4.17 Frequency Distribution In Terms Of Percentage of Girls/boys

S.No.	Frequency distribution In terms of obtained scores	Frequency distribution In terms of obtained percentage	No of girls	No of girls in %	No of boys	No of boys in %
01.	0-4	0-20	0	0	2	2.1
02.	05-08	21-40	5	9.09	25	26.31
03.	09-12	41-60	21	38.18	42	44.21
04.	13-16	61-80	27	49.09	17	17.89
05.	17-20	81-100	2	3.63	9	9.47

Conclusion: A reference to table 4.17 shows that 52.72 % girls and 27.36 % boys have scored more than average. Therefore researcher concluded that girls have more conceptual understanding of biological science in comparison of boys. But here interesting fact is that 9.47 % boys have excellent scores while only 3.63 % girls having it.

Table 4.18 Frequency Distribution In Terms Of Percentage of rural/urban students

S. No.	Frequency distribution In terms of obtained scores	Frequency distribution In terms of obtained percentage	No of Rural Students	No of rural students in %	No of urban Students	No of urban students in percentage
01.	0-4	0-20	2	2.59	0	0
02.	05-08	21-40	18	23.37	12	16.43
03.	09-12	41-60	29	37.66	34	46.57
04.	13-16	61-80	27	35.06	17	23.28
05.	17-20	81-100	1	1.29	10	13.69

Conclusion: A reference to table 4.18 shows that 36.35 % rural and 36.97 % urban students have scored more than average. Means almost similar number of students scored more than average. But if we look on average and excellent

category urban students performed better. Therefore researcher concluded that urban students have more conceptual understanding of biological science in comparison of rural students.

Table 4.19 Frequency Distribution In Terms Of Percentage of Hindi/English medium students

S.No.	Frequency distribution In terms of obtained scores	Frequency distribution In terms of obtained percentage	No of Hindi medium students	No of Hindi medium Students In %	No of English medium students	No of eng medium students in percentage
01.	0-4	0-20	2	3.6	0	0
02.	05-08	21-40	20	15.87	10	41.67
03.	09-12	41-60	55	43.65	8	33.33
04.	13-16	61-80	39	30.95	5	20.83
05.	17-20	81-100	10	7.93	1	4.16

Conclusion: A reference to table 4.19 shows that 38.88 % Hindi medium and 24.99 % English medium students have scored more than average. Also in average category Hindi medium students performed better. Therefore researcher concluded that Hindi medium students have more conceptual understanding of biological science in comparison of English medium students.

4.7 Biological Area wise distribution of marks

Table 4.20 Biological area and average marks of all the students

S. No.	Area	Average marks of all students
01.	Cell	3.327
02.	Cell division	2.613
03.	Genetics	3.18
04.	Human Genetics	2.16

A reference to table 4.20 shows that in selected areas of the biology. Students have maximum concepts understanding in cell biology. There is worst condition in conceptual understanding related to human genetics.