CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

4.1.0 INTRODUCTION

The present chapter deals with the analysis and interpretation of data collected through the tools viz. intelligent test, achievement tests in English and reaction scale. Achievement tests in English covered the components like, content knowledge, logic, divergent thinking, achievement and comprehension. For the purpose of interpretation it is essential to identify suitable and appropriate analysis techniques which can help to simplify the data. This process helps to build-up of the relationship between the data and subsequently aids to reduce the values to a solitary meaningful value that is comparable, understandable and further interpretable too. In this process, the undertaken experiment and its observations are condensed through analysis in a way that elucidates solution to the research problems. Interpretation of the analyzed data further aims to investigate extensive meaning of these solutions. The central idea of analysis and interpretation of data is to assess and determine the extent of attainment of objectives of the present study. Analysis of data also directs the researcher to test the hypotheses underlying the research. This process leads to the conclusion and helps to make decision for the researcher to formulate a theory. Any research study cannot be completed barring this and the importance of data analysis and interpretation of obtained data therefore cannot be undermined.

The present study was experimental in nature where quasi experimental research design was used. The data were collected by the researchers by administering intelligence test in the beginning of the study. Achievement test was administered at the end of each semester respectively on both experiment group and control group. The intelligence test score was used to make experiment group and control group equivalent. Data collected through achievement test in English was taken in terms of content knowledge, logic, divergent thinking, achievement and comprehension. As the nature of data was quantitative, the quantitative statistical techniques were adopted for analysis of data. The statistical techniques like Mean, Standard Deviation (SD), Standard Error of Mean (SE), Mann–Whitney U-test and Intensity Index (II) were used to attain different objectives of the present study. As the sample selection was done purposively and the assumptions of parametric statistics did not match for the

present data, it became the cause for the researcher to use non-parametric Mann–Whitney U-test which is quite equivalent of t-test of the parametric group. The detail analysis of data is presented objective-wise as follow.

4.2.0 IMPLEMENTATION OF OPEN BOOK EXAMINATION

In the present study an open book examination was designed and implemented. It was comprised of an open book environment (OBEn) and open book testing (OBT). To achieve the objective 2 of the present study i.e. “To implement the developed Open Book Environment (OBEn) for standard VIII students in teaching English”, the experiment group was taught in an OBEn and the control group was taught in a traditional environment. The effectiveness of OBT was measured both in OBEn and traditional environment. And the effectiveness of OBEn was measured both in OBT and traditional close book test (CBT).

4.2.1 EFFECTIVENESS OF OPEN BOOK TESTING IN A TRADITIONAL ENVIRONMENT

Under this caption data analysis is done to achieve the objective 3 of the present study i.e. “To study the effectiveness of the Open Book Testing (OBT) in a traditional close book environment in terms of content knowledge, logic, divergent thinking, comprehension and overall achievement of standard VIII students in English” and to test the following null hypothesis.

H_0 1 “There will be no significant difference in the mean scores of content knowledge in English of groups studied in traditional environment but examined through CBT and OBT”,

H_0 2 “There will be no significant difference in the mean scores of logic in English of groups studied in traditional environment but examined through CBT and OBT”,

H_0 3 “There will be no significant difference in the mean scores of divergent thinking in English of groups studied in traditional environment but examined through CBT and OBT”,

H_0 4 “There will be no significant difference in the mean scores of comprehension in English of groups studied in traditional environment but examined through CBT and OBT”, and

H_0 5 "There will be no significant difference in the mean scores of overall achievement in English of groups studied in traditional environment but examined through CBT and OBT."

As in the present study achievement in English was measured in terms of content knowledge, logic, divergent thinking, comprehension ability and overall achievement of the students, the data analysis is also done separately with respect to these components. In this analysis the mean scores of the control group that was taught in a traditional environment were compared for CBT and OBT along with their respective standard deviations and standard errors of means for different components separately. Further, u-test was used to see whether the difference in the mean scores were significant or by chance for different components. The detailed analysis is done through tables 4.1 to table 4.10.

Table 4.1 depicts the comparison of mean, standard deviation and standard error of means of the control groups examined through CBT and OBT for the achievement in English in terms of content knowledge and table 4.2 shows whether there is any significance different between the stated means or not.

Table: 4.1 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in English in a Traditional Environment in terms of its Content Knowledge.

Group With	N	Mean	SD	SE
CBT	16	22.50	7.47	1.93
OBT	16	24.25	14.16	3.66

From the table 4.1, it was found that the mean score of content knowledge in English through CBT of the group those were studied in a traditional environment was 22.50 out of total score of 70. The standard deviation from the mean for the content knowledge in English of the same group was found to be 7.47 with standard error of mean of 1.93. From the same table, it was found that the mean score of content knowledge in English through OBT of the group was 24.25. The standard deviation from the mean for the content knowledge in English of the same group was found to be 14.16 with standard error of mean of 3.66. From the mean scores and standard

deviation of the groups, it can be said that the group achievement in terms of content knowledge in both the types of examination was found to be very poor with a large variation in the group.

Considering the mean scores of content knowledge in English of both the groups studied without traditional environment and examined through CBT and OBT, it was found that the mean score of content knowledge of the group examined through OBT was found higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. $H_0$1"There will be no significant difference in the mean scores of content knowledge in English of groups studied in traditional environment but examined through CBT and OBT", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.2 which is followed by analysis.

Table: 4.2 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups with Close Book Test (CBT) and Open Book Test (OBT) in a Traditional Environment in English in terms of its Content Knowledge.

Group With	N	SR	U-Value	Z –Value	Probability (P)
CBT	16	271.00	128.00	0.00	0.5
OBT	16	264.00			

From table 4.2, it was observed that the sum of ranks of groups examined through CBT and OBT in English content knowledge were 271.00 and 264.00 respectively with 16 students in each group. The U-value and z-value were found to be 128.00 and 0.00 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq 0.00$ the two tailed probability was found to be 0.5 which is greater than the decided significance level (α) i.e. 0.01. Hence, the null hypothesis i.e. "There will be no significant difference in the mean scores of content knowledge in English of groups studied in traditional environment but examined through CBT and OBT" was retained and it could be believed that the

group studied in traditional environment and examined through CBT and OBT did not differ stochastically in terms of their content knowledge in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English content knowledge when taught in a traditional environment.

Table 4.3 depicts the comparison of mean, standard deviation and standard error of means of the control groups examined through CBT and OBT for the achievement in English in terms of logic and table 4.4 shows whether there is any significance different between the stated means or not.

Table: 4.3 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in English in a Traditional Environment in terms of its Logic.

Group With	N	Mean	SD	SE
CBT	16	17.50	8.35	2.16
OBT	16	18.00	13.13	3.39

From the table 4.3, it was found that the mean score of logic in English through CBT of the group those were studied in a traditional environment was 17.50 out of total score of 70. The standard deviation from the mean for the logic in English of the same group was found to be 8.35 with standard error of mean of 2.16. From the same table, it was found that the mean score of logic in English through Open Book Test (OBT) of the group was 18.00. The standard deviation from the mean for the logic in English of the same group was found to be 13.13 with standard error of mean of 3.39. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of logic in both the types of examination was found to be very poor with a large variation in the group.

Considering the mean scores of logic in English of both the groups studied without OBEn and examined through CBT and OBT, it was found that the mean score of logic of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the

other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. "There will be no significant difference in the mean scores of logic in English of groups studied in traditional environment but examined through CBT and OBT", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.4 which is followed by analysis.

Table: 4.4 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups with Close Book Test (CBT) and Open Book Test (OBT) in a Traditional Environment in English in terms of its Logic.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	277.00	136.00	0.30	0.382
OBT	16	256.00			

From table 4.4, it was observed that the sum of ranks of groups examined through CBT and OBT in English logic were 277.00 and 256.00 respectively with 16 students in each group. The U-value and z-value were found to be 136.00 and 0.30 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq 0.30$, the two tailed probability was found to be 0.382 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of logic in English of groups studied in traditional environment but examined through CBT and OBT" was retained and it could be believed that the group studied without OBEn, examined through CBT and OBT did not differ stochastically in terms of their logic in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English logic when taught in a traditional environment.

Table 4.5 depicts the comparison of mean, standard deviation and standard error of means of the control groups examined through CBT and OBT for the achievement in English in terms of divergent thinking and table 4.6 shows whether there is any significance different between the stated means or not.

Table: 4.5 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in English in a Traditional Environment in terms of its Divergent Thinking.

Group With	N	Mean	SD	SE
CBT	16	15.50	7.89	2.04
OBT	16	14.00	11.51	2.97

From the table 4.5, it was found that the mean score of divergent thinking in English through CBT of the group those were studied in a traditional environment was 15.50 out of total score of 70. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 7.89 with standard error of mean of 2.04. From the same table, it was found that the mean score of divergent thinking in English through OBT of the group was 14.00. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 11.51 with standard error of mean of 2.97. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of divergent thinking in both the types of examination was found to be very poor with a large variation in the group.

Considering the mean scores of divergent thinking in English of both the groups studied without OBEn and examined through CBT and OBT, it was found that the mean score of divergent thinking of the group examined through CBT was higher than that of the group examined through OBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean scores of divergent thinking in English of groups studied in traditional environment but examined through CBT and OBT”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.6 which is followed by analysis.

Table: 4.6 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups with Close Book Test (CBT) and Open Book Test (OBT) in a Traditional Environment in English in terms of its Divergent Thinking.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	289.00	147.00	0.72	0.235
OBT	16	245.00			

From table 4.6, it was observed that the sum of ranks of groups examined through CBT and OBT in English divergent thinking were 289.00 and 245.00 respectively with 16 students in each group. The U-value and z-value were found to be 147.00 and 0.72 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq 0.72$, the two tailed probability was found to be 0.235 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of divergent thinking in English of groups studied in traditional environment but examined through CBT and OBT" was retained and it could be believed that the group studied without OBEn, examined through OBT and CBT did not differ stochastically in terms of their divergent thinking in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English divergent thinking when taught in a traditional environment.

Table 4.7 depicts the comparison of mean, standard deviation and standard error of means of the control groups examined through CBT and OBT for the achievement in English in terms of comprehension and table 4.8 shows whether there is any significance different between the stated means or not.

Table: 4.7 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in English in a Traditional Environment in terms of its Comprehension.

Group With	N	Mean	SD	SE
CBT	16	4.63	2.62	0.68
OBT	16	6.13	2.39	0.62

From the table 4.7, it was found that the mean score of comprehension in English through CBT of the group those were studied in a traditional environment was 4.63 out of total score of 10. The standard deviation from the mean for the comprehension in English of the same group was found to be 2.62 with standard error of mean of 0.68. From the same table, it was found that the mean score of comprehension in English through OBT of the group was 6.13. The standard deviation from the mean for the comprehension in English of the same group was found to be 2.39 with standard error of mean of 0.62. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms comprehension of in both the types of examination was found to be poor.

Considering the mean scores of comprehension in English of both the groups studied without OBEn and examined through CBT and OBT, it was found that the mean score of comprehension of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through CBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through CBT was also found more than the group examined through OBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean scores of comprehension in English of groups studied in traditional environment but examined through CBT and OBT”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.8 which is followed by analysis.

Table: 4.8 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups with Close Book Test (CBT) and Open Book Test (OBT) in a Traditional Environment in English in terms of its Comprehension.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	228.00	90.00	-1.43	0.076
OBT	16	302.00			

From table 4.8, it was observed that the sum of ranks of groups examined through CBT and OBT in English comprehension were 228.00 and 302.00 respectively with 16 students in each group. The U-value and z-value were found to be 90.00 and -1.43 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -1.43$, the two tailed probability was found to be 0.076 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of comprehension in English of groups studied in traditional environment but examined through CBT and OBT" was retained and it could be believed that the group studied without OBEn, examined through CBT and OBT did not differ stochastically in terms of their comprehension in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English comprehension when taught in a traditional environment.

Table 4.9 depicts the comparison of mean, standard deviation and standard error of means of the control groups examined through CBT and OBT for the achievement in English in terms of achievement and table 4.10 shows whether there is any significance different between the stated means or not.

Table: 4.9 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in English in a Traditional Environment in terms of its Overall Achievement.

Group With	N	Mean	SD	SE
CBT	16	32.75	10.86	2.80
OBT	16	32.88	13.67	3.53

From the table 4.9, it was found that the mean score of overall achievement in English through CBT of the group those were studied in a traditional environment was 32.75 out of total score of 100. The standard deviation from the mean for the overall achievement in English of the same group was found to be 10.86 with standard error of mean of 2.80. From the same table, it was found that the mean score of overall achievement in English through OBT of the group was 32.88. The standard deviation from the mean for the overall achievement in English of the same group was found to be 13.67 with standard error of mean of 3.53. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms overall achievement of in both the types of examination was found to be very poor with a large variation in the group.

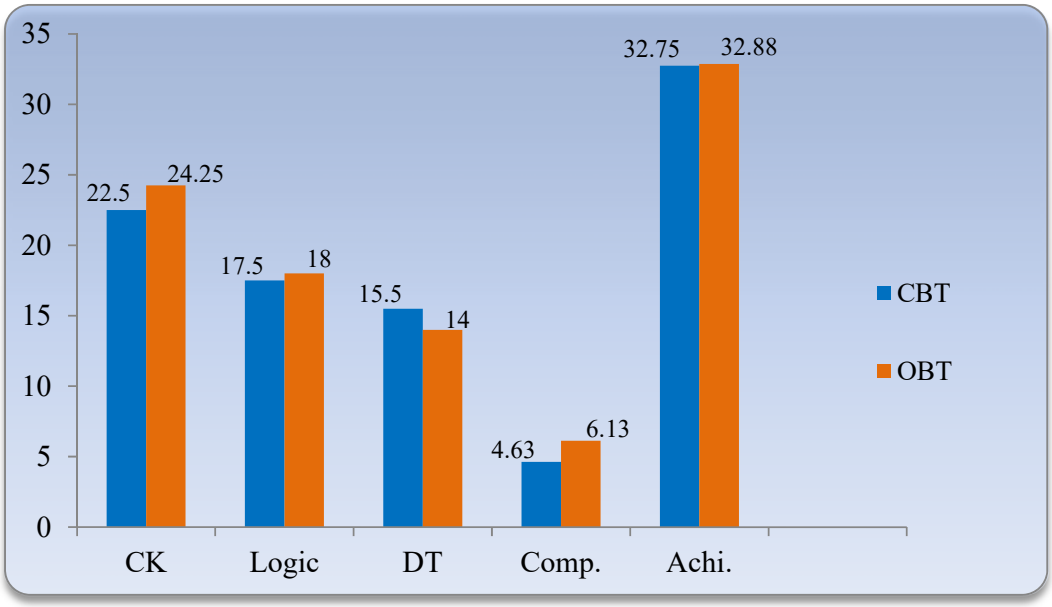
Considering the mean scores of overall achievement in English of both the groups studied without OBEn and examined through CBT and OBT, it was found that the mean score of overall achievement of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean scores of overall achievement in English of groups studied in traditional environment but examined through CBT and OBT”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.10 which is followed by analysis.

Table: 4.10 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups with Close Book Test (CBT) and Open Book Test (OBT) in a Traditional Environment in English in terms of its Overall Achievement.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	273.00	128.00	0.00	0.5
OBT	16	264.00			

From table 4.10, it was observed that the sum of ranks of groups examined through CBT and OBT in English overall achievement were 273.00 and 264.00 respectively with 16 students in each group. The U-value and z-value were found to be 128.00 and 0.00 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq 0.00$, the two tailed probability was found to be 0.5 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of overall achievement in English of groups studied in traditional environment but examined through CBT and OBT" was retained and it could be believed that the group studied without OBEn, examined through CBT and OBT did not differ stochastically in terms of their overall achievement in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English overall achievement when taught in a traditional environment. The overall comparisons of the means of the groups examined through CBT and OBT in different components of the English achievement are shown in figure 4.1.

Figure 4.1: Graph Representing the Mean Score of Content Knowledge (CK), Logic (L), Divergent Thinking (DT), Comprehension (Comp.) and Overall Achievement (Achi.) through CBT and OBT in English in a Traditional Environment (X axis and Y axis represents different components and Mean Marks respectively)



From figure 4.1, it can also be seen that there are no much differences between the mean scores achieved through CBT and OBT in all the components like, content knowledge, logic, comprehension and overall achievement.

4.2.2 EFFECTIVENESS OF OPEN BOOK TESTING IN AN OPEN BOOK ENVIRONMENT

Under this caption data analysis is done to achieve the objective 4 of the present study i.e. "To study the effectiveness of the Open Book Testing (OBT) in an Open Book Environment (OBEn) in terms of content knowledge, logic, divergent thinking, comprehension and overall achievement of standard VIII students in English" and to test the following null hypothesis.

H_0 6 "There will be no significant difference in the mean scores of content knowledge in English of groups studied in OBEn but examined through CBT and OBT",

H_0 7 "There will be no significant difference in the mean scores of logic in English of groups studied in OBEn but examined through CBT and OBT",

H_0 8 “There will be no significant difference in the mean scores of divergent thinking in English of groups studied in OBEn but examined through CBT and OBT”,

H_0 9 “There will be no significant difference in the mean scores of comprehension in English of groups studied in OBEn but examined through CBT and OBT” and

H_0 10 “There will be no significant difference in the mean scores of overall achievement in English of groups studied in OBEn but examined through CBT and OBT.”

As in the present study achievement in English was measured in terms of content knowledge, logic, divergent thinking, comprehension ability and overall achievement of the students, the data analysis is also done separately with respect to these components. In this analysis the mean scores of the experiment group that was taught in an OBEn were compared for CBT and OBT along with their respective standard deviations and standard errors of means for different components separately. Further, u-test was used to see whether the difference in the mean scores were significant or by chance for different components. The detailed analysis is done through tables 4.11 to table 4.20.

Table 4.11 depicts the comparison of mean, standard deviation and standard error of means of the experiment groups examined through CBT and OBT for the achievement in English in terms of content knowledge and table 4.12 shows whether there is any significance different between the stated means or not.

Table: 4.11 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Content Knowledge.

Group With	N	Mean	SD	SE
CBT	16	49.31	9.09	2.35
OBT	16	52.75	8.74	2.26

From the table 4.11, it was found that the mean score of content knowledge in English through CBT of the group those were studied with OBEn was 49.31 out of total score of 70. The standard deviation from the mean for the content knowledge in English of

the same group was found to be 9.09 with standard error of mean of 2.35. From the same table, it was found that the mean score of content knowledge in English through OBT of the group studied with OBEn was 52.75. The standard deviation from the mean for the content knowledge in English of the same group was found to be 8.74 with standard error of mean of 2.26. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of the content knowledge in both the types of examination was found to be quite better in comparison to the performance of the group taught in a traditional environment (table no. 4.1).

Considering the mean scores of content knowledge in English of both the groups studied through OBEn and examined through CBT and OBT, it was found that the mean score of content knowledge of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through CBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through CBT was also found more than the group examined through OBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. "There will be no significant difference in the mean scores of content knowledge in English of groups studied in OBEn but examined through CBT and OBT", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.12 which is followed by analysis.

Table: 4.12 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups examined through Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Content Knowledge.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	228	92.00	-1.36	0.086
OBT	16	300			

From table 4.12, it was observed that the sum of rank of groups examined through CBT and OBT in English achievement were 228 and 300 respectively with 16 students in each group. The U-value and z-value were found to be 92.00 and -1.36

respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -1.36$, the two tailed probability was found to be 0.086 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of content knowledge in English of groups studied in OBEn but examined through CBT and OBT" was retained and it could be believed that the group studied in OBEn, examined through CBT and OBT did not differ stochastically in terms of their achievement in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English content knowledge when taught in an OBEn.

Table 4.13 depicts the comparison of mean, standard deviation and standard error of means of the experiment groups examined through CBT and OBT for the achievement in English in terms of logic and table 4.14 shows whether there is any significance different between the stated means or not.

Table: 4.13 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Logic.

Group With	N	Mean	SD	SE
CBT	16	44.06	8.93	2.30
OBT	16	49.50	9.65	2.49

From the table 4.13, it was found that the mean score of logic in English through CBT of the group those were studied with OBEn was 44.06 out of total score of 70. The standard deviation from the mean for the logic in English of the same group was found to be 8.93 with standard error of mean of 2.30. From the same table, it was found that the mean score of logic in English through OBT of the group studied with OBEn was 49.50. The standard deviation from the mean for the logic in English of the same group was found to be 9.65 with standard error of mean of 2.49. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of logic in both the types of examination was found to be quite better in comparison to the performance of the group taught in a traditional environment (table no. 4.3).

Considering the mean scores of logic in English of both the groups studied through OBEn and examined through CBT and OBT, it was found that the mean score of logic of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. "There will be no significant difference in the mean scores of logic in English of groups studied in OBEn but examined through CBT and OBT", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.14 which is followed by analysis.

Table: 4.14 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups examined through Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Logic.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	206.00	70.00	-2.19	0.014
OBT	16	322.00			

From table 4.14, it was observed that the sum of rank of groups examined through CBT and OBT in English logic were 206.00 and 322.00 respectively with 16 students in each group. The U-value and z-value were found to be 70.00 and -2.19 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -2.19$, the two tailed probability was found to be 0.014 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of logic in English of groups studied in OBEn but examined through CBT and OBT" was retained and it could be believed that the group studied in OBEn, examined through CBT and OBT did not differ stochastically in terms of their logic in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English logic when taught in an OBEn.

Table 4.15 depicts the comparison of mean, standard deviation and standard error of means of the experiment groups examined through CBT and OBT for the achievement in English in terms of divergent thinking and table 4.16 shows whether there is any significance different between the stated means or not.

Table: 4.15 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Divergent Thinking.

Group With	N	Mean	SD	SE
CBT	16	41.63	9.14	2.36
OBT	16	47.50	9.75	2.52

From the table 4.15, it was found that the mean score of divergent thinking in English through CBT of the group those were studied with OBEn was 41.63 out of total score of 70. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 9.14 with standard error of mean of 2.36. From the same table, it was found that the mean score of divergent thinking in English through OBT of the group studied with OBEn was 47.50. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 9.75 with standard error of mean of 2.52. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of the divergent thinking in both the types of examination was found to be quite better in comparison to the performance of the group taught in a traditional environment (table no. 4.5).

Considering the mean scores of divergent thinking in English of both the groups studied through OBEn and examined through CBT and OBT, it was found that the mean score of divergent thinking of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean scores of divergent thinking in English of groups studied in

OBEn but examined through CBT and OBT", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.16 which is followed by analysis.

Table: 4.16 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups examined through Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Divergent Thinking.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	203.00	67.00	-2.30	0.011
OBT	16	325.00			

From table 4.16, it was observed that the sum of rank of groups examined through CBT and OBT in English divergent thinking were 203.00 and 325.00 respectively with 16 students in each group. The U-value and z-value were found to be 67.00 and -2.30 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -2.30$, the two tailed probability was found to be 0.011 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of divergent thinking in English of groups studied in OBEn but examined through CBT and OBT" was retained and it could be believed that the group studied in OBEn, examined through CBT and OBT did not differ stochastically in terms of their divergent thinking in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English divergent thinking when taught in an OBEn.

Table 4.17 depicts the comparison of mean, standard deviation and standard error of means of the experiment groups examined through CBT and OBT for the achievement in English in terms of comprehension and table 4.18 shows whether there is any significance different between the stated means or not.

Table: 4.17 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Comprehension.

Group With	N	Mean	SD	SE
CBT	16	6.75	1.52	0.39
OBT	16	7.31	1.72	0.44

From the table 4.17, it was found that the mean score of comprehension in English through CBT of the group those were studied with OBEn was 6.75 out of total score of 10. The standard deviation from the mean for the comprehension in English of the same group was found to be 1.52 with standard error of mean of 0.39. From the same table, it was found that the mean score of comprehension in English through OBT of the group studied with OBEn was 7.31. The standard deviation from the mean for the comprehension in English of the same group was found to be 1.72 with standard error of mean of 0.44. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of the comprehension in both the types of examination was found to be quite better in comparison to the performance of the group taught in a traditional environment (table no. 4.7).

Considering the mean scores of comprehension in English of both the groups studied through OBEn and examined through CBT and OBT, it was found that the mean score of comprehension of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean scores of comprehension in English of groups studied in OBEn but examined through CBT and OBT”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.18 which is followed by analysis.

Table: 4.18 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups examined through Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Comprehension.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	237.5	101.50	-1.00	0.158
OBT	16	290.5			

From table 4.18, it was observed that the sum of rank of groups examined through CBT and OBT in English comprehension were 237.5 and 290.5 respectively with 16 students in each group. The U-value and z-value were found to be 101.50 and -1.00 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -1.00$, the two tailed probability was found to be 0.158 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of comprehension in English of groups studied in OBEn but examined through CBT and OBT" was retained and it could be believed that the group studied in OBEn, examined through CBT and OBT did not differ stochastically in terms of their comprehension in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English comprehension when taught in an OBEn.

Table 4.19 depicts the comparison of mean, standard deviation and standard error of means of the experiment groups examined through CBT and OBT for the achievement in English in terms of achievement and table 4.20 shows whether there is any significance different between the stated means or not.

Table: 4.19 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Groups in Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Overall Achievement.

Group With	N	Mean	SD	SE
CBT	16	60.13	9.50	2.45
OBT	16	62.00	10.95	2.83

From the table 4.19, it was found that the mean score of overall achievement in English through CBT of the group those were studied with OBEn was 60.13 out of total score of 100. The standard deviation from the mean for the overall achievement in English of the same group was found to be 9.50 with standard error of mean of 2.45. From the same table, it was found that the mean score of overall achievement in English through OBT of the group studied with OBEn was 62.00. The standard deviation from the mean for the overall achievement in English of the same group was found to be 10.95 with standard error of mean of 2.83. From the mean scores and standard deviation of the groups, it can be said that the group achievement in terms of overall achievement in both the types of examination was found to be quite better in comparison to the performance of the group taught in a traditional environment (table no. 4.9).

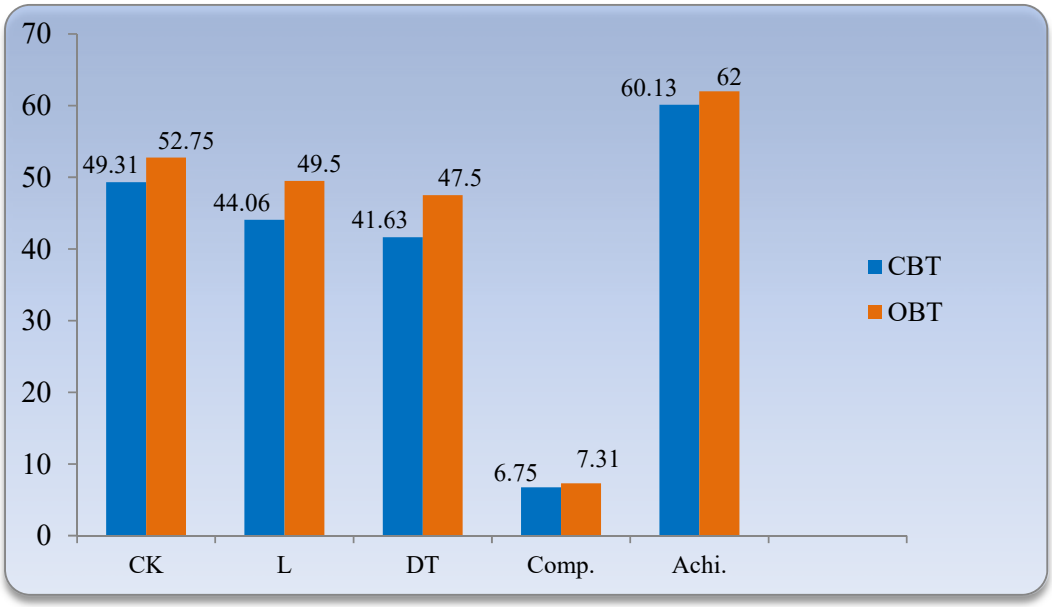
Considering the mean scores of overall achievement in English of both the groups studied through OBEn and examined through CBT and OBT, it was found that the mean score of overall achievement of the group examined through OBT was higher than that of the group examined through CBT. Comparing the standard deviations of both the groups it could be said that the group examined through OBT was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group examined through OBT was also found more than the group examined through CBT. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean scores of overall achievement in English of groups studied in OBEn but examined through CBT and OBT”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.20 which is followed by analysis.

Table: 4.20 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Groups examined through Close Book Test (CBT) and Open Book Test (OBT) in an Open Book Environment (OBEn) in English in terms of its Overall Achievement.

Group With	N	SR	U-Value	Z -Value	Probability (P)
CBT	16	242.50	106.50	-0.81	0.209
OBT	16	285.50			

From table 4.20, it was observed that the sum of rank of groups examined through CBT and OBT in English overall achievement were 242.50 and 285.50 respectively with 16 students in each group. The U-value and z-value were found to be 106.50 and -0.81 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -0.81$, the two tailed probability was found to be 0.209 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean scores of overall achievement in English of groups studied in OBEn but examined through CBT and OBT" was retained and it could be believed that the group studied in OBEn, examined through CBT and OBT did not differ stochastically in terms of their overall achievement in English and the differences found were by chance. Hence, it can be said that students examined through either CBT or OBT score similar in English overall achievement when taught in an OBEn. The overall comparisons of the means of the groups examined through OBT and CBT in different components of the English achievement is shown in figure 4.2.

Figure 4.2: Graph Representing the Mean Score of Content Knowledge (CK), Logic (L), Divergent Thinking (DT), Comprehension (Comp.) and Overall Achievement (Achi.) through CBT and OBT in English in an Open Book Environment (X axis and Y axis represents different components and mean marks respectively)



From figure 4.2, it can be seen that the group taught in an OBEn did very well in all the components of the English achievement. It can also be seen that there are no much differences between the mean scores achieved through CBT and OBT in all the components like, content knowledge, logic, divergent thinking, comprehension and achievement.

4.2.3 EFFECTIVENESS OF OPEN BOOK ENVIRONMENT IN A CLOSE BOOK TESTING

To study the effectiveness of open book environment in a close book testing, the experiment group was taught in the OBEn and the control group was taught in the traditional environment. Half of the experiment group and half of the control group were examined a in a close book test. Obtained data were analyzed with the help of mean, standard deviation, standard error of mean and Mann-Whitney U-test to achieve the objective 5 i.e. "To study the effectiveness of the Open Book Environment (OBEn) in a Close Book Testing (CBT) in terms of content knowledge, logic, divergent thinking, comprehension and overall achievement of standard VIII students in English" and to test the following null hypothesis.

H_0 11 “There will be no significant difference in the mean score of content knowledge in English examined through CBT of the groups studied with and without OBEn”,

H_0 12 “There will be no significant difference in the mean score of logic in English examined through CBT of the groups studied with and without OBEn”,

H_0 13 “There will be no significant difference in the mean score of divergent thinking in English examined through CBT of the groups studied with and without OBEn”,

H_0 14 “There will be no significant difference in the mean score of comprehension in English examined through CBT of the groups studied with and without OBEn”, and

H_0 15 “There will be no significant difference in the mean score of overall achievement in English examined through CBT of the groups studied with and without OBEn.”

Table 4.21 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group for the achievement in English in terms of content knowledge and table 4.22 shows whether there is any significance different between the stated means or not.

Table: 4.21 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (CBT with OBEn) and Control Group (CBT without OBEn) in English in terms of its Content Knowledge.

OBEn Status	N	Mean	SD	SE
With OBEn	16	52.75	8.74	2.26
Without OBEn	16	24.25	14.16	3.66

From the table 4.21, it was found that the mean score of content knowledge in English through CBT of the group those were studied with OBEn was 52.75 out of total score of 70. The standard deviation from the mean for the content knowledge in English of the same group was found to be 8.74 with standard error of mean of 2.26. From the same table, it was found that the mean score of content knowledge in English examined through CBT of the group studied without OBEn was 24.25. The standard deviation from the mean for the content knowledge in English of the same group was found to be 14.16 with standard error of mean of 3.66.

Considering the mean scores of content knowledge in English of both the groups studied with and without OBEn and examined through CBT, it was found that the mean score of content knowledge in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. "There will be no significant difference in the mean score of content knowledge in English examined through CBT of the groups studied with and without OBEn", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.22 which is followed by analysis.

Table: 4.22 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Content Knowledge.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	379.50	12.50	-4.35	0.00003
Without OBEn	16	148.50			

From table 4.22, it was observed that the sum of rank of groups with OBEn and group without OBEn in English content knowledge were 379.50 and 148.50 respectively with 16 students in each group. The U-value and z-value were found to be 12.50 and -4.35 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.35$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of content knowledge in English examined through CBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their content knowledge in English. Further, referring table 4.21, it could be believed that the group studied with OBEn did significantly better in English content knowledge in comparison to the

group studied without OBEn where both the groups were examined through CBT that may be due to the OBEn.

Table 4.23 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through CBT for the achievement in English in terms of logic and table 4.24 shows whether there is any significance different between the stated means or not.

Table: 4.23 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Logic.

OBEn Status	N	Mean	SD	SE
With OBEn	16	49.50	9.65	2.49
Without OBEn	16	18.00	13.13	3.39

From the table 4.23, it was found that the mean score of logic in English through CBT of the group those were studied with OBEn was 49.50 out of total score of 70. The standard deviation from the mean for the logic in English of the same group was found to be 9.65 with standard error of mean of 2.49. From the same table, it was found that the mean score of logic in English examined through CBT of the group studied without OBEn was 18.00. The standard deviation from the mean for the logic in English of the same group was found to be 13.13 with standard error of mean of 3.39.

Considering the mean scores of logic in English of both the groups studied with and without OBEn and examined through CBT, it was found that the mean score of logic in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of logic in English examined through CBT of the groups studied with and without OBEn”, Mann-

Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.24 which is followed by analysis.

Table: 4.24 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Logic.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	384.00	8.00	-4.52	0.00003
Without OBEn	16	144.00			

From table 4.24, it was observed that the sum of rank of groups with OBEn and group without OBEn in English logic were 384.00 and 144.00 respectively in with 16 students in each group. The U-value and z-value were found to be 8.00 and -4.52 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.52$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of logic in English examined through CBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their logic in English. Further, referring table 4.23, it could be believed that the group studied with OBEn did significantly better in English logic in comparison to the group studied without OBEn where both the groups were examined through CBT that may be due to the OBEn.

Table 4.25 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through CBT for the achievement in English in terms of divergent thinking and table 4.26 shows whether there is any significance different between the stated means or not.

Table: 4.25 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Divergent Thinking.

OBEn Status	N	Mean	SD	SE
With OBEn	16	47.50	9.75	2.52
Without OBEn	16	14.00	11.51	2.97

From the table 4.25, it was found that the mean score of divergent thinking in English through CBT of the group those were studied with OBEn was 47.50 out of total score of 70. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 9.75 with standard error of mean of 2.52 in. From the same table, it was found that the mean score of divergent thinking in English examined through CBT of the group studied without OBEn was 14.00. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 11.51 with standard error of mean of 2.97.

Considering the mean scores of divergent thinking in English of both the groups studied with and without OBEn and examined through CBT, it was found that the mean score of divergent thinking in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of divergent thinking in English examined through CBT of the groups studied with and without OBEn”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.26 which is followed by analysis.

Table: 4.26 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Divergent Thinking.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	386.00	6.00	-4.60	0.00003
Without OBEn	16	142.00			

From table 4.26, it was observed that the sum of rank of groups with OBEn and group without OBEn in English divergent thinking were 386.00 and 142.00 respectively with 16 students in each group. The U-value and z-value were found to be 6.00 and -4.60 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.60$, the two tailed probability was found to be 0.00003which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of divergent thinking in English examined through CBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their divergent thinking in English. Further, referring table 4.25, it could be believed that the group studied with OBEn did significantly better in English divergent thinking in comparison to the group studied without OBEn where both the groups were examined through CBT that may be due to the OBEn.

Table 4.27 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through CBT for the achievement in English in terms of comprehension and table 4.28 shows whether there is any significance different between the stated means or not.

Table: 4.27 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Comprehension.

OBEn Status	N	Mean	SD	SE
With OBEn	16	7.31	1.72	0.44
Without OBEn	16	6.13	2.39	0.62

From the table 4.27, it was found that the mean score of comprehension in English through CBT of the group those were studied with OBEn was 7.31 out of total score of 10. The standard deviation from the mean for the comprehension in English of the same group was found to be 1.72 with standard error of mean of 0.44. From the same table, it was found that the mean score of comprehension in English examined through CBT of the group studied without OBEn was 6.13. The standard deviation from the mean for the comprehension in English of the same group was found to be 2.39 with standard error of mean of 0.62.

Considering the mean scores of comprehension in English of both the groups studied with and without OBEn and examined through CBT, it was found that the mean score of comprehension in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of comprehension in English examined through CBT of the groups studied with and without OBEn”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.28 which is followed by analysis.

Table: 4.28 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Comprehension.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	302.50	89.50	-1.45	0.073
Without OBEn	16	225.50			

From table 4.28, it was observed that the sum of rank of groups with OBEn and group without OBEn in English comprehension were 302.50 and 225.50 respectively with 16 students in each group. The U-value and z-value were found to be 89.50 and -1.45 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -1.45$, the two tailed probability was found to be 0.073 which is greater than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of comprehension in English examined through CBT of the groups studied with and without OBEn" was retained and it could be believed that the groups studied with and without OBEn did not differ stochastically in terms of their comprehension in English and the differences found were by chance. Hence, it can be said that the group studied with OBEn did similar in English with the group studied without OBEn when both the groups were examined through CBT

Table 4.29 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through CBT for the achievement in English in terms of achievement and table 4.30 shows whether there is any significance different between the stated means or not.

Table: 4.29 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Overall Achievement.

OBEn Status	N	Mean	SD	SE
With OBEn	16	62.00	10.95	2.83
Without OBEn	16	32.88	13.67	3.53

From the table 4.29, it was found that the mean score of overall achievement in English through CBT of the group those were studied with OBEn was 62.00 out of total score of 100. The standard deviation from the mean for the overall achievement in English of the same group was found to be 10.95 with standard error of mean of 2.83. From the same table, it was found that the mean score of overall achievement in English examined through CBT of the group studied without OBEn was 32.88. The standard deviation from the mean for the overall achievement in English of the same group was found to be 13.67 with standard error of mean of 3.53.

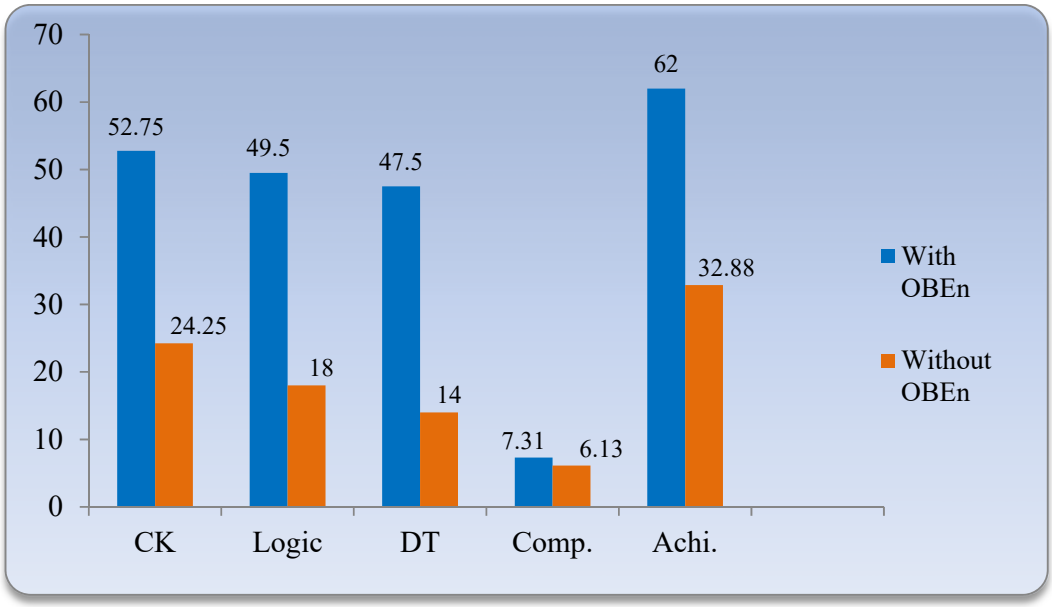
Considering the mean scores of overall achievement in English of both the groups studied with and without OBEn and examined through CBT, it was found that the mean score of overall achievement in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of overall achievement in English examined through CBT of the groups studied with and without OBEn”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.30 which is followed by analysis.

Table: 4.30 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (CBT with OBEn) and Control group (CBT without OBEn) in English in terms of its Overall Achievement.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	378.00	14.00	-4.30	0.00003
Without OBEn	16	150.00			

From table 4.30, it was observed that the sum of rank of groups with OBEn and group without OBEn in English overall achievement were 378.00 and 150.00 respectively with 16 students in each group. The U-value and z-value were found to be 14.00 and -4.30 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.30$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of overall achievement in English examined through CBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their overall achievement in English. Further, referring table 4.29, it could be believed that the group studied with OBEn did significantly better in English overall achievement in comparison to the group studied without OBEn where both the groups were examined through CBT that may be due to the OBEn. The overall comparisons of the means of different components of the English achievement of the groups taught in an OBEn and traditional environment but examined through CBT are shown in figure 4.3.

Figure 4.3: Graph Representing the Mean Score of Content Knowledge (CK), Logic (L), Divergent Thinking (DT), Comprehension (Comp.) and Overall Achievement (Achi.) through CBT in English in an Open Book Environment and Traditional Environment (X axis and Y axis represents different components and mean marks respectively).



From figure 4.1, it can also be seen that there are prominent differences in the mean scores achieved through CBT between the two groups studied with OBEn and without OBEn in all the components content knowledge, logic and overall achievement except comprehension.

4.2.4 EFFECTIVENESS OF OPEN BOOK ENVIRONMENT IN AN OPEN BOOK TESTING

To study the effectiveness of open book environment in a open book testing, the experiment group was taught in the OBEn and the control group was taught in the traditional environment. Half of the experiment group and half of the control group were examined a in a open book test. Obtained data were analyzed with the help of mean, standard deviation, standard error of mean and Mann-Whitney U-test to achieve the objective 6 i.e. "To study the effectiveness of the Open Book Environment (OBEn) in an Open Book Testing (OBT) in terms of content knowledge, logic, divergent thinking, comprehension and overall achievement of standard VIII students in English" and to test the following null hypothesis.

H_0 16 “There will be no significant difference in the mean score of content knowledge in English examined through OBT of the groups studied with and without OBEn”,

H_0 17 “There will be no significant difference in the mean score of logic in English examined through OBT of the groups studied with and without OBEn”,

H_0 18 “There will be no significant difference in the mean score of divergent thinking in English examined through OBT of the groups studied with and without OBEn”,

H_0 19 “There will be no significant difference in the mean score of comprehension in English examined through OBT of the groups studied with and without OBEn”, and

H_0 20 “There will be no significant difference in the mean score of overall achievement in English examined through OBT of the groups studied with and without OBEn.”

Table 4.31 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through OBT for the achievement in English in terms of content knowledge and table 4.32 shows whether there is any significance different between the stated means or not.

Table: 4.31 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (with Open Book Environment (OBEn)) and Open Book Test (OBT) and Control group (without Open Book Environment (OBEn)) and Open Book Test (OBT) in English in terms of its Content Knowledge.

OBEn Status	N	Mean	SD	SE
With OBEn	16	49.31	9.09	2.35
Without OBEn	16	22.50	7.47	1.93

From the table 4.31, it was found that the mean score of content knowledge in English through OBT of the group those were studied with OBEn was 49.31 out of total score of 70. The standard deviation from the mean for the content knowledge in English of the same group was found to be 9.09 with standard error of mean of 2.35. From the same table, it was found that the mean score of content knowledge in English examined through OBT of the group studied without OBEn was 22.50. The standard

deviation from the mean for the content knowledge in English of the same group was found to be 7.47 with standard error of mean of 1.93.

Considering the mean scores of content knowledge in English of both the groups studied with and without OBEn and examined through OBT, it was found that the mean score of content knowledge in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied with OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied with OBEn was also found more than the group studied without OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. "There will be no significant difference in the mean score of content knowledge in English examined through OBT of the groups studied with and without OBEn", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.32 which is followed by analysis.

Table: 4.32 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (with Open Book Environment (OBEn) and Open Book Test (OBT)) and Control group (without Open Book Environment (OBEn) and Open Book Test (OBT)) in English in terms of its Content Knowledge.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	386.50	5.50	-4.62	0.00003
Without OBEn	16	141.50			

From table 4.32, it was observed that the sum of rank of groups with OBEn and group without OBEn in English content knowledge were 386.50 and 141.50 respectively with 16 students in each group. The U-value and z-value were found to be 5.50 and -4.62 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.62$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of content knowledge in English examined through OBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their content knowledge in

English. Further, referring table 4.31, it could be believed that the group studied with OBEn did significantly better in English content knowledge in comparison to the group studied without OBEn where both the groups were examined through OBT that may be due to the OBEn.

Table 4.33 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through OBT for the achievement in English in terms of logic and table 4.34 shows whether there is any significance different between the stated means or not.

Table: 4.33 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (with Open Book Environment (OBEn)) and Open Book Test (OBT) and Control group (without Open Book Environment (OBEn)) and Open Book Test (OBT) in English in terms of its Logic.

OBEn Status	N	Mean	SD	SE
With OBEn	16	44.06	8.93	2.30
Without OBEn	16	17.50	8.35	2.16

From the table 4.33, it was found that the mean score of logic in English through OBT of the group those were studied with OBEn was 44.06 out of total score of 70. The standard deviation from the mean for the logic in English of the same group was found to be 8.93 with standard error of mean of 2.30. From the same table, it was found that the mean score of logic in English examined through OBT of the group studied without OBEn was 17.50. The standard deviation from the mean for the logic in English of the same group was found to be 8.35 with standard error of mean of 2.16.

Considering the mean scores of logic in English of both the groups studied with and without OBEn and examined through OBT, it was found that the mean score of logic in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied with OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied with OBEn was also found more than the group studied without OBEn. To find whether the difference

in the means were significant or by chance and to test the null hypothesis i.e. "There will be no significant difference in the mean score of logic in English examined through OBT of the groups studied with and without OBEn", Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.34 which is followed by analysis.

Table: 4.34 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (with Open Book Environment (OBEn) and Open Book Test (OBT)) and Control group (without Open Book Environment (OBEn) and Open Book Test (OBT)) in English in terms of its Logic.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	386.00	6.00	-4.60	0.00003
Without OBEn	16	142.00			

From table 4.34, it was observed that the sum of rank of groups with OBEn and group without OBEn in English logic were 386.00 and 142.00 respectively with 16 students in each group. The U-value and z-value were found to be 6.00 and -4.60 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.60$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of logic in English examined through OBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their logic in English. Further, referring table 4.33, it could be believed that the group studied with OBEn did significantly better in English logic in comparison to the group studied without OBEn where both the groups were examined through OBT that may be due to the OBEn.

Table 4.35 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through OBT for the achievement in English in terms of divergent thinking and table 4.36 shows whether there is any significance different between the stated means or not.

Table: 4.35 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (with Open Book Environment (OBEn)) and Open Book Test (OBT) and Control group (without Open Book Environment (OBEn)) and Open Book Test (OBT) in English in terms of its Divergent Thinking.

OBEn Status	N	Mean	SD	SE
With OBEn	16	41.63	9.14	2.36
Without OBEn	16	15.50	7.89	2.04

From the table 4.35, it was found that the mean score of divergent thinking in English through OBT of the group and studied with OBEn was 41.63 out of total score of 70. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 9.14 with standard error of mean of 2.36. From the same table, it was found that the mean score of divergent thinking in English examined through OBT of the group studied without OBEn was 15.50. The standard deviation from the mean for the divergent thinking in English of the same group was found to be 7.89 with standard error of mean of 2.04.

Considering the mean scores of divergent thinking in English of both the groups studied with and without OBEn and examined through OBT, it was found that the mean score of divergent thinking in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied with OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied with OBEn was also found more than the group studied without OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of divergent thinking in English examined through OBT of the groups studied with and without OBEn”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.36 which is followed by analysis.

Table: 4.36 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (with Open Book Environment (OBEn) and Open Book Test (OBT)) and Control group (without Open Book Environment (OBEn) and Open Book Test (OBT)) in English in terms of its Divergent Thinking.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	384.00	8.00	-4.52	0.00003
Without OBEn	16	144.00			

From table 4.36, it was observed that the sum of rank of groups with OBEn and group without OBEn in English divergent thinking were 384.00 and 144.00 respectively with 16 students in each group. The U-value and z-value were found to be 8.00 and -4.52 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.52$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of divergent thinking in English examined through OBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their divergent thinking in English. Further, referring table 4.35, it could be believed that the group studied with OBEn did significantly better in English divergent thinking in comparison to the group studied without OBEn where both the groups were examined through OBT that may be due to the OBEn.

Table 4.37 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through OBT for the achievement in English in terms of comprehension and table 4.38 shows whether there is any significance different between the stated means or not.

Table: 4.37 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (with Open Book Environment (OBEn)) and Open Book Test (OBT) and Control group (without Open Book Environment (OBEn)) and Open Book Test (OBT) in English in terms of its Comprehension.

OBEn Status	N	Mean	SD	SE
With OBEn	16	6.75	1.52	0.39
Without OBEn	16	4.63	2.62	0.68

From the table 4.37, it was found that the mean score of comprehension in English through OBT of the group those were studied with OBEn was 6.75 out of total score of 10. The standard deviation from the mean for the comprehension in English of the same group was found to be 1.52 with standard error of mean of 0.39. From the same table, it was found that the mean score of comprehension in English examined through OBT of the group studied without OBEn was 4.63. The standard deviation from the mean for the comprehension in English of the same group was found to be 2.62 with standard error of mean of 0.68.

Considering the mean scores of comprehension in English of both the groups studied with and without OBEn and examined through OBT, it was found that the mean score of comprehension in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of comprehension in English examined through OBT of the groups studied with and without OBEn”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.38 which is followed by analysis.

Table: 4.38 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (with Open Book Environment (OBEn) and Open Book Test (OBT)) and Control group (without Open Book Environment (OBEn) and Open Book Test (OBT)) in English in terms of its Comprehension.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	325.50	66.50	-2.32	0.010
Without OBEn	16	202.50			

From table 4.38, it was observed that the sum of rank of groups with OBEn and group without OBEn in English comprehension were 325.50 and 202.50 respectively with 16 students in each group. The U-value and z-value were found to be 66.50 and -2.32 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -2.32$, the two tailed probability was found to be 0.01 which is equal to the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of comprehension in English examined through OBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their comprehension in English. Further, referring table 4.37, it could be believed that the group studied with OBEn did significantly better in English comprehension in comparison to the group studied without OBEn where both the groups were examined through OBT that may be due to the OBEn.

Table 4.39 depicts the comparison of mean, standard deviation and standard error of means between the experiment group and control group and both the groups examined through OBT for the achievement in English in terms of achievement and table 4.40 shows whether there is any significance different between the stated means or not.

Table: 4.39 Distribution of Mean, Standard Deviation (SD) and Standard Error of Mean (SE) of the Experiment Group (with Open Book Environment (OBEn)) and Open Book Test (OBT) and Control group (without Open Book Environment (OBEn)) and Open Book Test (OBT) in English in terms of its Overall Achievement.

OBEn Status	N	Mean	SD	SE
With OBEn	16	60.13	9.50	2.45
Without OBEn	16	32.75	10.86	2.80

From the table 4.39, it was found that the mean score of overall achievement in English through OBT of the group those were studied with OBEn was 60.13 out of total score of 100. The standard deviation from the mean for the overall achievement in English of the same group was found to be 9.50 with standard error of mean of 2.45. From the same table, it was found that the mean score of overall achievement in English examined through OBT of the group studied without OBEn was 32.75. The standard deviation from the mean for the overall achievement in English of the same group was found to be 10.86 with standard error of mean of 2.80.

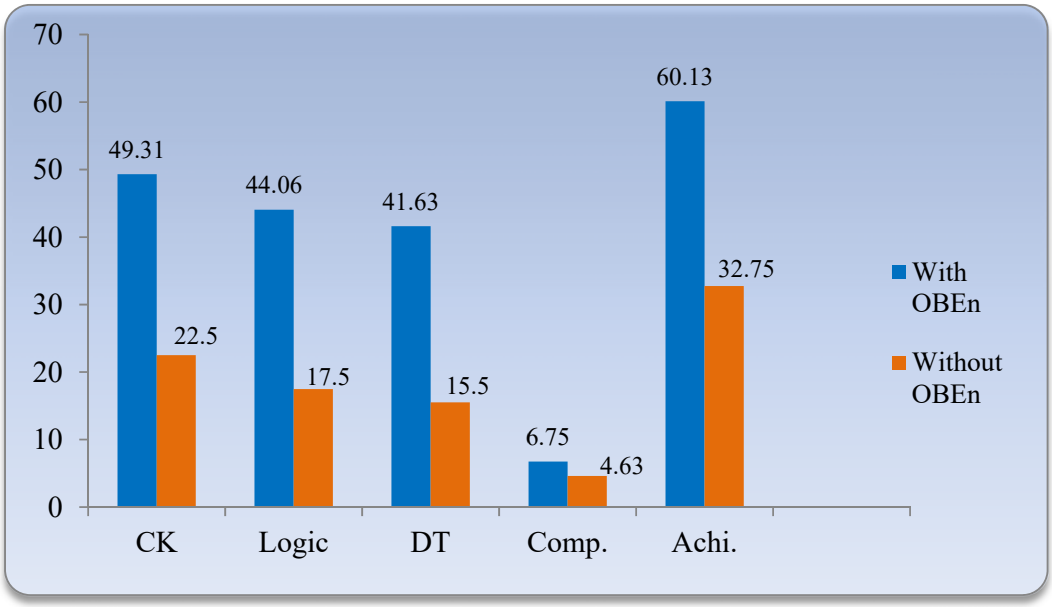
Considering the mean scores of overall achievement in English of both the groups studied with and without OBEn and examined through OBT, it was found that the mean score of overall achievement in English of the group studied with OBEn was higher than that of the group studied without OBEn. Comparing the standard deviations of both the groups it could be said that the group studied without OBEn was more heterogeneous in comparison to the other group. Similarly, the standard error of the mean of the group studied without OBEn was also found more than the group studied with OBEn. To find whether the difference in the means were significant or by chance and to test the null hypothesis i.e. “There will be no significant difference in the mean score of overall achievement in English examined through OBT of the groups studied with and without OBEn”, Mann-Whitney U-test was used. The summary of the Mann-Whitney U-test is given in table 4.40 which is followed by analysis.

Table: 4.40 Distribution of Sum of the Ranks (SR), U-Value (U), Z-Value (Z) and Indicator of Significance of the Experiment Group (with Open Book Environment (OBEn) and Open Book Test (OBT)) and Control group (without Open Book Environment (OBEn) and Open Book Test (OBT)) in English in terms of its Overall Achievement.

OBEn Status	N	SR	U-Value	Z -Value	Probability (P)
With OBEn	16	382.00	10.00	-4.45	0.00003
Without OBEn	16	146.00			

From table 4.40, it was observed that the sum of rank of groups with OBEn and group without OBEn in English overall achievement were 382.00 and 146.00 respectively with 16 students in each group. The U-value and z-value were found to be 10.00 and -4.45 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_o) of z, for $z \leq -4.45$, the two tailed probability was found to be 0.00003 which is smaller than the decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. "There will be no significant difference in the mean score of overall achievement in English examined through OBT of the groups studied with and without OBEn" was rejected and it could be believed that the groups studied with and without OBEn differ stochastically in terms of their overall achievement in English. Further, referring table 4.39, it could be believed that the group studied with OBEn did significantly better in English overall achievement in comparison to the group studied without OBEn where both the groups were examined through OBT that may be due to the OBEn. The overall comparisons of the means of different components of the English achievement of the groups taught in an OBEn and traditional environment but examined through OBT are shown in figure 4.4.

Figure 4.4: Graph Representing the Mean Score of Content Knowledge (CK), Logic (L), Divergent Thinking (DT), Comprehension (Comp.) and Overall Achievement (Achi.) through OBT in English in an Open Book Environment and Traditional Environment (X axis and Y axis represents different components and mean marks respectively).



From figure 4.4, it can also be seen that there are significant differences in the mean scores achieved through OBT between the two groups studied with OBEn and without OBEn in all the components like content knowledge, logic, overall achievement and comprehension.

Table 4.41 shows a comprehensive view of the total analysis so far done in the present study to realize different objectives.

Table: 4.41: Comprehensive result with respect to different Objectives in Terms of different Components in English (CK: Content Knowledge, L: Logic, DT: Divergent Thinking, Comp.: Comprehension and Overall Achievement)

Objectives of the Present Study	Results in Various Components				
	CK	**L**	**DT**	**Comp.**	**Overall Achi.**
Objective 3 CBT and OBT in a traditional Environment.	No significant difference in Means	No significant difference in Means	No significant difference in Means	No significant difference in Means	No significant difference in Means
Objective 4 CBT and OBT in an OBEn.	No significant difference in Means	No significant difference in Means	No significant difference in Means	No significant difference in Means	No significant difference in Means
Objective 5 CBT in an OBEn and Traditional Environment.	Significant difference in Means	Significant difference in Means	Significant difference in Means	No significant difference in Means	Significant difference in Means
Objective 6 OBT in an OBEn and Traditional Environment.	Significant difference in Means	Significant difference in Means	Significant difference in Means	Significant difference in Means	Significant difference in Means

From the table 4.41, it is clear that there is no significant difference between the mean scores in all the components of English achievement in traditional environment when examined through CBT and OBT. Even in an open book environment, there is no significant difference in the mean scores of the different components of English achievement when examined through CBT and OBT. From the same table it is observed that there is significant difference between the means of the groups taught through OBEn and traditional Environment in all the components of English achievement except comprehension when examined through CBT. Similarly, there is significant difference between the means of the groups taught through OBEn and traditional Environment in all the components of English achievement when examined through OBT.

Hence, from the table 4.41, it could be concluded that there is similar result in CBT and OBT whatever may be the environment either traditional environment or OBEn. It can also be said that in a similar environment there is no much difference in CBT and OBT. On the other hand, OBEn was found to be significantly better in comparison to traditional environment in all most all the components of English achievement both in OBT and CBT.

4.3.0 EFFECTIVENESS OF THE OPEN BOOK EXAMINATION IN TERMS OF THE REACTION OF STUDENTS

To achieve objective 7 i.e. "To study the effectiveness of the Open Book Examination in terms of the reaction of Students." data were collected from the sample of experiment group where the developed OBEn was implemented. Data were collected through a Likert type five point reaction scale. Collected data were analyzed using percentage and Intensity Index (II) which is given in table 4.42.

Table 4.42: Summary of the Reactions of Students towards the Statements related to implementation OBEn and OBT in terms of Percentage Response and Intensity Index (II)

Sl No	Statements	SA	A	UD	DA	SDA	II
1.	I liked the teaching of English by our teacher in open book environment.	43.8	53.1	3.1	0	0	4.4
2.	Teaching of English in open book environment developed my listening, speaking, reading and writing skills.	53.1	37.5	6.3	0	3.1	4.4
3.	Teaching of English in open book environment helped me in better learning of the subject.	18.8	50	28.1	0	3.1	3.8
4.	Teaching of English through open book environment was quite interesting.	68.8	28.1	3.1	0	0	4.7
5.	I liked to work with cognitive questions given in the group.	34.4	50	15.6	0	0	4.2

Sr No	Statements	SA	A	UD	DA	SDA	II
6.	Cognitive questions given in different chapter of English were interesting.	25	59.4	12.5	0	3.1	4.0
7.	Cognitive questions helped me and my group to think divergently.	31.3	46.9	18.8	3.1	0	4.1
8.	It was interesting to find answers of the cognitive questions.	43.8	37.5	12.5	6.3	0	4.2
9.	I liked the group activities as it helped to think logically and stimulate my mind to imagine.	53.1	31.3	12.5	3.1	0	4.3
10.	Solving cognitive questions and presenting that in the whole class helped to develop my level of confidence.	28.1	56.3	12.5	3.1	0	4.1
11.	Solving cognitive questions in group helped me to develop my communication skills.	34.4	43.8	18.8	3.1	0	4.1
12.	I liked the way my teacher and friends appreciate our group work.	37.5	37.5	21.9	3.1	0	4.1
13.	Power Point Presentation in English during open book environment was interesting to us.	46.9	34.4	15.6	0	3.1	4.2
14.	Power Point Presentation in English during open book environment helped us to understand the text easily.	31.3	50	12.5	0	6.3	4
15.	We came to know many more information about the writer, poet and their main works through power point presentation (PPT) and video clips during open book environment.	34.4	31.3	25	9.4	0	3.9

Sr No	Statements	SA	A	UD	DA	SDA	II
16.	There was a proper coordination between power point presentation and the explanation by the teacher during open book environment.	31.3	31.3	34.4	3.1	0	3.9
17.	I liked the way freedom was given to us during the teaching through open book environment.	53.1	25	18.8	3.1	0	4.3
18.	Freedom given to us during the teaching through open book environment helped us to increase our confidence level.	40.6	43.8	9.4	3.1	3.1	4.2
19.	Freedom given to us during the teaching through open book environment helped us to be self disciplined.	28.1	46.9	18.8	3.1	3.1	3.9
20.	Learning through open book environment developed our decision making skills.	34.4	40.6	21.9	3.1	0	4.1
21.	Concept mapping during open book environment helped use to remember things easily.	31.3	37.5	28.1	3.1	0	4.0
22.	Learning in an open book environment would help in minimizing rote learning.	31.3	46.9	18.8	0	3.1	4.0
23.	Learning in an open book environment will help me to realize my own capacity.	40.6	43.8	15.6	0	0	4.3
24.	Working with groups in open book environment helped me to be cooperative.	40.6	46.9	9.4	0	3.1	4.2
25.	Learning in an open book environment is better than our traditional learning environment.	43.8	25	18.8	12.5	0	4

Sr No	Statements	SA	A	UD	DA	SDA	II
26.	I liked answering questions during the open book testing.	37.5	53.1	9.4	0	0	4.3
27.	Answering questions in the open book testing helped to reduce my fear for examination.	37.5	37.5	15.6	9.4	0	4.0
28.	I got the answers of the questions from my notes and books asked during the examination of open book environment.	28.1	31.3	21.9	12.5	6.3	3.6
29.	I liked the whole concept of open book examination starting from teaching to the testing.	50	31.3	9.4	3.1	6.3	4.2
30.	The open book examination is a better alternative to our traditional system of examination.	43.8	21.9	15.6	15.6	3.1	3.9
						Over all Reaction	4.1

SA-Strongly Agree**, A-**Agree**, UD-**Undecided**, DA-** Disagree**, SDA-**Strongly Disagree**, II-** Intensity Index

In terms of the reaction of the students towards the **statement 1** i.e. "I liked the teaching of English by our teacher in open book environment", 43.8 %, 53.1 % and 3.1 % of them reacted strongly agree, agree and undecided respectively. The intensity index of 4.4 showed favorable reaction of students towards the OBEn in terms of their liking and feeling of enjoyment towards the learning process in the OBEn.

For the **statement 2** i.e. "Teaching of English in open book environment developed my listening, speaking, reading and writing skills", 53.1 %, 37.5 %, 6.3 % and 3.1 % of them reacted strongly agree, agree, undecided and strongly disagree respectively. The intensity index of 4.4 showed favorable reaction of students towards the OBEn that helped them for enhancing theire listening, speaking, reading and writing skills.

For **statement 3** i.e. "Teaching of English in open book environment helped me in better learning of the subject", 18.8 %, 50 %, 28.1 % and 3.1 % of them reacted

strongly agree, agree, undecided and strongly disagree respectively. The intensity index of 3.8 showed favorable reaction of students towards the OBEn in terms of better learning of the subject.

In terms of the reaction of the students towards the **statement 4** i.e. “Teaching of English through open book environment was quite interesting”, 68.8 %, 28.1 % and 3.1 % of them reacted strongly agree, agree and undecided respectively. The intensity index of 4.7 showed strongly favorable reaction of students towards the OBEn which was implemented throughout the whole year with lots of group activities with great interest while the students were performing these tasks.

For the **statement 5** i.e. “I liked to work with cognitive questions given in the group”, 34.4%, 50% and 15.6% of them reacted strongly agree, agree and undecided respectively. The intensity index of 4.2 showed favorable reaction of the student towards the cognitive questions which were given in the group.

In terms of the reaction of the students towards the **statement 6** i.e. “Cognitive questions given in different chapter of English were interesting”, 25%, 59.4%, 12.5% and 3.1% of them reacted strongly agree, agree, undecided, and strongly disagree respectively. The intensity index of 4.0 showed favorable reaction of students regarding the cognitive questions of different chapter of English and these question were interesting to them.

In terms of the reaction of the students towards the **statement 7** i.e. “Cognitive questions helped me and my group to think divergently”, 31.3%, 46.9%, 18.8% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.1 showed favorable reaction of students towards the cognitive questions which helped them and their group to think divergently.

In terms of the reaction of the students towards the **statement 8** i.e. “It was interesting to find answers of the cognitive questions”, 43.8%, 37.5%, 12.5% and 6.3% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.2 showed favorable reaction of students regarding the finding answer of the cognitive questions with interest.

For the **statement 9** i.e. “I liked the group activities as it helped to think logically and stimulate my mind to imagine”, 53.1%, 31.3%, 12.5% and 3.1% of them reacted

strongly agree, agree, undecided and disagree respectively. The intensity index of 4.3 showed favorable reaction of students towards the group activities, ability to think logically and the power of imagination.

In terms of the reaction of the students towards the **statement 10** i.e. “Solving cognitive questions and presenting that in the whole class helped to develop my level of confidence”, 28.1%, 56.3%, 12.5% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.1 showed favorable reaction of students towards the developing of their level of confidence due to solving cognitive questions and presenting that in front of the whole class.

For the **statement 11** i.e. “Solving cognitive questions in group helped me to develop my communication skills”, 34.4%, 43.8%, 18.8% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.1 showed favorable reaction of students towards group work through cognitive questions in the OBEn in realizing the fact that they developed their communication skill while discussing in the group.

For the **statement 12** i.e. “I liked the way my teacher and friends appreciate our group work”, 37.5%, 37.5%, 21.9% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.1 showed favorable reaction of the student towards group works which were appreciated by their peers and teacher.

In terms of the reaction of the students towards the **statement 13** i.e. “Power Point Presentation in English during open book environment was interesting to us”, 46.9%, 34.4%, 15.6% and 3.1% of them reacted strongly agree, agree, undecided and strongly disagree respectively. The intensity index of 4.2 showed favorable reaction of students towards the power point presentation and discussion of the text by the teacher.

In terms of the reaction of the students towards the **statement 14** i.e. “Power Point Presentation in English during open book environment helped us to understand the text easily”, 31.3%, 50%, 12.5% and 6.3% of them reacted strongly agree, agree, undecided and strongly disagree respectively. The intensity index of 4 showed favorable reaction of students regarding the use of technological aids by their teacher

during the teaching process in the OBEn that made their learning better and very effectively.

In terms of the reaction of the students towards the **statement 15** i.e. “We came to know many more information about the writer, poet and their main works through power point presentation (PPT) and video clips during open book environment”, 34.4%, 31.3%, 25% and 9.4% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 3.9 showed favorable reaction of students towards the detail discussion regarding the writer, poet and their main works in the OBEn that helped them to get more information related to the text.

In terms of the reaction of the students towards the **statement 16** i.e. “There was a proper coordination between power point presentation and the explanation by the teacher during open book environment”, 31.3%, 31.3%, 34.4% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 3.9 showed favorable reaction of students towards the discussion and presentation in front of whole class used in the OBEn that helped them to integrate the textual knowledge properly.

In terms of the reaction of the students towards the **statement 17** i.e. “I liked the way freedom was given to us during the teaching through open book environment”, 53.1%, 25%, 18.8% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.3 showed favorable reaction of students towards the OBEn in terms of their feeling that helped them to think freely.

For the **statement 18** i.e. “Freedom given to us during the teaching through open book environment helped us to increase our confidence level”, 40.6%, 43.8%, 9.4%, 3.1%, and 3.1% of them reacted strongly agree, agree, undecided, disagree and strongly disagree respectively. The intensity index of 4.2 showed favorable reaction of students towards the OBEn in terms of their feeling that it helped them becoming confident and to performed better.

In terms of the reaction of the students towards the **statement 19** i.e. “Freedom given to us during the teaching through open book environment helped us to be self disciplined”, 28.1%, 46.9%, 18.8%, 3.1% and 3.1% of them reacted strongly agree, agree, undecided, disagree and strongly disagree respectively. The intensity index of

3.9 showed favorable reaction of students towards the self disciplined that was maintained in the group work, sharing the ideas with their peers and teacher.

In terms of the reaction of the students towards the **statement 20** i.e. “Learning through open book environment developed our decision making skills”, 34.4%, 40.6%, 21.9% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4.1 showed favorable reaction of students towards the changing attitude and behavior in the OBEn as they were capable of making decision in a conflict situation.

For the **statement 21** i.e. “Concept mapping during open book environment helped use to remember things easily”, 31.3%, 37.5%, 28.1% and 3.1% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4 showed favorable reaction of students towards the concept mapping techniques in the OBEn in making the whole content in image like diagram in the mind.

For the **statement 22** i.e. “Learning in an open book environment would help in minimizing rote learning”, 31.3%, 46.9%, 18.8% and 3.1% of them reacted strongly agree, agree, undecided and strongly disagree respectively. The intensity index of 4 showed favorable reaction of the student towards the changing nature of the learning in the OBEn helped them to understand the concepts rather than memorizing the answers of the questions.

For the **statement 23** i.e. “Learning in an open book environment will help me to realize my own capacity”, 40.6%, 43.8% and 15.6% of them reacted strongly agree, agree and undecided respectively. The intensity index of 4.3 showed favorable reaction of students towards the OBEn that helped the students to realized their strength and capabilities in terms of learning English language.

For the **statement 24** i.e. “Working with groups in open book environment helped me to be cooperative”, 40.6%, 46.9%, 9.4% and 3.1% of them reacted strongly agree, agree, undecided and strongly disagree respectively. The intensity index of 4.2 showed favorable reaction of students towards the OBEn that helped them to work in group.

For the **statement 25** i.e. “Learning in an open book environment is better than our traditional learning environment”, 43.8%, 25%, 18.8% and 12.5% of them reacted

strongly agree, agree, undecided and disagree respectively. The intensity index of 4 showed favorable reaction of students towards the advantages of OBEn as it gives less stress to students in comparison to their traditional close book examination.

For the **statement 26** i.e. “I liked answering questions during the open book testing”, 37.5%, 53.1% and 9.4% of them reacted strongly agree, agree and undecided respectively. The intensity index of 4.3 showed favorable reaction of students towards the advantages OBEn that prepared them for the OBT.

For the **statement 27** i.e. “Answering questions in the open book testing helped to reduce my fear for examination”, 37.5%, 37.5%, 15.6% and 9.4% of them reacted strongly agree, agree, undecided and disagree respectively. The intensity index of 4 showed favorable reaction of students towards the OBT that reduces the examination fear and anxiety due to the OBEn that prepared the students optimally based on better understanding.

For the **statement 28** i.e. “I got the answers of the questions from my notes and books asked during the examination of open book environment”, 28.1%, 31.3%, 21.9%, 12.5% and 6.3% of them reacted strongly agree, agree, undecided, disagree and strongly disagree respectively. The intensity index of 3.6 showed unfavorable reaction of students towards the nature of the OBT.

For the **statement 29** i.e. “I liked the whole concept of open book examination starting from teaching to the testing”, 50%, 31.3%, 9.4%, 3.1% and 6.3% of them reacted strongly agree, agree, undecided, disagree and strongly disagree respectively. The intensity index of 4.2 showed favorable reaction of students towards the OBEn and open book test (OBT).

For the **statement 30** i.e. “The open book examination is a better alternative to our traditional system of examination”, 43.8%, 21.9%, 15.6%, 15.6% and 3.1% of them reacted strongly agree, agree, undecided, disagree and strongly disagree respectively. The intensity index of 3.9 showed favorable reaction of students towards the OBEn and OBT. It showed the paradigm shift in the attitude of students towards their own teaching learning process.

The average intensity index of 4.1 showed favorable reaction of students towards the whole OBE. It showed that students liked both OBEn and OBT.

Considering the reaction towards all the 30 statements in the reaction scale and the average reaction of students, it was found that in all the statements, the reaction of students were favourable towards different aspects of the OBEn and OBT. Hence, it can be said that the developed OBEn was found to be effective in terms of the reaction of students.

4.4.0 FINDINGS OF THE STUDY

On the basis of the analysis and interpretation of data the following findings were drawn.

1. Students taught in a traditional environment scored measurably in all the components of English achievement when tested either through CBT or OBT.
2. Students taught in an open book environment scored good in all the components of English achievement when tested either through CBT or OBT. The same group also scored better than the group taught in a traditional environment in all the components of English achievement when tested either through CBT or OBT.
3. In a traditional environment, students score similar in English content knowledge when examined through either CBT or OBT.
4. In a traditional environment, students score similar in English logic when examined through either CBT or OBT.
5. In a traditional environment, students score similar in English divergent thinking when examined through either CBT or OBT.
6. In a traditional environment, students score similar in English comprehension when examined through either CBT or OBT.
7. In a traditional environment, students score similar in English overall achievement when examined through either CBT or OBT.
8. In an OBEn, students score similar in English content knowledge when examined through either CBT or OBT.

9. In an OBEn, students score similar in English logic when examined through either CBT or OBT.

10. In an OBEn, students score similar in English divergent thinking when examined through either CBT or OBT.

11. In an OBEn, students score similar in English comprehension when examined through either CBT or OBT.

12. In an OBEn, students score similar in English overall achievement when examined through either CBT or OBT.

13. Group scored significantly better in English content knowledge in an OBEn in comparison to a traditional environment when both the groups were examined through CBT.

14. Group scored significantly better in English logic in an OBEn in comparison to a traditional environment when both the groups were examined through CBT.

15. Group scored significantly better in English divergent thinking in an OBEn in comparison to a traditional environment when both the groups were examined through CBT.

16. Group scored significantly better in English comprehension in an OBEn in comparison to a traditional environment when both the groups were examined through CBT.

17. Group scored significantly better in English overall achievement in an OBEn in comparison to a traditional environment when both the groups were examined through CBT.

18. Group scored significantly better in English content knowledge in an OBEn in comparison to a traditional environment when both the groups were examined through OBT.

19. Group scored significantly better in English logic in an OBEn in comparison to a traditional environment when both the groups were examined through OBT.

20. Group scored significantly better in English divergent thinking in an OBEn in comparison to a traditional environment when both the groups were examined through OBT.

21. Group scored significantly better in English comprehension in an OBEn in comparison to a traditional environment when both the groups were examined through OBT.

22. Group scored significantly better in English overall achievement in an OBEn in comparison to a traditional environment when both the groups were examined through OBT.

23. Reaction of students towards the OBEn and the OBT were found effective in terms of their positively agreed response in all of the components related to OBEn and OBT separately and as a whole.

4.5.0 DISCUSSION

One of the findings of the study revealed that students taught in a traditional environment scored measurably in all the components of English achievement and students taught in an open book environment scored compartively good in all the components of English achievement when tested either through OBT or CBT. It depicts that in a traditional environment students found it very difficult to answer the questions of higher order thinking (HOT) when tested either through OBT or CBT. It also depicts that in an OBEn students are able to answer the questions of higher order thinking (HOT) better when tested either through OBT or CBT. Here the credit goes to OBEn.

From the findings of the present study it can be said that examination pattern either OBT or the CBT did not differ significantly while the environment was same. In the present study, OBT was not found effective in enhancing content knowledge, logic, divergent thinking, comprehension and overall achievement of English when the environment is the same which was supported with the findings of the studies like Pauker (1974), Loannidou (1997), Vyas and Vyas (2009), Biswal and Das (2011) and Zulfia (2013). The present study also reveals that if the questions of higher order thinking, there would be no difference in the English achievement of students whether it is OBT or CBT. But the researcher has found one study conducted by

Gupta (2011) which showed that in the same environment students scored higher in OBT than CBT in terms of their overall academic achievement. It may be due to the framing of the lower order thinking achievement tests where students can get direct answers from the books or notes. It suggests that questions in the OBT should be asked on higher order thinking. Thus, answer of any question would not be found in the book directly and students have to write answer from their own. Many people have the misconception that OBT helps the students to score high. But the present study reveals that for better performance in the OBT a thorough preparation is needed to create an environment to train students for OBT with questions of higher order thinking. Therefore, present classroom practice has to be modified and an environment should be prepared where such type of practices would be done.

In the present research the developed teaching learning environment for teaching English played an important role for enhancing the overall achievement in the OBT. In other words, it was not the examination but the environment that made the differences in learning among the students. In the present research work, OBEn was found significantly effective in enhancing content knowledge, logic, divergent thinking and overall achievement in English. It nullified the belief that OBT enhance student achievement which was drawn from the studies conducted by Krarup, Naeraa and Olsen (1974), Francis (1982) and Agarwal et al. (2007) and Ranjan (2011). The reasons for enhancing scores in the open book test may be due to the impact of OBEn on learning habit of students (Loi & Teo, 1999), high degree study behaviour of students (Theophilides & Kontselini, 2000), less anxiety (Brightwell, Daniel & Stewart, 2004; Vyas & Vyas, 2009) and less stress (Chan & Mui, 2004), deeper and enriched learning (William & Wang, 2007), favourable attitude of teachers (Chaudhary, 2009; Thaker, 2009; Rekhakumari, 2011; Gamit, 2013). It could be said that to do well in the examinations of higher order thinking, students need to develop their thinking style and logic pattern. It does not matter if it is a CBT or OBT. There is a need for specific teaching learning environment to train students in thinking to do well in the questions of higher order thinking which was supported by the studies conducted by Loannidou (1997), Chatterjee (2014), Biswal (2015) and Das (2015).

OBEn was found effective in terms of the favourable reactions of students as students taught through OBEn showed their positive response in all the components separately and as a whole. This result is also supported by the findings reported by Williams &

Wong (2007), Block (2012) and Gharib et. al.(2012). The positive responses of the students towards OBEn could be due to the acceptance by the students (Eilersten & Valdermo, 2000) and more freedom to the students in OBEn for learning and thinking about the contents at their own. The other reasons could be the relevance of the lesson plans, teaching-learning, planned and collaborative activities, working and sharing ideas in group, use of audio-visual aids and strategy of divergent thinking and logic that allowed students to think and imagine outside the boundary of content. It was also observed that the students were more interested and involved in OBEn. This may be due to the fact that the students remain active in the OBEn and they learns the language from the teacher, from themselves working in the groups and using their thinking abilities emphasizing less on the rote memorization.