Comparative Analysis of Reaction of Students on Final Version of Computer Assisted Instruction for Teaching Arithmetic with Different Modes

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ABSTRACT: *Investigators conducted a True Experimental study to compare the academic performance of students in class VIII in one of the English Medium School of Vadodara, India among traditional instruction, only Computer Assisted Instruction (CAI) and Computer Assisted Instruction with simultaneous discussion. The design used in this study was posttest only control group design. Three sections of class VIII students were selected and groups were randomly allotted. Students studied through their respective methods till the completion of the selected topic. Reaction scale was developed and administered to the experimental group students to know their opinion on the developed CAI. Chi-square was used for data analysis. The analysis revealed that students liked their respective way of learning.*

Keywords – Abstract, Auto Instructional Material, Computer Assisted Instruction, simultaneous discussion and Symbolic Language.

I. INTRODUCTION

Mathematics is a special subject symbol occupies a very important role in it. The nature of mathematics makes difficult for the students to learn. [1] Success or failure in a mathematics course has a strong influence on students' choice of major and whether they graduate and qualify for meaningful jobs. Mathematics is an abstract subject. [2]The reasoning in mathematics possesses a number of characteristics, namely, characteristics of accuracy, verification of results, certainty of results, similarity to reasoning in life, originality. All these characteristics automatically become a part and parcel of a child when he learns mathematics. Mathematics is a symbolic language. Students find it difficult to understand mathematics because of symbols and abstractness. [3]Patel in her study specifies that one of the reasons for the selection of commerce stream was that students felt science stream to be difficult, as it requires a lot of hard work to be put in. The study also stated that few of the students who earlier took up science stream later on got shifted to commerce stream, as they could not cope up with Physics and Mathematics. [4] Ours and previous few generations have failed to produce good mathematics teachers at school level in adequately large numbers. If a boy or girl is taught by a bad mathematics teacher he will be worse off than not being taught it at all. The corpus of this enormous knowledge that man built over the last few centuries will be too burdensome to carry into future on the shoulders of ill-equipped school Mathematics teachers. As the twenty first century advances we need technically skilled human resource to take up new job opportunities. Mathematics is important to develop human resource in this direction. Students find it difficult to learn mathematics because of the nature of the subject. [5] In order to overcome the difficulties faced by the students, teacher should adopt different methodology in teaching of mathematics like drill method, using different audio visual aids, computer aided instruction, mathematical club etc. One of the methods is auto-instructional method. It is a method of individualized instruction. One of its forms is CAI (Computer Assisted/Aided Instruction) auto instructional teaching. It is very useful to the teachers and the students as it lessens the burden of teaching and learning and it makes teaching and learning interesting. It also helps the students to learn at their own pace and at their own convenience. It motivates the students and increases the enthusiasm of the students. In this method students read different frames and answer the questions that follow and by this way they learn automatically. Even the learning that takes place through CAI is accurate and untiring. The most beneficial part of CAI is it provides the mixture of wide range of visual, graphics and pictures to make the teaching learning more interesting. Investigators developed CAI and found its effectiveness in one of the school of Vadodara. CAI was modified and final version was prepared according to the comments of students, Mathematics teachers and investigators observation. The final version was used in the experiment conducted in another school of Vadodara, India.

II. RATIONALE OF THE STUDY

[6]Author have studied the low results in mathematics at Secondary Examination in Rajasthan and found that the cause of failure was non-availability of mathematics teachers due to late appointments and frequent teacher transfers; lack of appropriate classrooms. [7]Author has found the causes responsible for under achievements were gaps in knowledge of concepts, difficulties in understanding of mathematics language. These studies clearly show that students find difficulty in learning mathematics and there is a need to develop some self learning material to make learning easy. These studies show that students find it difficult to learn Mathematics. Many studies have been conducted to find out the effectiveness of CAI in terms of achievement of the students in learning. [8] Author found that experimental group performed better on post test. The studies conducted by authors [9-18] showed that CAI was effective than conventional method. [20]Author in his study found that mathematics learning through CAI with Peer Instruction (CAIPI) was effective on posttest. [21]Author found that there was no statistically significant difference in the posttest scores of students receiving traditional instruction and traditional instruction supplemented with computer-assisted instruction. All the above stated research are conducted is subject other than mathematics. There were only three studies related to mathematics one was related to higher mathematics and other two are related to school mathematics and these two compared the traditional method and CAI. As per the review above there was no research related to arithmetic part of mathematics and related to upper primary section. Investigators felt the need to conduct a research in arithmetic part of mathematic in upper primary section and with different modes.

III. METHODOLOGY OF THE STUDY

A. *The Present Study Entitles*

Comparative Analysis on Reaction of Students on Final Version of Computer Assisted Instruction for Teaching Arithmetic with Different Modes

B. *Objectives of the Study*

- To study the effectiveness of the developed CAI in terms of Experimental Group A (only CAI) (Exp A) students' response to the reaction scale.
- To study the effectiveness of the developed CAI in terms of Experimental Group B (CAI with simultaneous Discussion) (Exp B) students' response to the reaction scale.
- To study the relative effectiveness of the developed CAI in terms of Experimental Group A (only CAI) students' response to the reaction scale and that of Experimental Group B(CAI with simultaneous Discussion).

C. *Hypotheses of the Study*

H_0: *There is no significant difference between Experimental group A and Experimental group B towards effectiveness of the developed CAI.*

D. *Delimitation of the Study*

The present study was delimited to standard VIII English Medium GSHSEB students and only arithmetic unit of the mathematics textbook in the year 2010 was covered during experimentation of the present study.

E. *Design of the Study*

The study adopts the post test only control group design.

F. *Population of the Study*

There are 61 grant-in-aid schools in the city of Vadodara, functioning under the Gujarat State Board of secondary and Higher Secondary Education (GSHSEB) following the rules and regulations laid by the Ministry of Human Resources of the Government of India. The population of the study consists of all the Standard VIII English medium students of GSHSEB of Vadodara city in the year 2010.

G. *Sample and Procedure of the Study*

One school in the urban area was selected on the basis of the computer facilities available in their campus for conducting the experiment. Random sampling technique was used to select groups by the researchers in this study. The experimental group A consisted of 30 students and experimental group B consisted of 35 students. Experimental Group A studied through the developed CAI. Experimental Group B studied through the developed CAI along with simultaneous discussions. The total sample for the experiment consisted of 65 students. Students in both the groups learned the same topics viz 'Profit and Loss' and 'Simple and Compound Interest' through the respective instructional strategy. Experiment time duration was 30 periods in both the groups.

H. *Tools for Data Collection*

1) Computer Assisted Instruction developed by the Investigator and modified according to the advice given by experts in mathematics, mathematics education, English and Computer Science 2) Reaction Scale developed by the Investigator and modified according to the advice given by the expert in English.

I. Plan and Procedure of Data Collection

        Step 1: One of the English medium school of Vadodara, India following GSHSEB syllabus class VIII students were selected purposively having the required facility to conduct the experiment.

        Step 2: Students were divided randomly into three groups control group taught by usual conventional method, Experimental Group A (only CAI) and Experimental Group B(CAI with simultaneous discussion).

        Step 3: Students were taught in their respective methods for month till the completion of the selected arithmetic unit.

        Step 4: Reaction scale was administered to the students and their response was collected and analysed.

IV. DATA ANALYSIS

        Data were analyzed through the statistical technique χ^2.The Chi Square statistic compares the tallies or counts of categorical responses between two (or more) independent groups.

        [19] Chi-square is a statistical test commonly used to compare observed data with data we would expect to obtain according to a specific hypothesis. Then we might want to know about the "goodness to fit" between the observed and expected. Were the deviations (differences between observed and expected) the result of chance, or were they due to other factors. How much deviation can occur before you, the investigator, must conclude that something other than chance is at work, causing the observed to differ from the expected? The chi-square test is always testing what scientists call the **null hypothesis,** which states that there is no significant difference between the expected and observed result.

Most common application for chi-squared is in comparing observed counts of particular cases to the expected counts.

We can calculate X^2:

$$X^2 = \frac{(x_1 - E_1)^2}{E_1} + \frac{(x_2 - E_2)^2}{E_2} + \cdots + \frac{(x_k - E_k)^2}{E_k}$$
$$= \sum_{i=1}^{k} \frac{(x_i - E_i)^2}{E_i}$$

Comparative Analysis of Reaction Scale

Table 1: Positive Polarity Statements are given Points as follows

Response	Strongly Agree	Agree	Not Decided	Disagree	Strongly Disagree
Points	5	4	3	2	1

Table 2: Negative polarity statements are given points as follows

Response	Strongly Disagree	Disagree	Not Decided	Agree	Strongly Agree
Points	5	4	3	2	1

Statement 1: I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.

Table 3: Response for Statement 1

| Points	Response of Exp B	Response of Exp A
5	4	7
4	13	11
3	2	9
2	12	1
1	3	1

Chi-square statistics = 15.4
degrees of freedom = 4
probability of chance = 0.004
Table value of chi square at 4df at .05 significance level is 9.488. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that there is significant difference observed between Experimental group A and Experimental B towards effectiveness of the developed CAI for the given statement.
38.24% students of Exp B 'agree' where as 37.93% students of the Exp A 'agree' with the statement I**.** More load is on 'agree' of the Exp B which implies they found CAI more effective than the Exp A.

Graph 1: Graphical Representation of analysis of statement 1
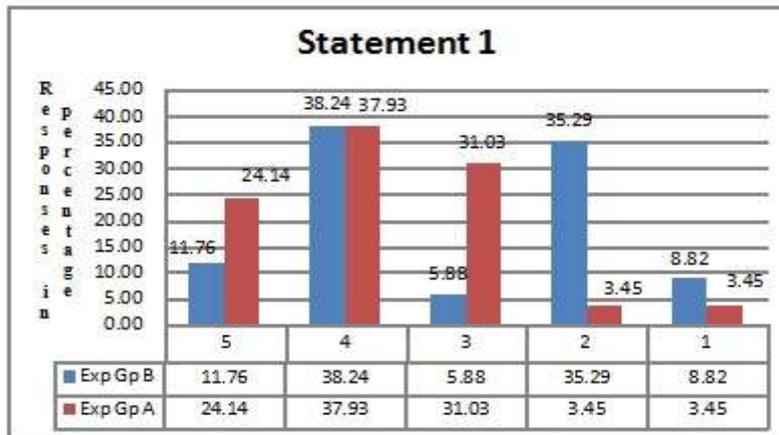
Statement 2: I like illustrations given in the slides, which actually made me learn the lesson.

Table 4: Response for Statement 2

Points	Response of Exp B	Response of Exp A
5	8	3
4	13	21
3	3	4
2	8	1
1	1	0

Chi-Square statistics = 10.5
Degrees of freedom = 4
Probability of chance = 0.032
Table value of chi square at 4df at .05 significance level is 9.488. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that there *is significant difference* observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.
39.39% students' of Exp B '*agree*' where as 72.41% students' of the Exp A '*agree*' with the statement 2. More load is on '*agree*' of the Exp A which implies that they found CAI more effective than the Exp B.

Graph 2: Graphical Representation of analysis of statement 2
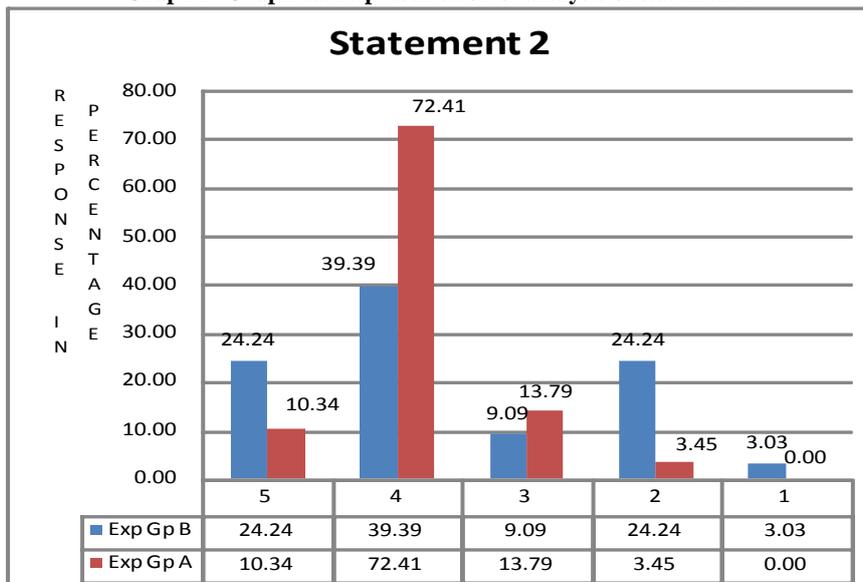
Statement 3: Illustrations didn't help me to relate what we learned in mathematics to real life situation.

Table 5: Response for Statement 3

| Points	Response of Exp B	Response of Exp A
5	8	5
4	7	11
3	7	4
2	10	6
1	1	2

Chi-Square statistics= 3.35
Degrees of freedom = 4
Probability of chance = 0.502
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 3: Graphical Representation of analysis of statement 3
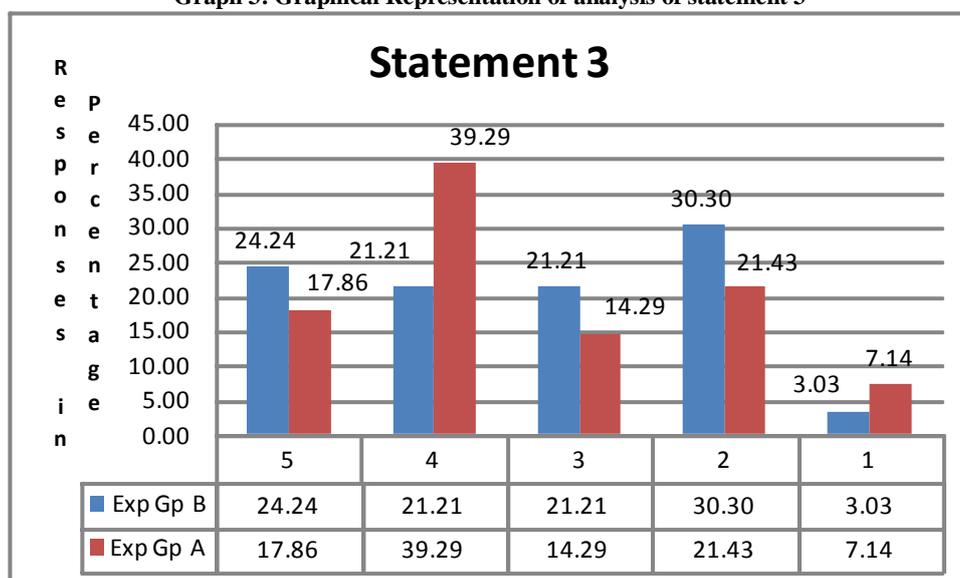
Statement 4: CAI is effective way of presentation because there is little stress in learning situation.

Table 6: Response for Statement 4

| Points	Response of Exp B	Response of Exp A
5	5	2
4	12	9
3	5	12
2	8	4
1	3	2

Chi-Square statistics = 5.90
Degrees of freedom = 4
Probability of chance = 0.207
Table value of Chi Square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 4: Graphical Representation of analysis of statement 4
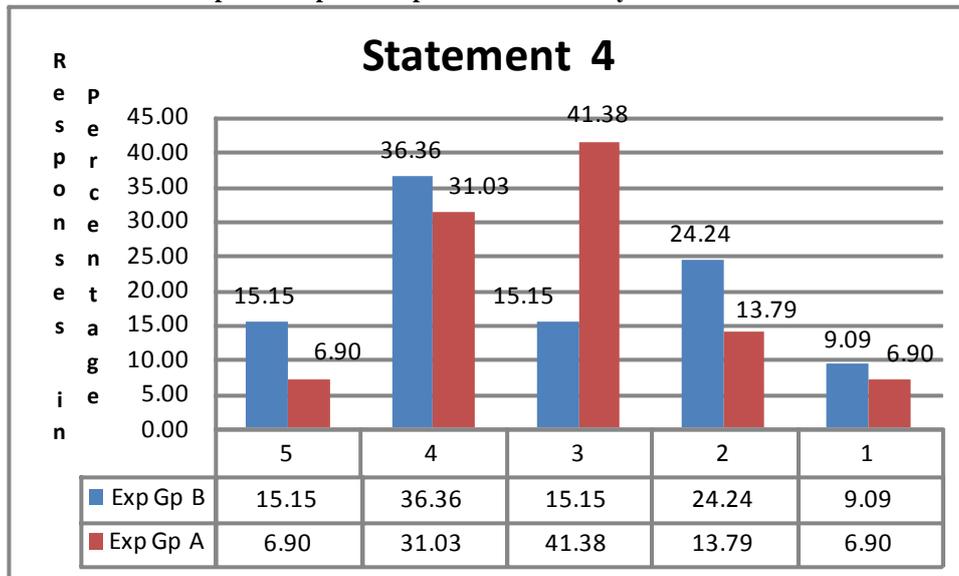
Statement 5: I can learn with my own speed.

Table 7: Response for statement 5

Points	Response of Exp B	Response of Exp A
5	13	8
4	7	15
3	5	4
2	7	3
1	1	0

Chi-Square statistics= 6.68
Degrees of freedom = 4
Probability of chance = 0.154
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental groupB towards effectiveness of the developed CAI for the given statement.

Graph 5: Graphical Representation of Analysis of Statement 5
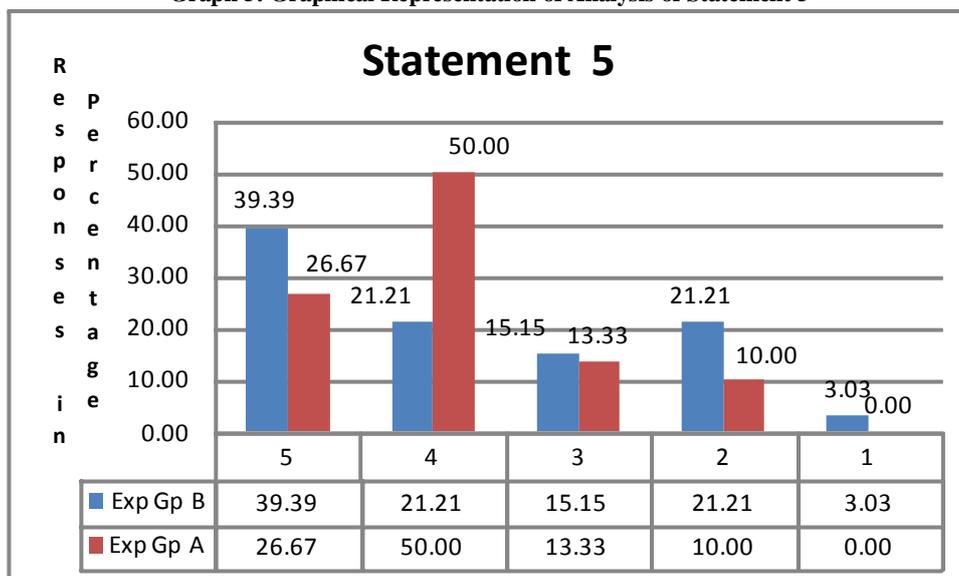
Statement 6: I can immediately test myself because there is lot of practice exercise.

Table 8: Response for statement 6

| Points	Response of Exp B	Response of Exp A
5	8	7
4	15	15
3	3	5
2	5	0
1	2	2

Chi-Square statistics= 5.33
Degrees of freedom = 3
Probability of chance = 0.255
Table value of Chi Square at 3df at .05 significance level is 7.815. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental B towards effectiveness of the developed CAI for the given statement.

Graph 6: Graphical Representation of analysis of statement 6

	5	4	3	2	1
Exp Gp B	24.24	45.45	9.09	15.15	6.06
Exp Gp A	24.14	51.72	17.24	0.00	6.90
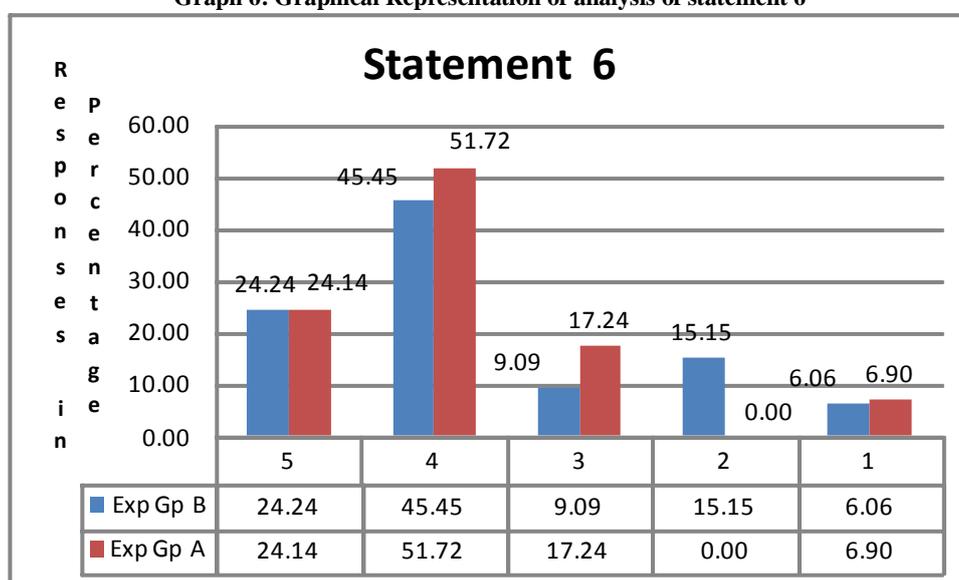
Statement 7: This method is having more freedom to learn
.

Table 9: Response for statement 7

Points	Response of Exp B	Response of Exp A
5	10	11
4	11	13
3	4	4
2	7	2
1	2	0

Chi-Square statistics = 4.76
Degrees of freedom = 4
Probability of chance= 0.313

Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 7: Graphical Representation of analysis of statement 7

	1	2	3	4	5
■ Exp Gp B	29.41	32.35	11.76	20.59	5.88
■ Exp Gp A	36.67	43.33	13.33	6.67	0.00
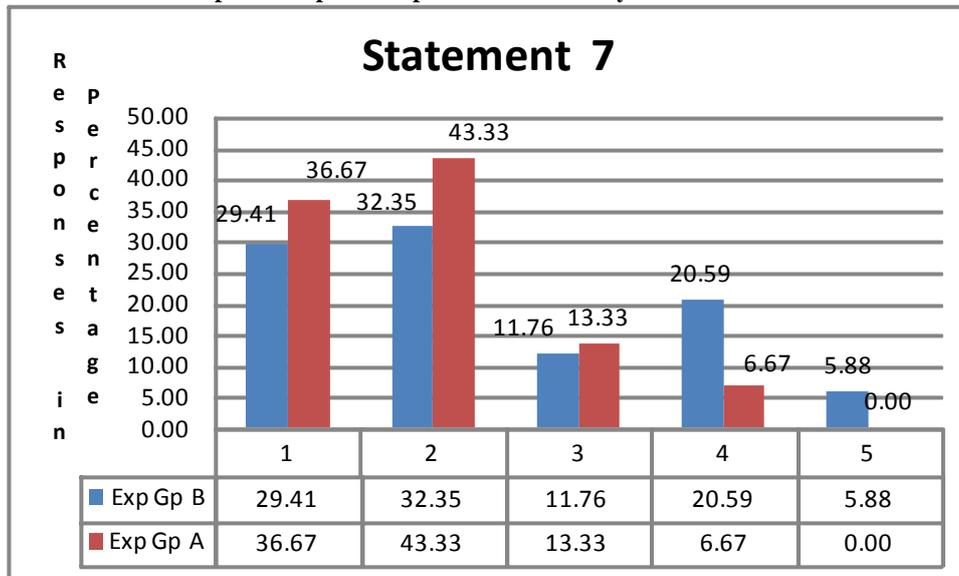
Statement 8: CAI didn't focus on more freedom situation.

Table 10: Response for statement 8

| Points	Response of Exp B	Response of Exp A
5	2	7
4	13	7
3	11	9
2	3	4
1	4	2

Chi-Square statistics = 5.35
Degrees of freedom = 4
Probability of chance = 0.253
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 8: Graphical Representation of analysis of statement 8

	5	4	3	2	1
■ Exp Gp B	6.06	39.39	33.33	9.09	12.12
■ Exp Gp A	24.14	24.14	31.03	13.79	6.90
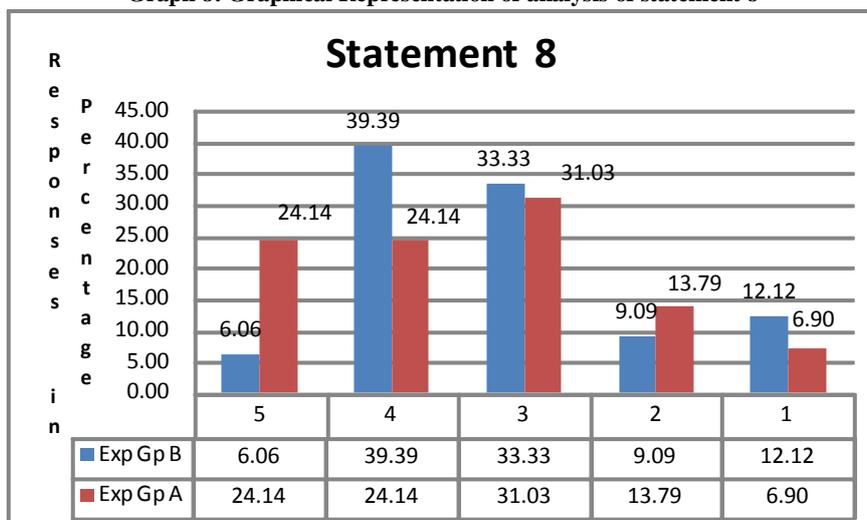
Statement 9: Learning mathematics is fun in this CAI method.

Table 11: Response for statement 9

Points	Response of Exp B	Response of Exp A
5	8	7
4	13	14
3	3	7
2	7	0
1	2	1

Chi-Square statistics = 8.82
Degrees of freedom = 4
probability of chance = 0.066
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 9: Graphical Representation of analysis of statement 9

	5	4	3	2	1
Exp Gp B	24.24	39.39	9.09	21.21	6.06
Exp Gp A	24.14	48.28	24.14	0.00	3.45
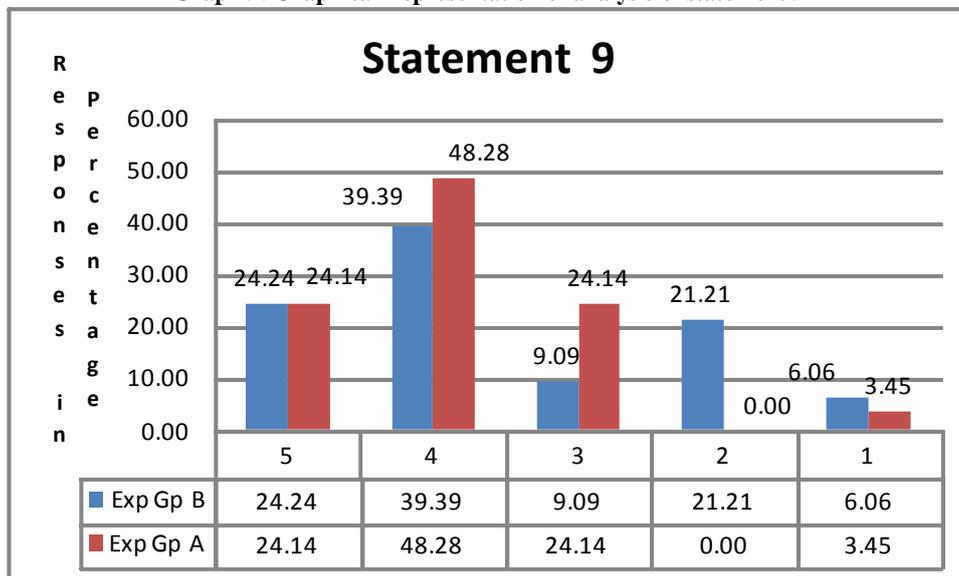
Statement 10: This method is not good in learning mathematics because my doubts are not cleared.

Table 12: Response for statement 10

Points	Response of Exp B	Response of Exp A
5	2	7
4	9	6
3	4	7
2	11	8
1	7	2

Chi-Square statistics = 7.32
Degrees of freedom = 4
Probability of chance = 0.120
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 10: Graphical Representation of analysis of statement 10

Statement 10

	5	4	3	2	1
Exp Gp B	6.06	27.27	12.12	33.33	21.21
Exp Gp A	23.33	20.00	23.33	26.67	6.67
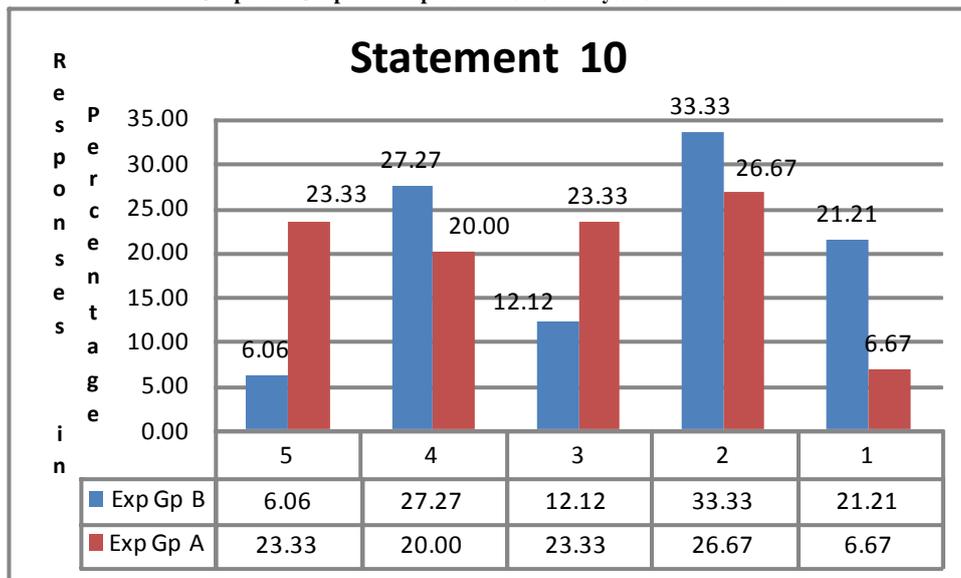
Statement 11: In CAI I can teach myself (self-study) without the help of others.

Table 13: Response for statement 11

Points	Response of Exp B	Response of Exp A
5	9	5
4	14	10
3	5	7
2	2	4
1	3	3

Chi-Square statistics = 2.56
degrees of freedom = 4
probability of chance = 0.634
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 11: Graphical Representation of analysis of statement 11

Statement 11

	5	4	3	2	1
Exp Gp B	27.27	42.42	15.15	6.06	9.09
Exp Gp A	17.24	34.48	24.14	13.79	10.34
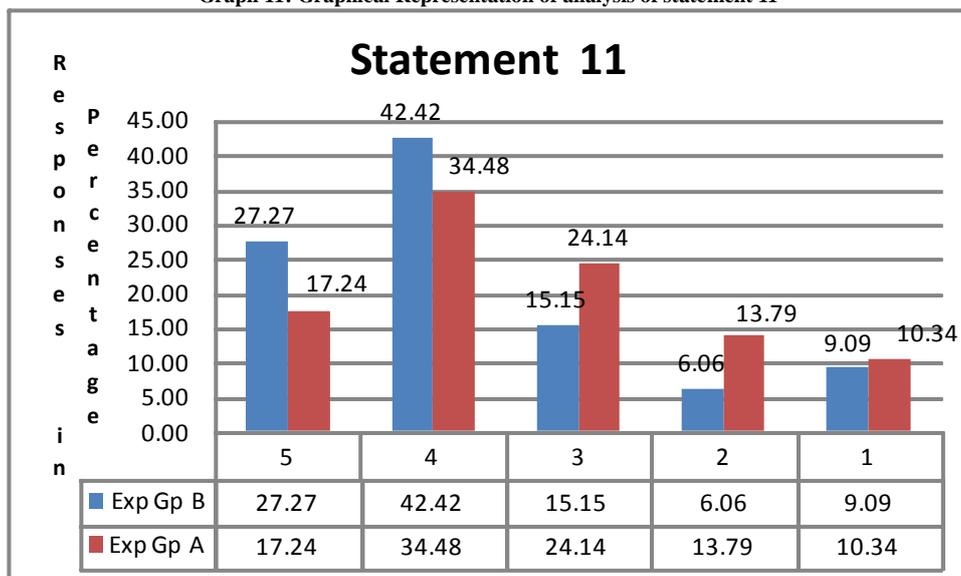
Statement 12: Matter presented in CAI is not very clear.

Table 14: Response for statement 12

| Points	Response of Exp B	Response of Exp A
5	6	3
4	11	11
3	7	9
2	7	6
1	2	1

Chi-Square statistics= 1.52
Degrees of freedom = 4
Probability of chance = 0.823
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

**Graph 12: Graphical Representation of analysis of statement 12**

	5	4	3	2	1
Exp Gp B	27.27	42.42	15.15	6.06	9.09
Exp Gp A	17.24	34.48	24.14	13.79	10.34
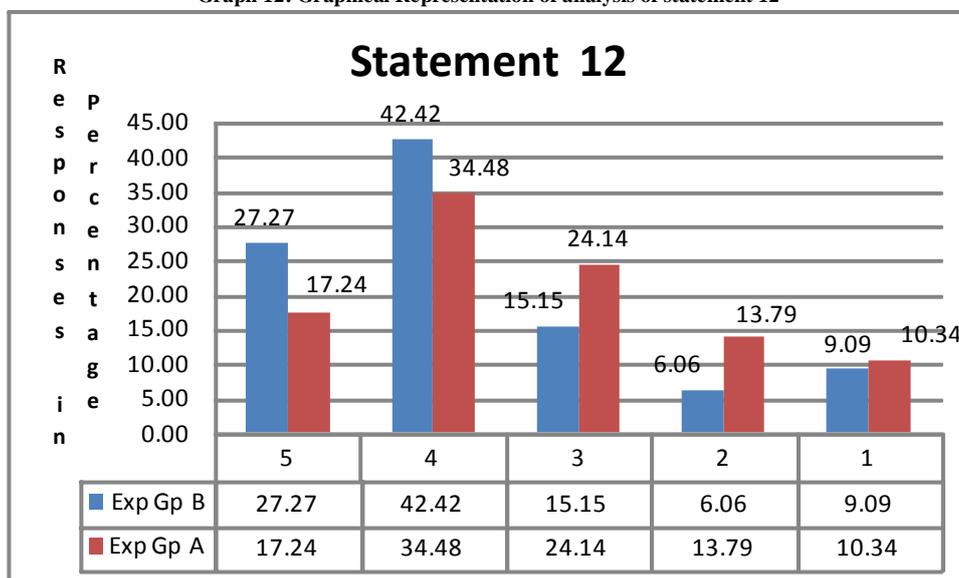
Statement 13: CAI is easy to understand.

Table 15: Response for statement 13

Points	Response of Exp B	Response of Exp A
5	8	4
4	14	11
3	3	10
2	6	4
1	2	0

Chi-Square statistics = 7.64
Degrees of freedom = 4
Probability of chance= 0.106
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental B towards effectiveness of the developed CAI for the given statement.

Graph 13: Graphical Representation of analysis of statement 13

Statement 13

	5	4	3	2	1
■ Exp Gp B	24.24	42.42	9.09	18.18	6.06
■ Exp Gp A	13.79	37.93	34.48	13.79	0.00
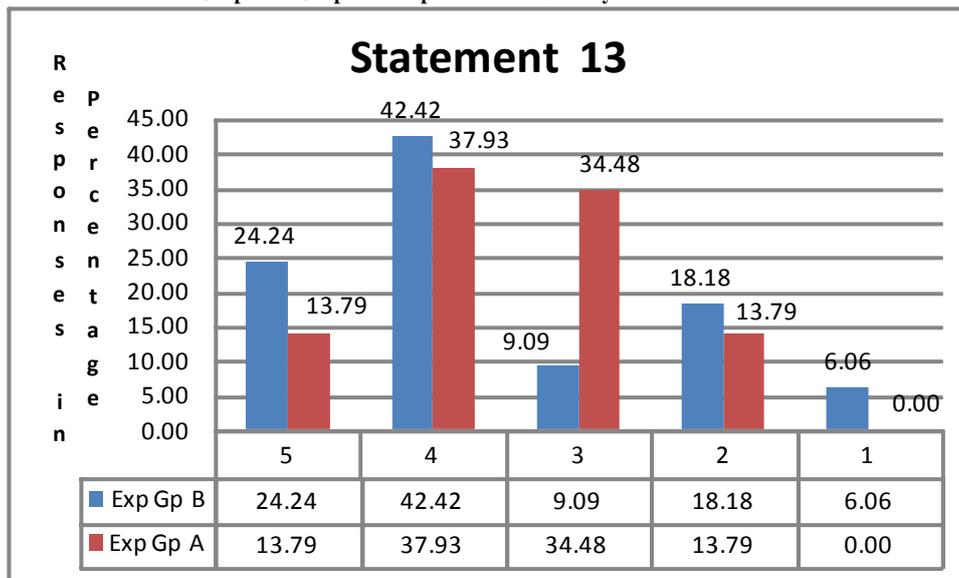
Statement 14: Animations are distracting in understanding the concept.

Table 16: Responses for statement 14

Points	Response of Exp B	Response of Exp A
5	12	6
4	16	8
3	1	4
2	5	7
1	1	1

Chi-Square statistics = 5.59
Degrees of freedom = 4
Probability of chance = 0.232
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 14: Graphical Representation of analysis of statement 14

Statement 14

	5	4	3	2	1
■ Exp Gp B	34.29	45.71	2.86	14.29	2.86
■ Exp Gp A	23.08	30.77	15.38	26.92	3.85
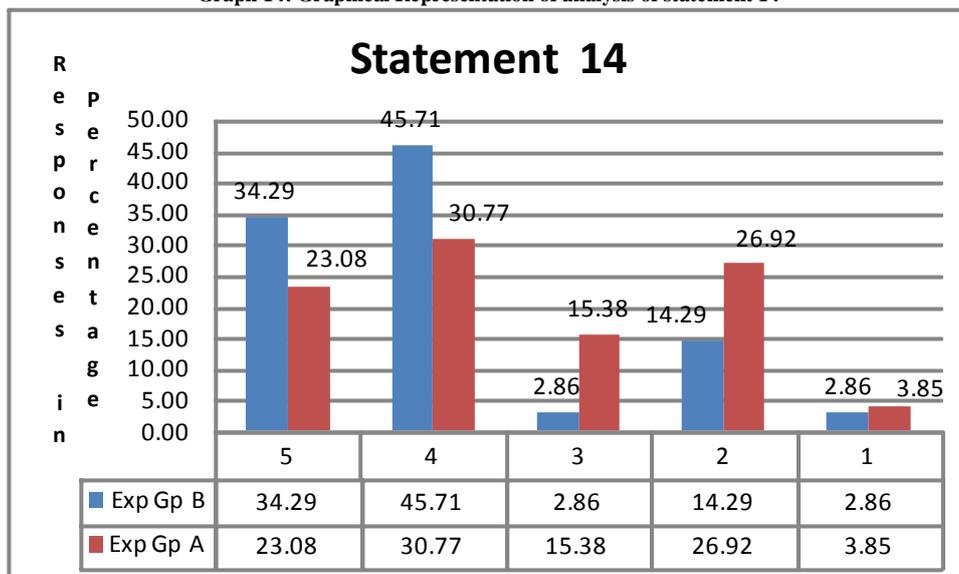
Statement 15: CAI took more time to understand the concept than usual classroom teaching.

Table 17: Responses for statement 15

| Points	Response of Exp B	Response of Exp A
5	7	6
4	5	9
3	1	5
2	13	9
1	7	1

Chi-Square statistics = 8.99
Degrees of freedom = 4
Probability of chance = 0.0610
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 15: Graphical Representation of analysis of statement 15

	5	4	3	2	1
Exp Gp B	21.21	15.15	3.03	39.39	21.21
Exp Gp A	20.00	30.00	16.67	30.00	3.33
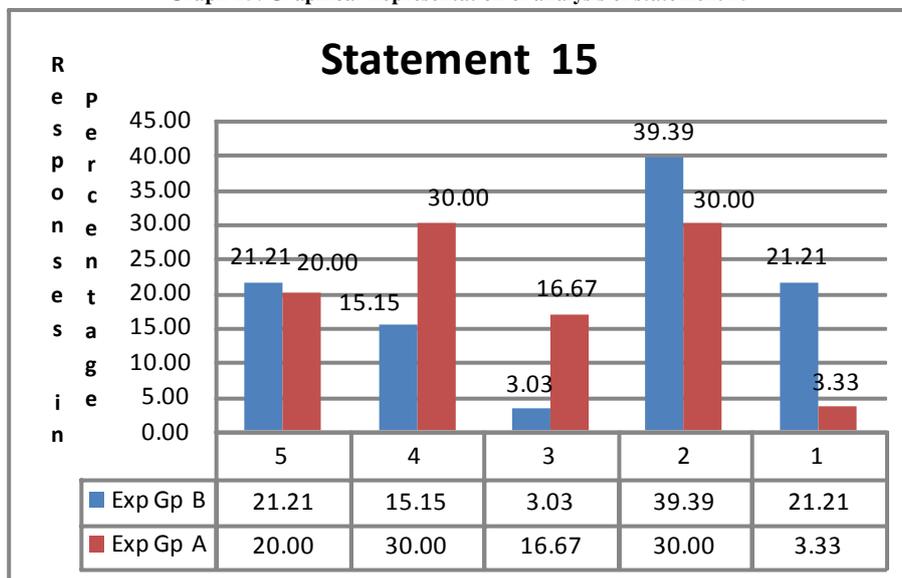
Statement 16: Illustrations given in CAI are enough to understand the concept clearly.

Table 18: Responses for statement 16

Points	Response of Exp B	Response of Exp A
5	5	5
4	11	13
3	4	4
2	10	5
1	3	3

Chi-Square statistics= 1.69
Degrees of freedom = 4
Probability of chance = 0.792
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 16: Graphical Representation of analysis of statement 16

Statement 16

Responses Percentage in	5	4	3	2	1
Exp Gp B	15.15	33.33	12.12	30.30	9.09
Exp Gp A	16.67	43.33	13.33	16.67	10.00
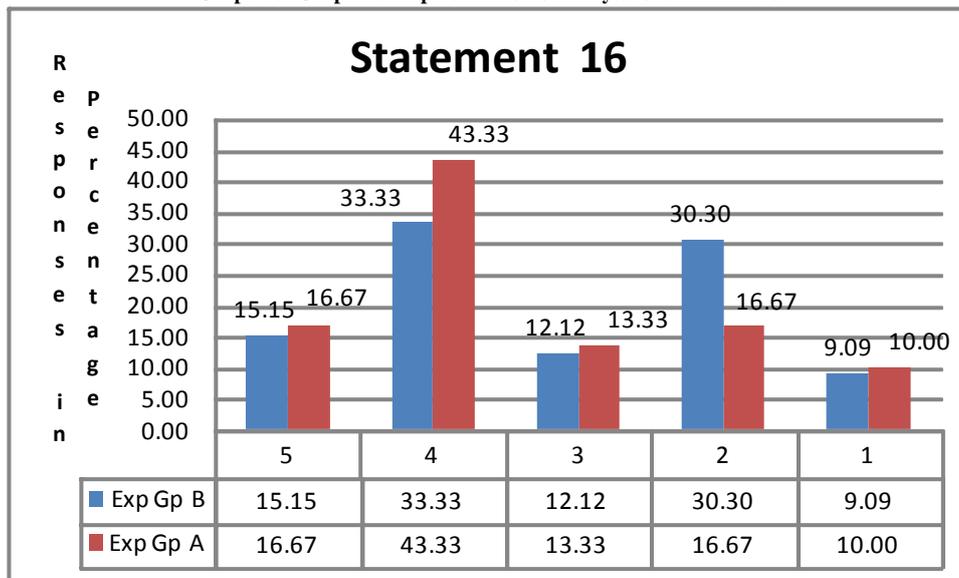
Statement 17: Matter presented in CAI was logically arranged.

Table 19: Responses for statement 17

| Points	Response of Exp B	Response of Exp A
5	8	6
4	14	15
3	6	6
2	5	0
1	0	3

Chi-Square statistics = 8.20
Degrees of freedom = 4
Probability of chance= 0.085
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 17: Graphical Representation of analysis of statement 17

Statement 17

Responses Percentage in	5	4	3	2	1
Exp Gp B	24.24	42.42	18.18	15.15	0.00
Exp Gp A	20.00	50.00	20.00	0.00	10.00
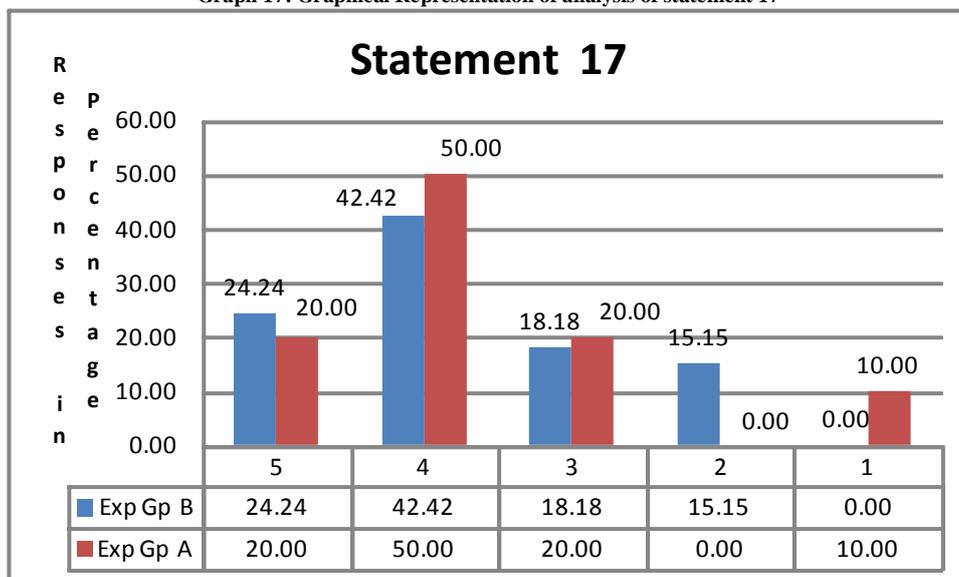
Statement 18: Learning through CAI was waste of time.

Table 20: Responses for statement 18

Points	Response of Exp B	Response of Exp A
5	9	14
4	12	3
3	6	8
2	1	0
1	6	5

Chi-Square = 7.64
Degrees of freedom = 4
Probability = 0.106
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no *significant difference* observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 18: Graphical Representation of analysis of statement 18

	5	4	3	2	1
Exp Gp B	27.27	36.36	18.18	3.03	18.18
Exp Gp A	46.67	10.00	26.67	0.00	16.67
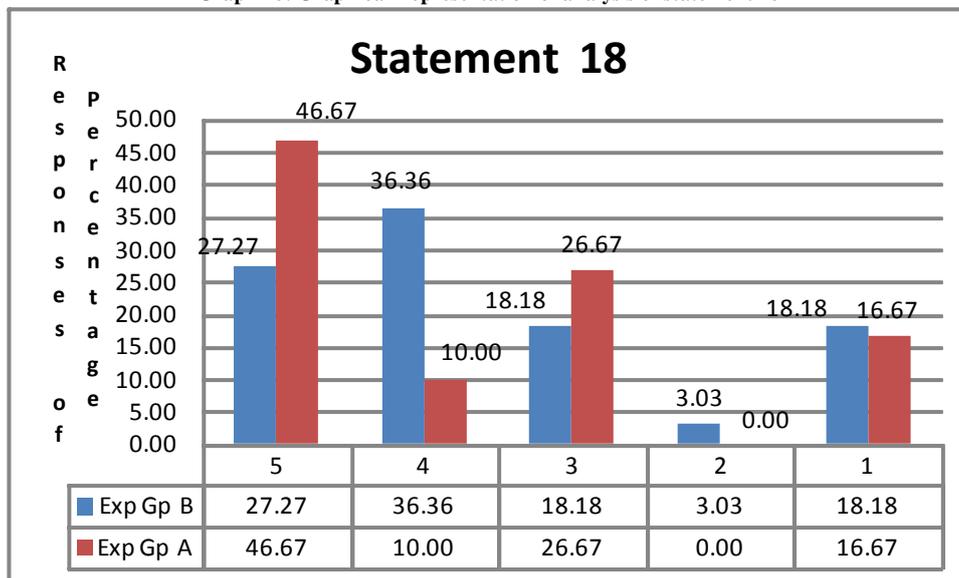
Statement 19: Illustrations given in CAI are related to day today life experiences.

Table 21: Responses for statement 19

Points	Response of Exp B	Response of Exp A
5	5	6
4	14	16
3	8	4
2	5	4
1	0	0

Chi-Square statistics = 1.61
Degrees of freedom = 3
Probability of chance = 0.658
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 19: Graphical Representation of analysis of statement 19

Statement 19

Response Percentage of	5	4	3	2	1
Exp Gp B	15.63	43.75	25.00	15.63	0.00
Exp Gp A	20.00	53.33	13.33	13.33	0.00
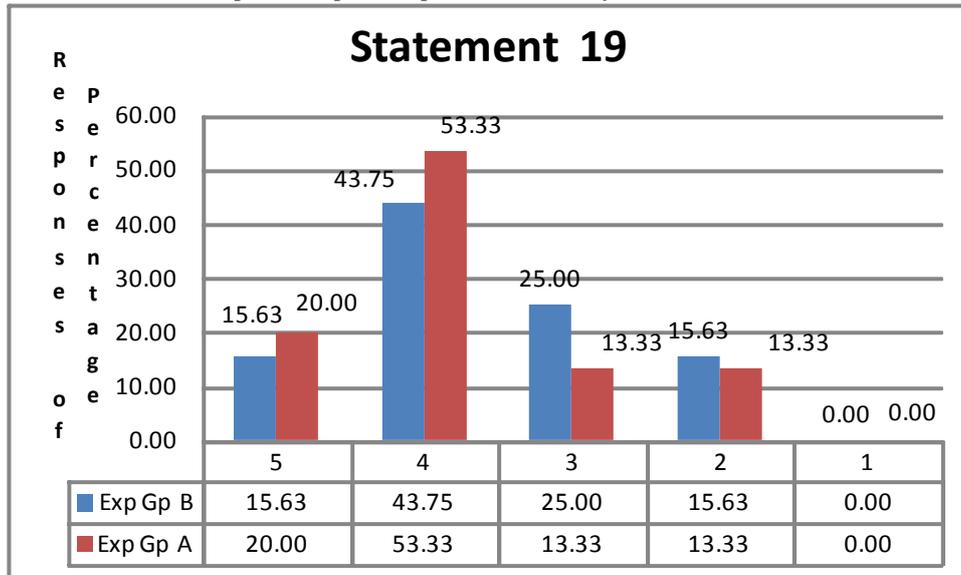
Statement 20: Classroom teaching is more enjoyable.

Table 22: Responses for statement 20

Points	Response of Exp B	Response of Exp A
5	5	2
4	6	2
3	8	3
2	4	12
1	10	11

Chi-Square statistics= 9.48
Degrees of freedom = 4
Probability of chance= 0.050
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 20: Graphical Representation of analysis of statement 20

Statement 20

Response Percentage in	5	4	3	2	1
Exp Gp B	15.15	18.18	24.24	12.12	30.30
Exp Gp A	6.67	6.67	10.00	40.00	36.67
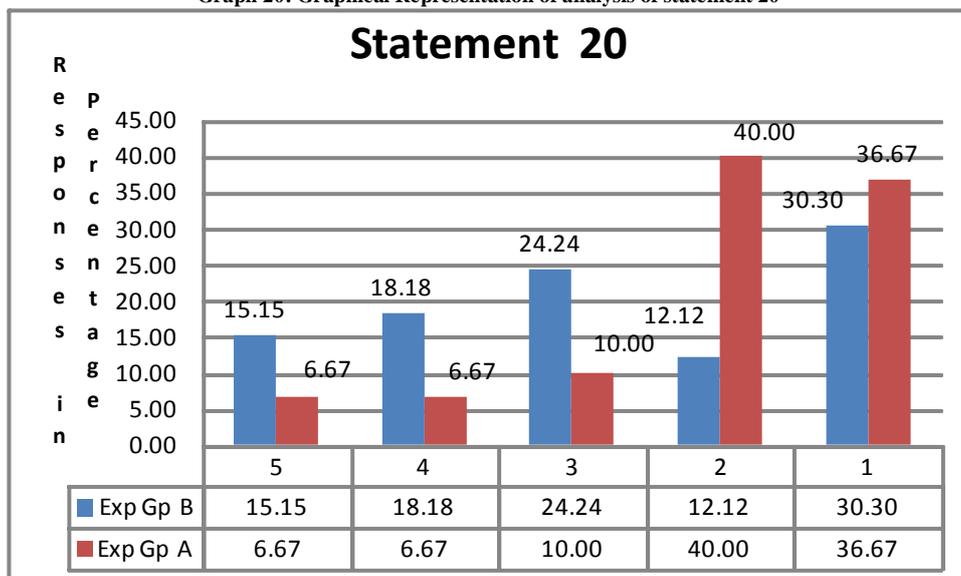
Statement 21: The language used in CAI is easy and simple to understand.

Table 23: Responses for statement 21

Points	Response of Exp B	Response of Exp A
5	13	12
4	11	11
3	4	3
2	5	3
1	0	0

Chi-Square = 0.427
Degrees of freedom = 3
Probability = 0.935
Table value of Chi Square at 3df at .05 significance level is 7.815. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 21: Graphical Representation of analysis of statement 21

	5	4	3	2	1
Exp Gp B	39.39	33.33	12.12	15.15	0.00
Exp Gp A	41.38	37.93	10.34	10.34	0.00
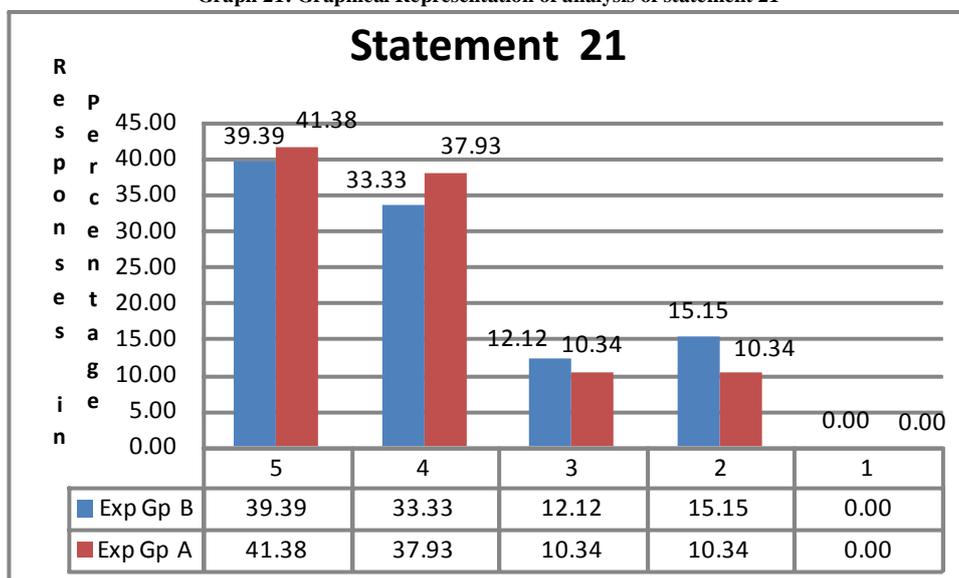
Statement 22: The exercises given in each chapter is adequate.

Table 24: Responses for statement 22

Points	Response of Exp B	Response of Exp A
5	8	6
4	12	16
3	3	4
2	8	1
1	2	5

Chi-Square statistics= 7.72
Degrees of freedom = 4
Probability of chance = 0.103
Table value of chi square at 4df at .05 significance level is 9.488. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 22: Graphical Representation of analysis of statement 22

Statement 22

	5	4	3	2	1
Exp Gp B	24.24	36.36	9.09	24.24	6.06
Exp Gp A	18.75	50.00	12.50	3.13	15.63
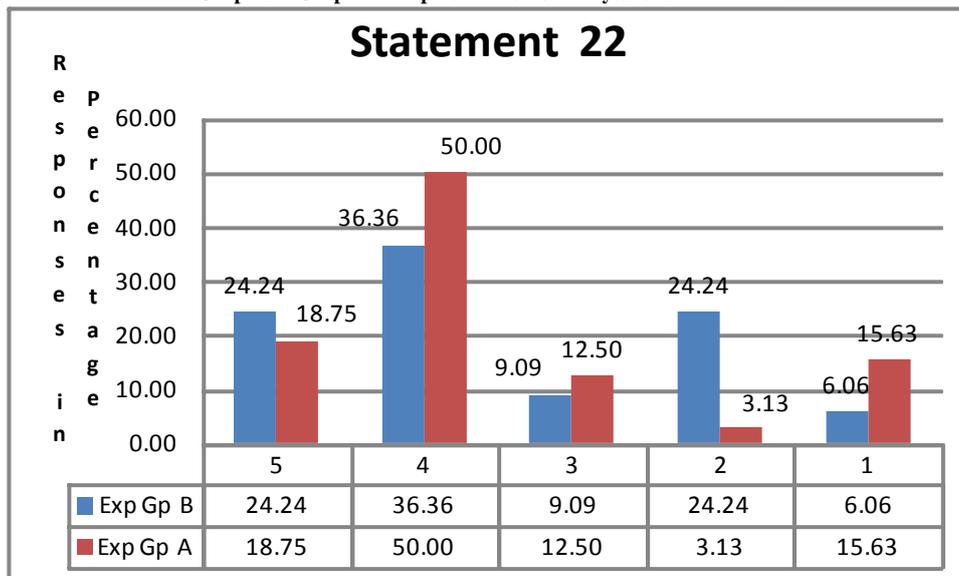
Statement 23: CAI takes care of previous knowledge in the subject.

Table 25: Responses for statement 23

| Points	Response of Exp B	Response of Exp A
5	8	7
4	15	12
3	5	5
2	4	0
1	1	6

Chi-Square statistics= 7.85
Degrees of freedom = 4
Probability of chance = 0.097
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 23: Graphical Representation of analysis of statement 23

Statement 23

	5	4	3	2	1
Exp Gp B	24.24	45.45	15.15	12.12	3.03
Exp Gp A	23.33	40.00	16.67	0.00	20.00
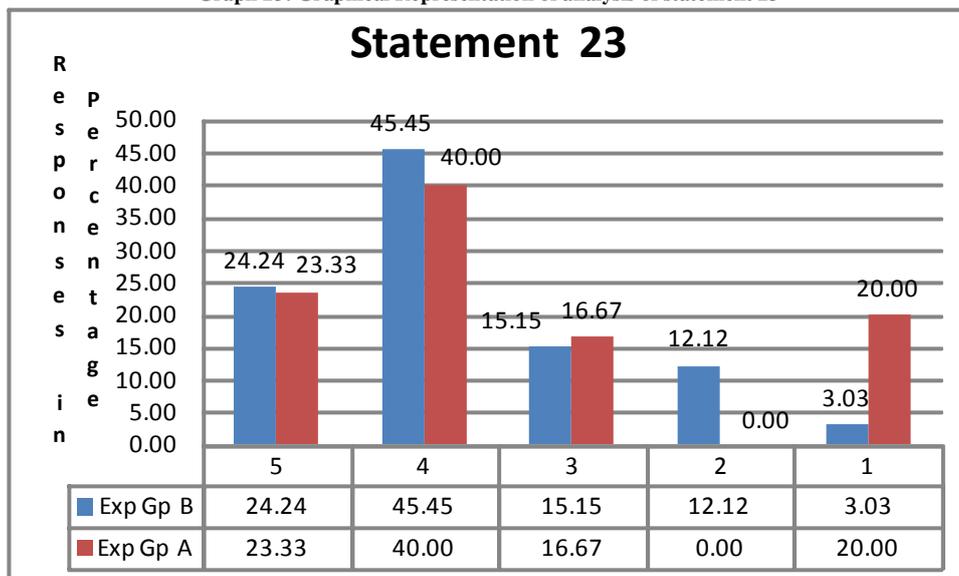
Statement 24: The solution to the problem is not easy to understand.

Table 26: Responses for statement 24

| Points	Response of Exp B	Response of Exp A
5	7	5
4	16	9
3	2	5
2	7	8
1	3	4

Chi-Square statistics = 3.56
Degrees of freedom = 4
Probability of chance = 0.469
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 24: Graphical Representation of analysis of statement 24

	5	4	3	2	1
Exp Gp B	20.00	45.71	5.71	20.00	8.57
Exp Gp A	16.13	29.03	16.13	25.81	12.90
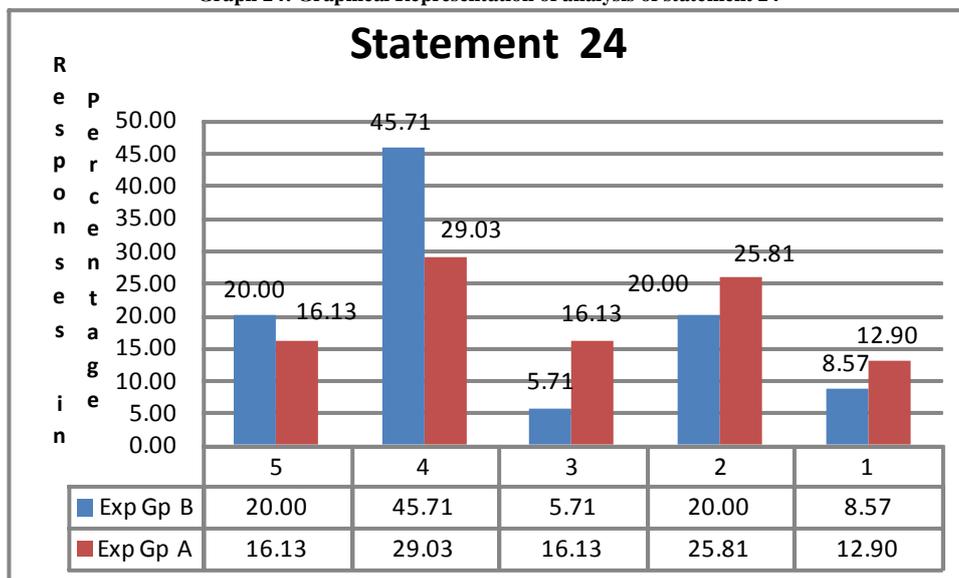
Statement 25: The exercises helped in understanding the chapter in depth.

Table 27: Responses for statement 25

Points	Response of Exp B	Response of Exp A
5	9	6
4	12	13
3	8	7
2	5	5
1	2	0

Chi-Square statistics= 2.35
Degrees of freedom = 4
Probability of chance = 0.672
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 25: Graphical Representation of analysis of statement 25

	5	4	3	2	1
Exp Gp B	25.00	33.33	22.22	13.89	5.56
Exp Gp A	19.35	41.94	22.58	16.13	0.00
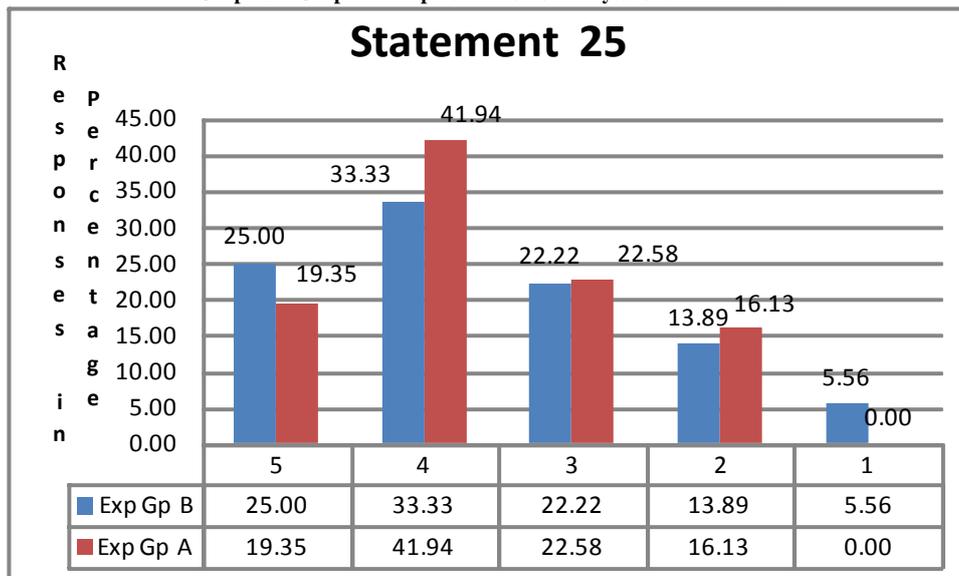
**Statement 26:** Solutions didn't help me whenever I was not able to solve the problem.

Table 28: Responses for statement 26

Points	Response of Exp B	Response of Exp A
5	13	9
4	6	2
3	2	9
2	10	7
1	4	2

Chi-Square statistics = 7.88
Degrees of freedom = 4
Probability of chance = 0.096

Table value of chi square at 4df at .05 significance level is 9.488. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 26: Graphical Representation of analysis of statement 26

	5	4	3	2	1
Exp Gp B	37.14	17.14	5.71	28.57	11.43
Exp Gp A	31.03	6.90	31.03	24.14	6.90
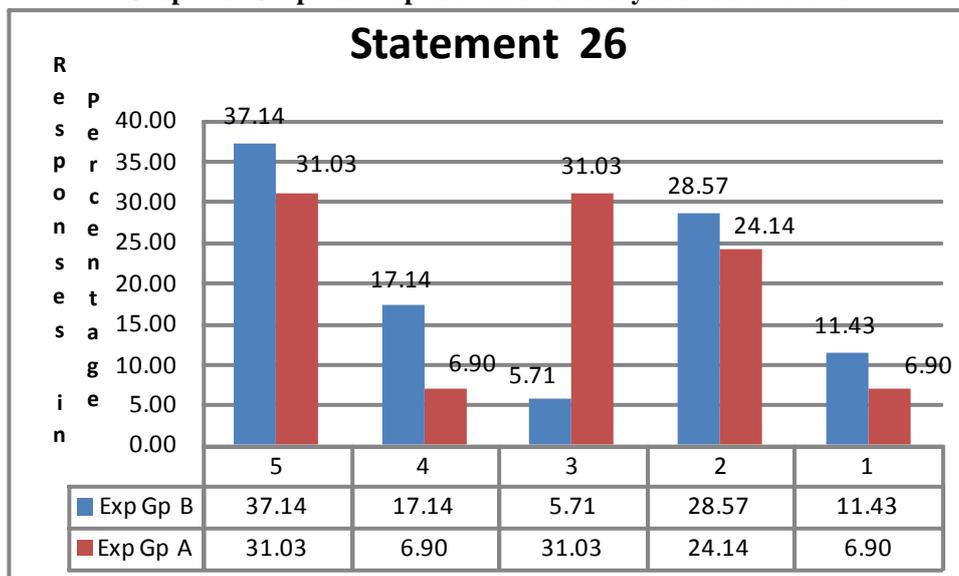
Statement 27: Break given in CAI helped me to refresh my mind.

Table 29: Responses for statement 27

| Points	Response of Exp B	Response of Exp A
1	10	4
2	10	10
3	4	4
4	5	3
5	4	8

Chi-Square of statistics = 4.16
Degrees of freedom = 4
Probability of chance= 0.384
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 27: Graphical Representation of analysis of statement 27
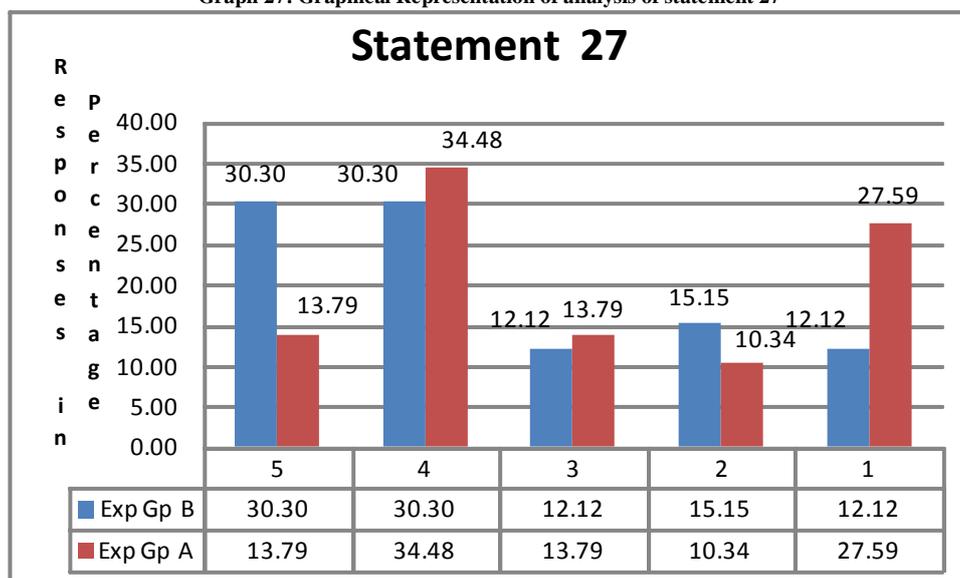
Statement 28: I am feeling tired while going through the slide.

Table 30: Responses for statement 28

Points	Response of Exp B	Response of Exp A
5	6	5
4	15	6
3	5	7
2	3	7
1	4	4

hi-Square statistics = 5.65
Degrees of freedom = 4
Probability of chance = 0.227
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 28: Graphical Representation of analysis of statement 28

Statement 28

	5	4	3	2	1
Exp Gp B	18.18	45.45	15.15	9.09	12.12
Exp Gp A	17.24	20.69	24.14	24.14	13.79
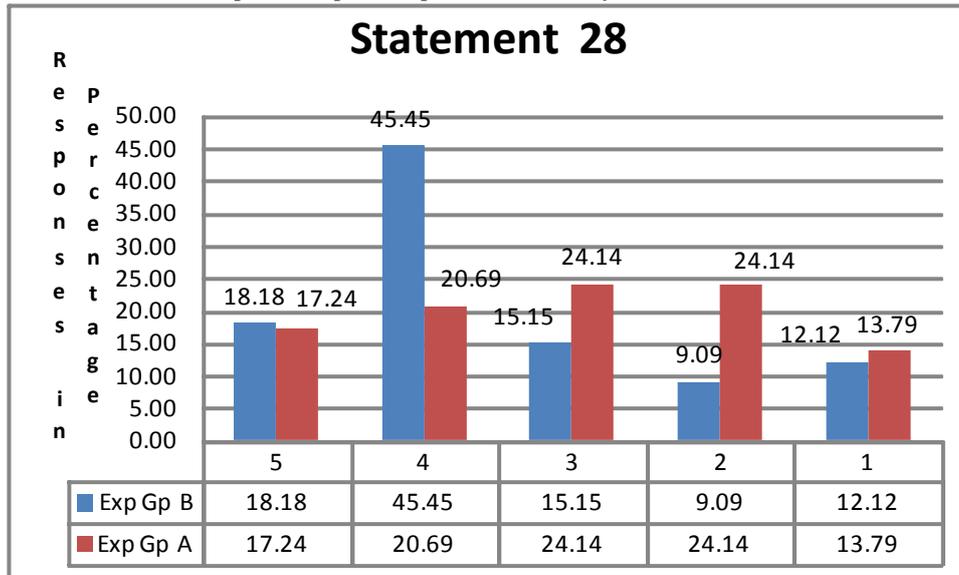
Statement 29: Animation shown in CAI is appropriate to help me in understanding the concept.

Table 31: Responses for statement 29

| Points	Response of Exp B	Response of Exp A
5	8	12
4	7	8
3	4	6
2	5	3
1	9	0

Chi-Square statistics = 10.6
Degrees of freedom = 4
Probability of chance = 0.032
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that there is significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.
24.24% students' of Exp B 'strongly *agree*' where as 41.38% students' of the Exp A ' strongly *agree*' with the statement 29. More load is on 'strongly *agree*' of the Exp A which implies that they found CAI more effective than the Exp B.

Graph 29: Graphical Representation of analysis of statement 29

Statement 29

	5	4	3	2	1
Exp Gp B	24.24	21.21	12.12	15.15	27.27
Exp Gp A	41.38	27.59	20.69	10.34	0.00
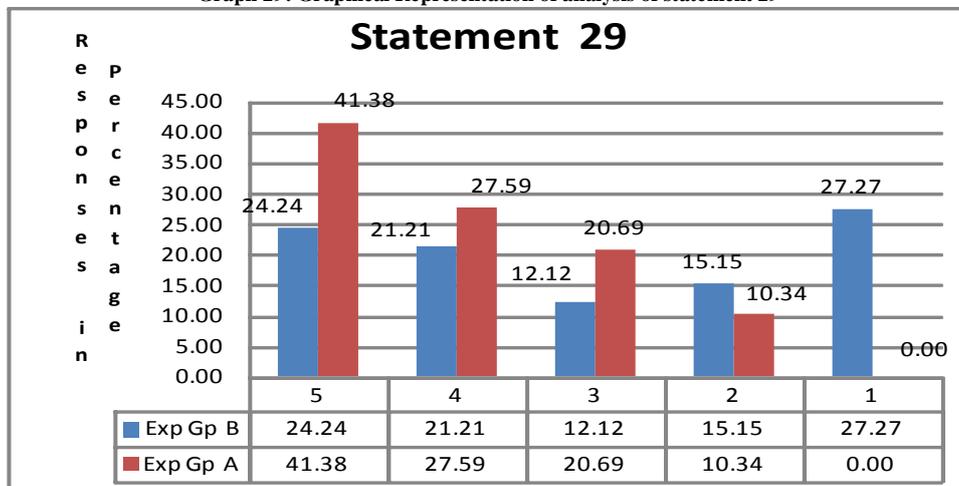
Statement 30: Topic is not introduced properly.

Table 32: Responses for statement 30

| Points	Response of Exp B	Response of Exp A
5	9	12
4	11	9
3	2	5
2	9	2
1	2	1

Chi-Square statistics= 6.47
Degrees of freedom = 4
Probability of chance = 0.167
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that there is significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 30: Graphical Representation of analysis of statement 30

Statement 30

	5	4	3	2	1
Exp Gp B	27.27	33.33	6.06	27.27	6.06
Exp Gp A	41.38	31.03	17.24	6.90	3.45
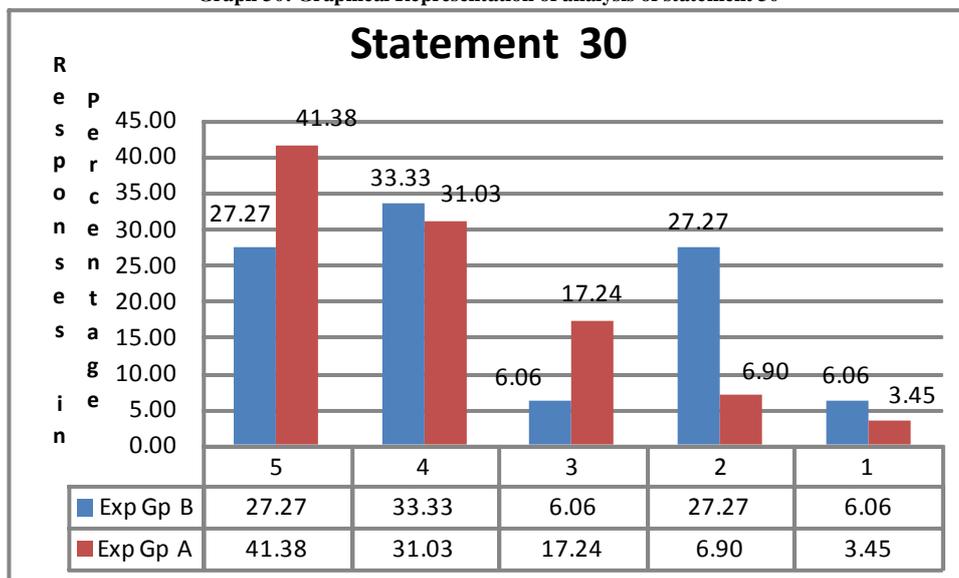
Statement 31: CAI does not take care of previous knowledge (percentage) needed to understand the present concept.

Table 33: Responses for statement 31

Points	Response of Exp B	Response of Exp A
5	6	5
4	12	11
3	9	7
2	3	6
1	3	0

Chi-Square statistics= 4.14
Degrees of freedom = 4
Probability of chance = 0.387
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 31: Graphical Representation of analysis of statement 31

	5	4	3	2	1
Exp Gp B	18.18	36.36	27.27	9.09	9.09
Exp Gp A	17.24	37.93	24.14	20.69	0.00
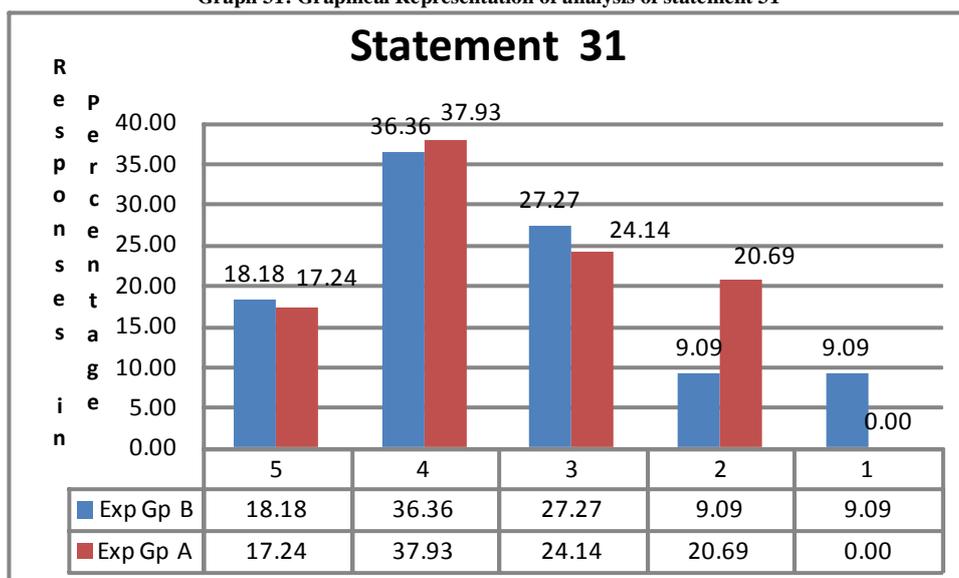
Statement 32: Enough revision is not done in CAI after the topic simple interest.

Table 34: Responses for statement 32

Points	Response of Exp B	Response of Exp A
5	4	3
4	13	10
3	3	10
2	10	8
1	4	1

Chi-Square statistics= 6.27
Degrees of freedom = 4
Probability of chance = 0.180
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 32: Graphical Representation of analysis of statement 32

	5	4	3	2	1
Exp Gp B	11.76	38.24	8.82	29.41	11.76
Exp Gp A	9.38	31.25	31.25	25.00	3.13
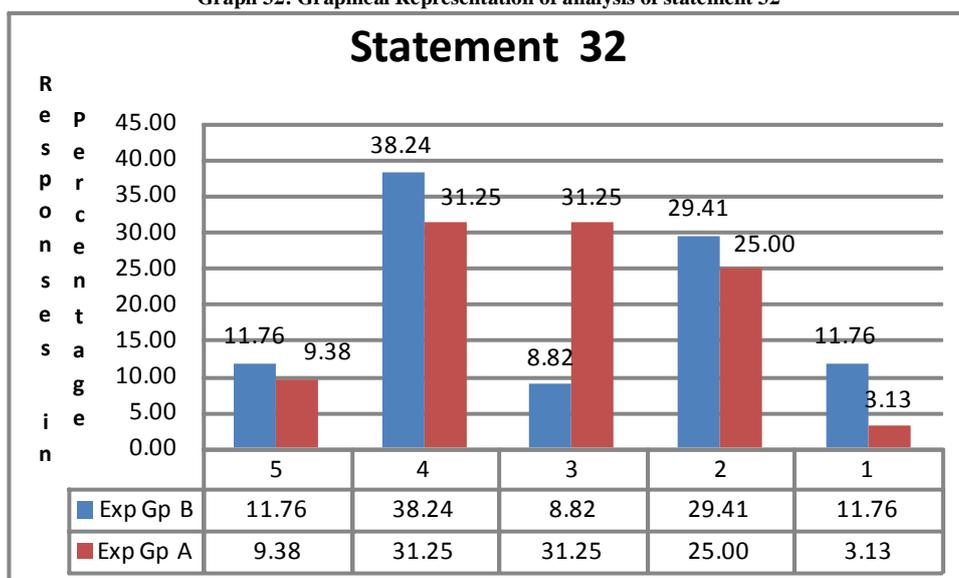
Statement 33: Enough revision is not done in CAI after the topic compound interest.

Table 35: Responses for statement 33

| Points	Response of Exp B	Response of Exp A
5	4	6
4	10	10
3	7	2
2	5	7
1	3	8

Chi-Square statistics = 5.55
Degrees of freedom = 4
Probability of chance = 0.235
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 33: Graphical Representation of analysis of statement 33

	5	4	3	2	1
Exp Gp B	13.79	34.48	24.14	17.24	10.34
Exp Gp A	18.18	30.30	6.06	21.21	24.24
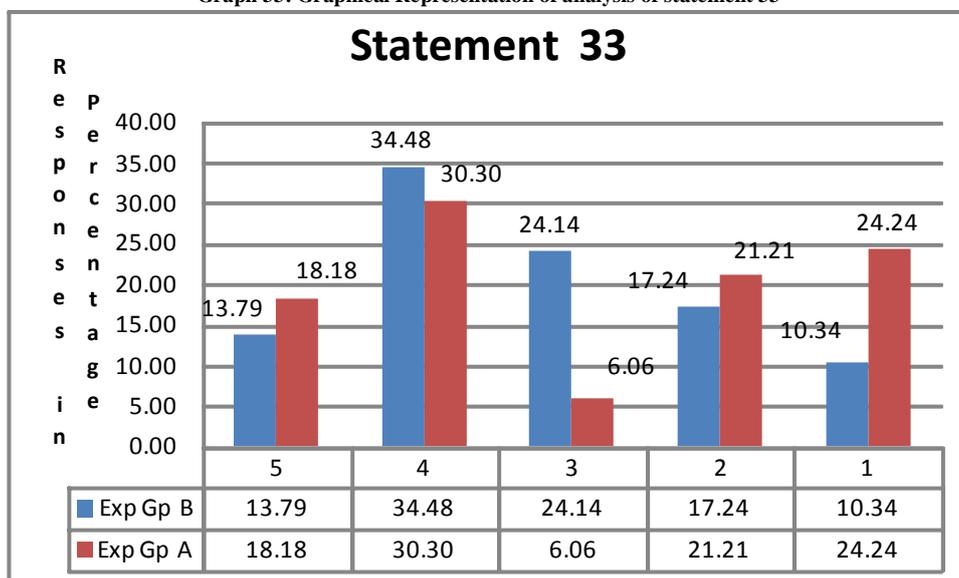
Statement 34: Enough revision is not done in CAI after the topic profit and loss.

Table 36: Responses for statement 34

Points	Response of Exp B	Response of Exp A
5	6	2
4	12	8
3	4	10
2	5	6
1	6	4

Chi-Square statistics = 5.73
Degrees of freedom = 4
Probability of chance= 0.220
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 34: Graphical Representation of analysis of statement 34

Statement 34

	5	4	3	2	1
Exp Gp B	18.18	36.36	12.12	15.15	18.18
Exp Gp A	6.67	26.67	33.33	20.00	13.33
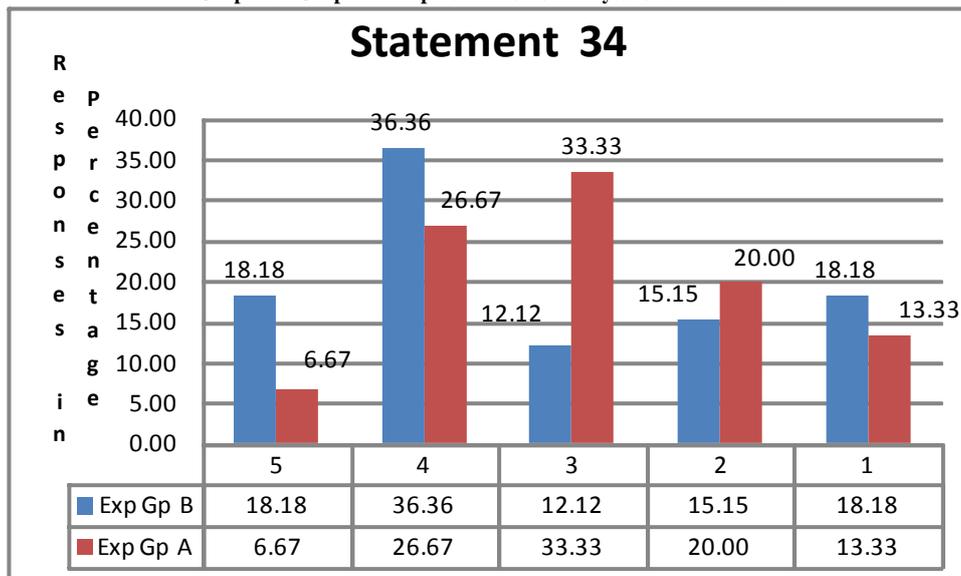
Statement 35: Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.

Table 37: Responses for statement 35

Points	Response of Exp B	Response of Exp A
5	6	5
4	10	10
3	2	5
2	13	5
1	1	4

Chi-Square statistics = 6.60
Degrees of freedom = 4
Probability of chance = 0.159
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 35: Graphical Representation of analysis of statement 35

Statement 35

	5	4	3	2	1
Exp Gp B	18.75	31.25	6.25	40.63	3.13
Exp Gp A	17.24	34.48	17.24	17.24	13.79
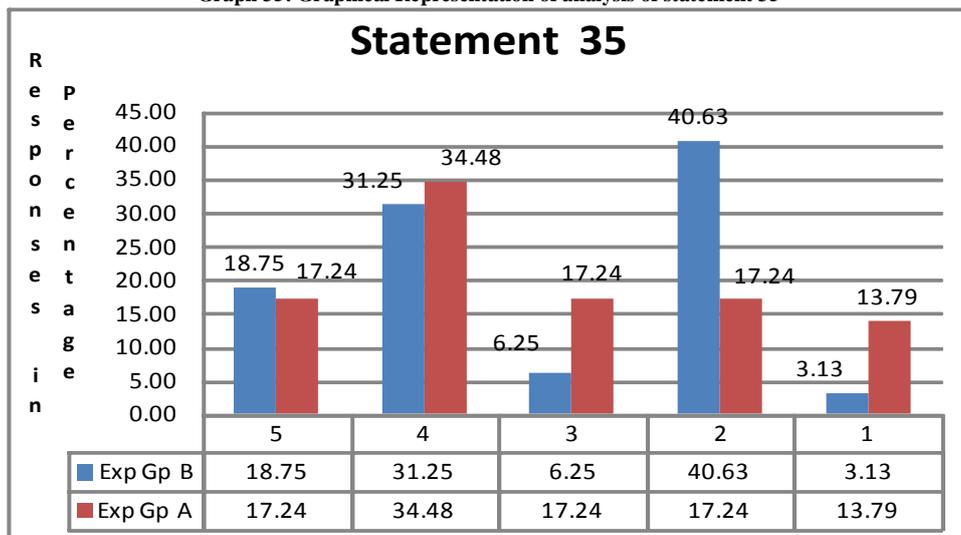
Statement 36: I had to read the slide many times to understand what is being said as there was no clarity in understand.

Table 38: Responses for statement 36

| Points	Response of Exp B	Response of Exp A
5	5	4
4	15	9
3	4	4
2	7	6
1	3	6

Chi-Square statistics = 2.31
Degrees of freedom = 4
Probability of chance = 0.680
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 36: Graphical Representation of analysis of statement 36

	5	4	3	2	1
Exp Gp B	14.71	44.12	11.76	20.59	8.82
Exp Gp A	13.79	31.03	13.79	20.69	20.69
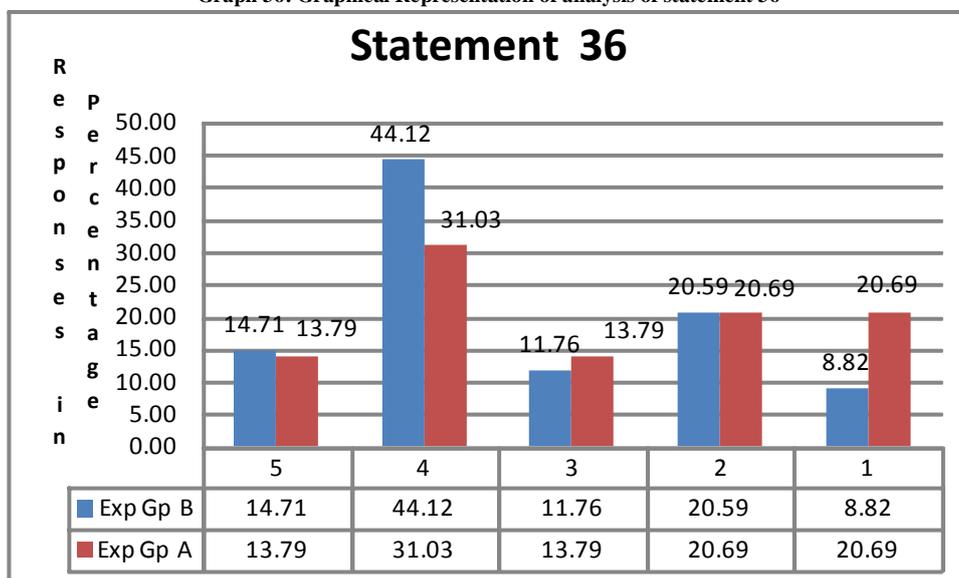
Statement 37: Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.

Table 39: Responses for statement 37

Points	Response of Exp B	Response of Exp A
5	5	5
4	15	11
3	3	5
2	6	3
1	3	6

Chi-Square = 3.05
Degrees of freedom = 4
Probability = 0.549
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 37: Graphical Representation of analysis of statement 37

Statement 37

	5	4	3	2	1
Exp Gp B	15.63	46.88	9.38	18.75	9.38
Exp Gp A	16.67	36.67	16.67	10.00	20.00
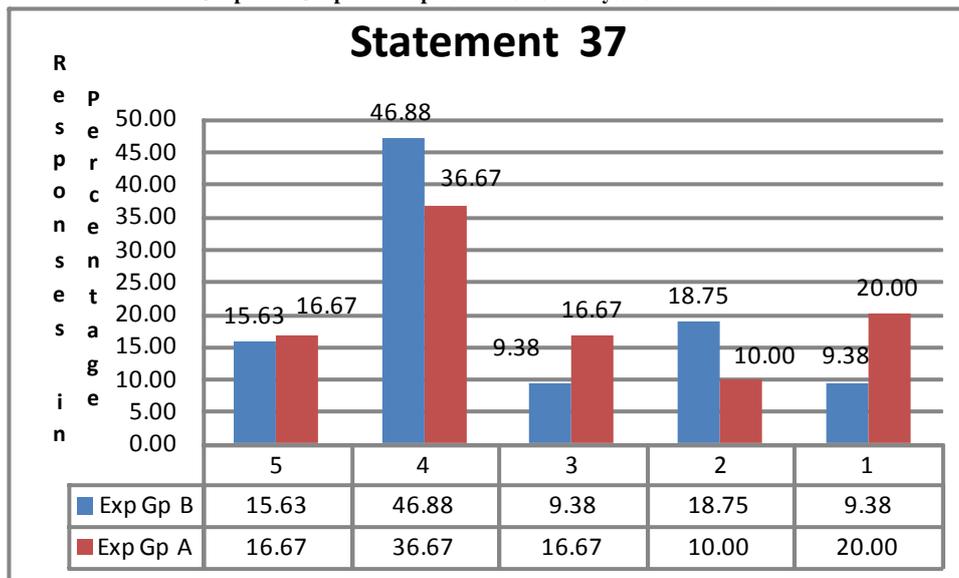
Statement 38: Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.

Table 40: Responses for statement 38

Points	Response of Exp B	Response of Exp A
5	5	8
4	13	12
3	3	5
2	10	3
1	2	2

Chi-Square statistics = 4.87
Degrees of freedom = 4
Probability of chance = 0.301
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 38: Graphical Representation of analysis of statement 38

Statement 38

	5	4	3	2	1
Exp Gp B	15.15	39.39	9.09	30.30	6.06
Exp Gp A	26.67	40.00	16.67	10.00	6.67
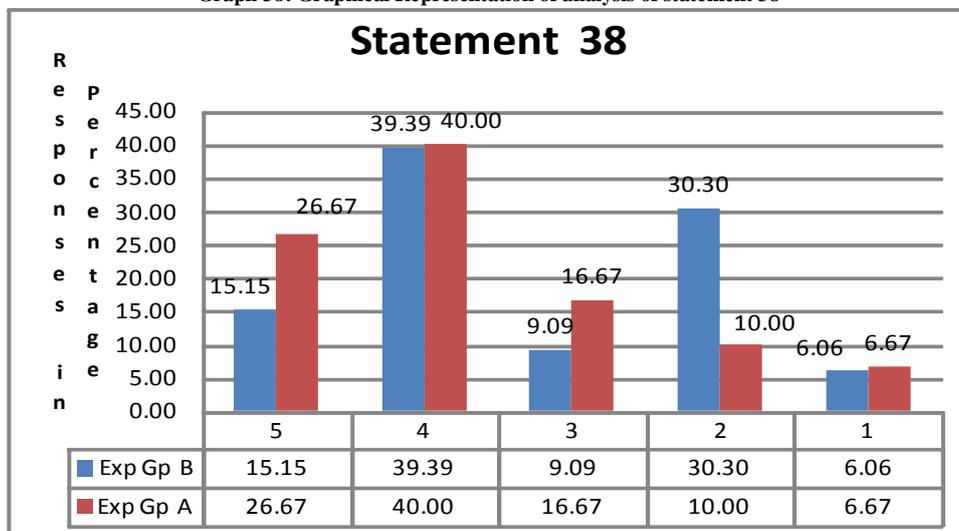
Statement 39: Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.

Table 41: Responses for statement 39

| Points	Response of Exp B	Response of Exp A
5	9	5
4	9	12
3	5	2
2	4	12
1	3	3

Chi-Square statistics = 6.63
Degrees of freedom = 4
Probability of chance = 0.157
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 39: Graphical Representation of analysis of statement 39

	5	4	3	2	1
Exp Gp B	30.00	30.00	16.67	13.33	10.00
Exp Gp A	14.71	35.29	5.88	35.29	8.82
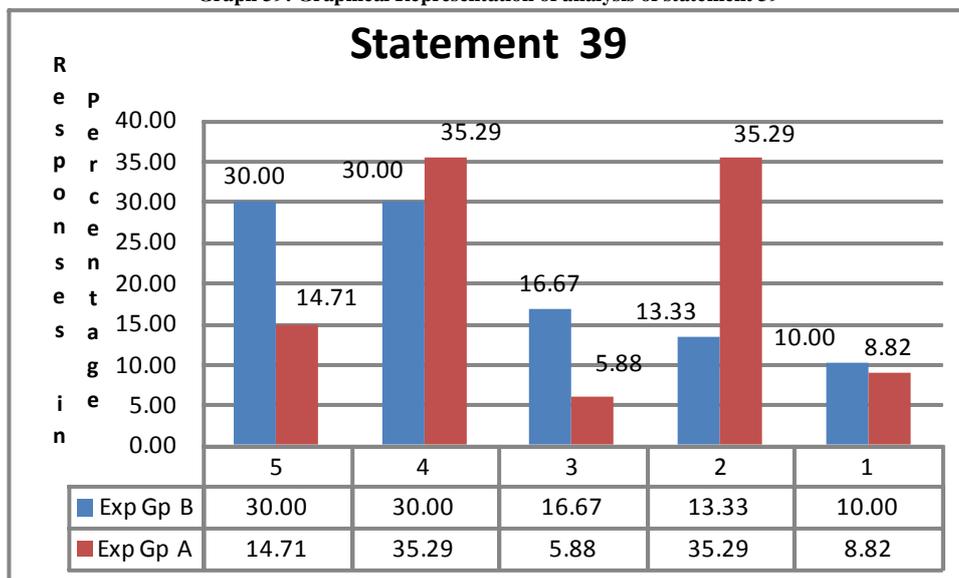
Statement 40: CAI is not enough in understanding the concept very clearly.

Table 42: Responses for statement 40

Points	Response of Exp B	Response of Exp A
5	5	6
4	11	10
3	6	9
2	5	4
1	6	1

Chi-Square statistics = 4.29
Degrees of freedom = 4
Probability of chance = 0.368
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 40: Graphical Representation of analysis of statement 40

Statement 40

	5	4	3	2	1
Exp Gp B	15.15	33.33	18.18	15.15	18.18
Exp Gp A	20.00	33.33	30.00	13.33	3.33
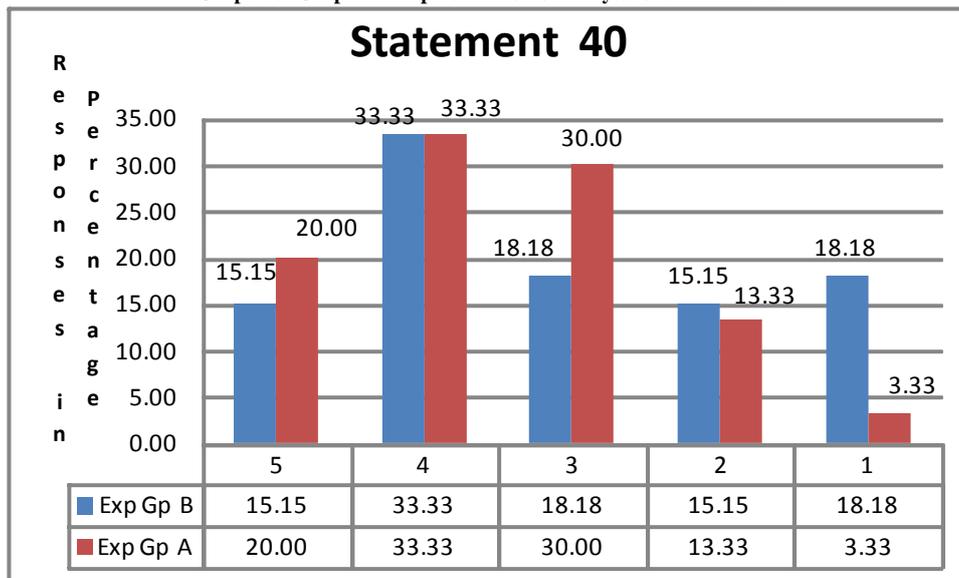
Statement 41: Independent learning is not possible through CAI.

Table 43: Responses for statement 41

Points	Response of Exp B	Response of Exp A
5	10	7
4	17	5
3	2	10
2	4	3
1	0	4

Chi-Square statistics = 16.4
Degrees of freedom = 4
Probability of chance = 0.003
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that there is significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

51.52% students of Exp B '*disagree*' where as 17.24% students of Exp A '*Disagree*' with the statement 41. More load is on '*disagree*' of the Exp B than Exp A.

Graph 41: Graphical Representation of analysis of statement 41

Statement 41

	5	4	3	2	1
Exp Gp B	30.30	51.52	6.06	12.12	0.00
Exp Gp A	24.14	17.24	34.48	10.34	13.79
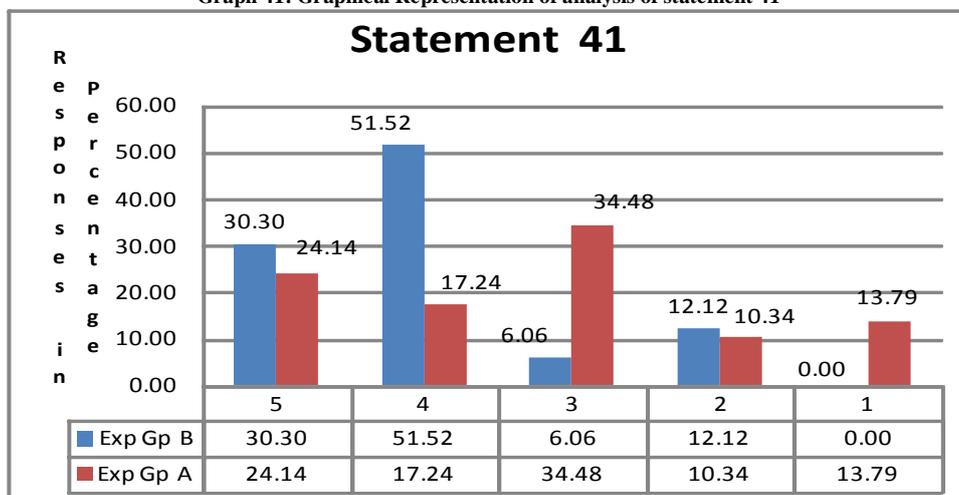
Statement 42: Evaluation is done objectively (objective questions) so no partiality is involved in scoring.

Table 44: Responses for statement 42

| Points	Response of Exp B	Response of Exp A
5	9	9
4	14	8
3	5	7
2	3	4
1	2	1

Chi-Square statistics= 2.20
Degrees of freedom = 4
Probability of chance = 0.700
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 42: Graphical Representation of analysis of statement 42

Statement 42

	5	4	3	2	1
Exp Gp B	27.27	42.42	15.15	9.09	6.06
Exp Gp A	31.03	27.59	24.14	13.79	3.45
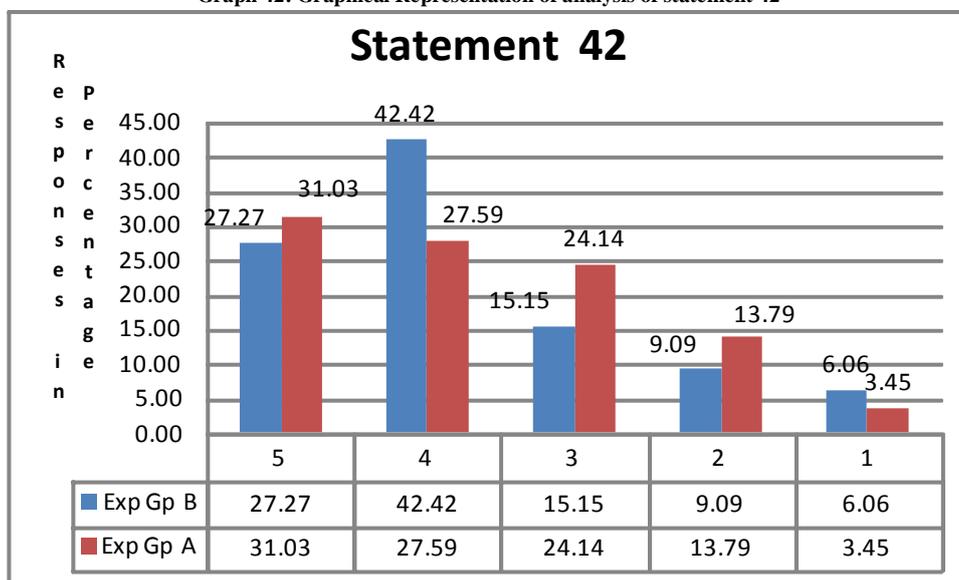
Statement 43: Evaluation done at the end of the topic "simple interest" is not suitable measure to know my understanding about that topic.

Table 45: Responses for statement 43

Points	Response of Exp B	Response of Exp A
5	4	5
4	9	8
3	9	12
2	9	4
1	2	2

Chi-Square statistics = 2.46
Degrees of freedom = 4
Probability of chance= 0.652
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 43: Graphical Representation of analysis of statement 43
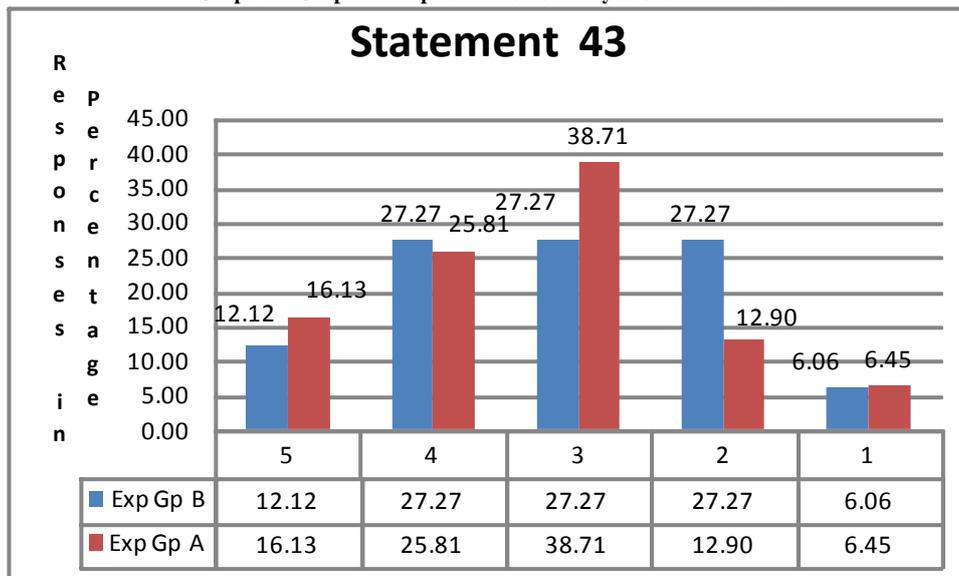
Statement 44: Instruction given in each slide of CAI is easy and clear to follow.

Table 46: Responses for statement 44

Points	Response of Exp B	Response of Exp A
5	10	13
4	11	9
3	8	5
2	4	0
1	0	2

Chi-square statistics = 7.05
Degree of freedom = 4
Probability of chance =.133
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 44: Graphical Representation of analysis of statement 44
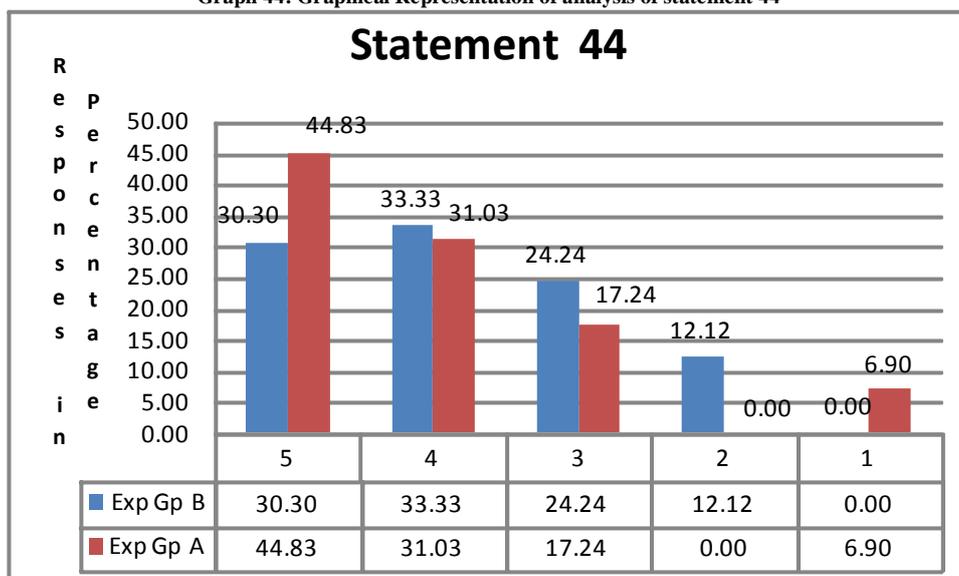
Statement 45: Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.

Table 47: Responses for statement 45

| Points	Response of Exp B	Response of Exp A
5	6	3
4	9	3
3	8	11
2	7	7
1	3	5

Chi-square statistics = 4.74
Degree of freedom = 4
Probability of chance =.316
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 45: Graphical Representation of analysis of statement 45

	5	4	3	2	1
Exp Gp B	18.18	27.27	24.24	21.21	9.09
Exp Gp A	10.34	10.34	37.93	24.14	17.24
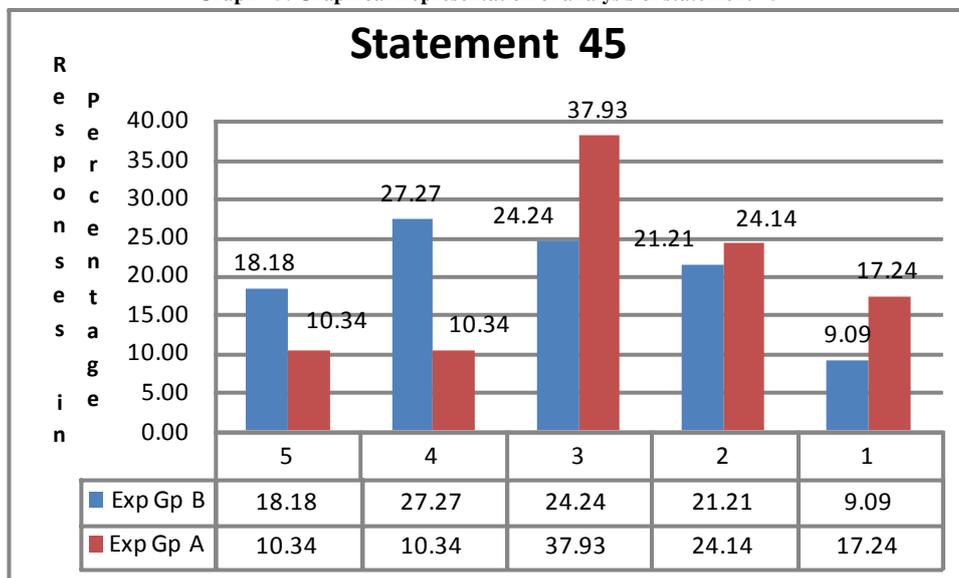
Statement 46: Interaction with mathematics teacher is not possible while using this CAI.

Table 48: Responses for statement 46

Points	Response of Exp B	Response of Exp A
5	5	3
4	11	5
3	2	8
2	12	10
1	3	3

Chi-square statistics = 6.30
Degree of freedom = 4
Probability of chance =.178
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 46: Graphical Representation of analysis of statement 46

Statement 46

	5	4	3	2	1
Exp Gp B	15.15	33.33	6.06	36.36	9.09
Exp Gp A	10.34	17.24	27.59	34.48	10.34
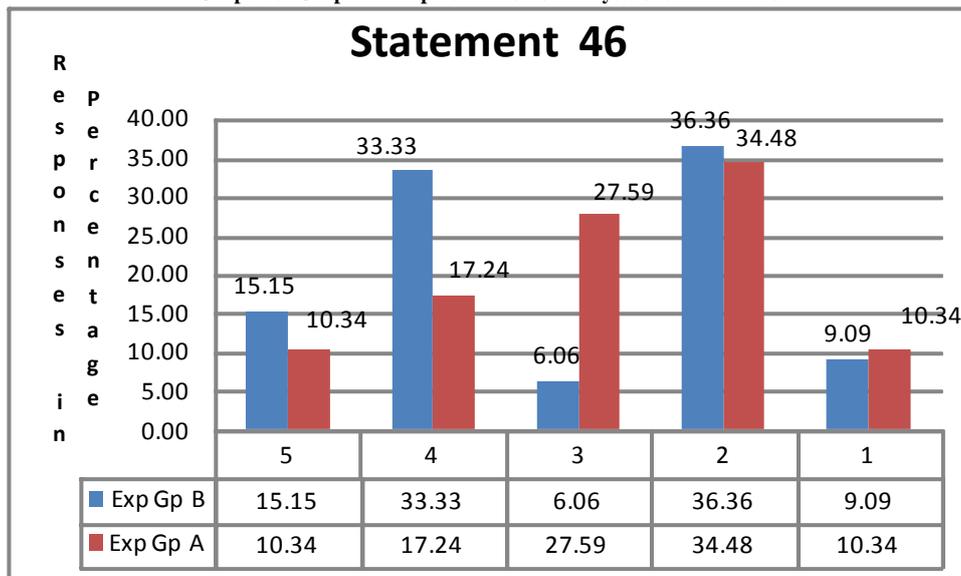
Statement 47: To get the correct answer I had to go back to the slide/s many times for topic simple interest.

Table 49: Responses for statement 47

Points	Response of Exp B	Response of Exp A
5	6	2
4	15	11
3	3	4
2	7	5
1	2	7

Chi-square statistics = 5.63
Degree of freedom = 4
Probability of chance =.228
Table value of chi square at 4df at .05 significance level is 9.488. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 47: Graphical Representation of analysis of statement 47

Statement 47

|	5	4	3	2	1
Exp Gp B	18.18	45.45	9.09	21.21	6.06
Exp Gp A	6.90	37.93	13.79	17.24	24.14
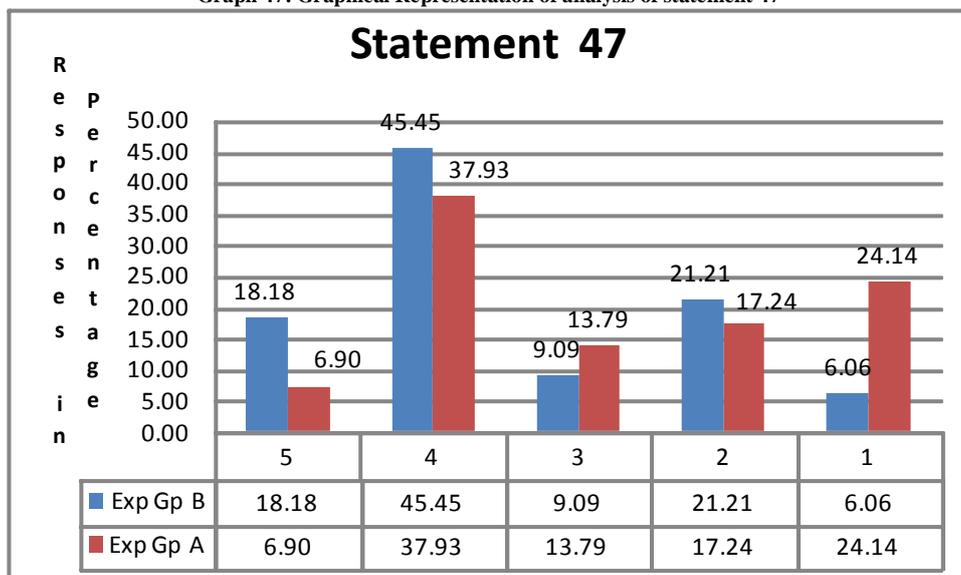
Statement 48: To get the correct answer I had to go back to the slide/s many times for topic Compound interest.

Table 50: Responses for statement 48

| Points	Response of Exp B	Response of Exp A
5	7	2
4	12	9
3	1	7
2	7	5
1	7	6

Chi-square statistics = 7.77
Degree of freedom = 4
Probability of chance =.100
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 48: Graphical Representation of analysis of statement 48

	5	4	3	2	1
Exp Gp B	20.59	35.29	2.94	20.59	20.59
Exp Gp A	6.90	31.03	24.14	17.24	20.69
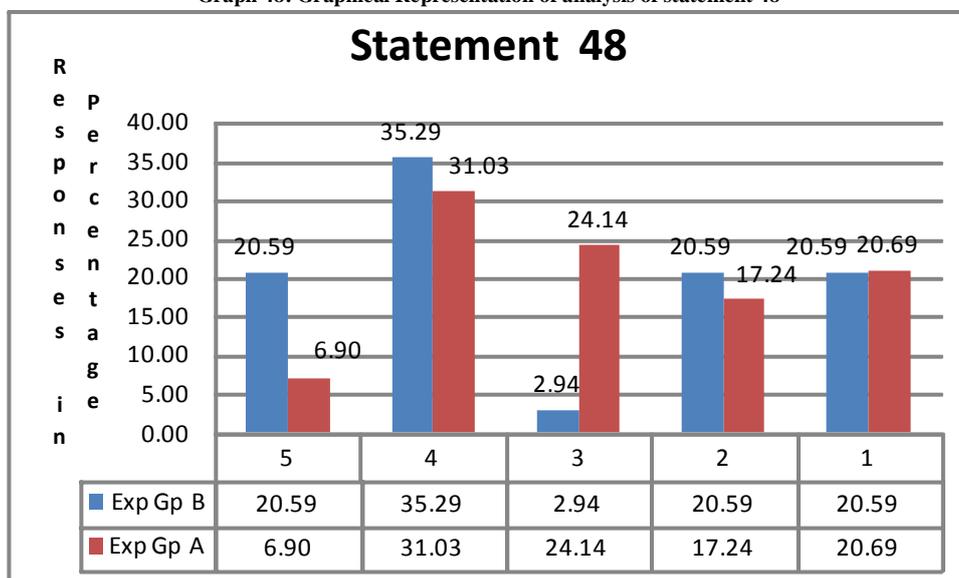
Statement 49: To get the correct answer I had to go back to the slide/s many times for topic profit and loss.

Table 51: Responses for statement 49

Points	Response of Exp B	Response of Exp A
5	8	2
4	14	12
3	3	5
2	5	3
1	4	7

Chi-square statistics = 5.21
Degree of freedom = 4
Probability of chance =.267

Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 49 Graphical Representation of analysis of statement 49

	5	4	3	2	1
Exp Gp B	23.53	41.18	8.82	14.71	11.76
Exp Gp A	6.90	41.38	17.24	10.34	24.14
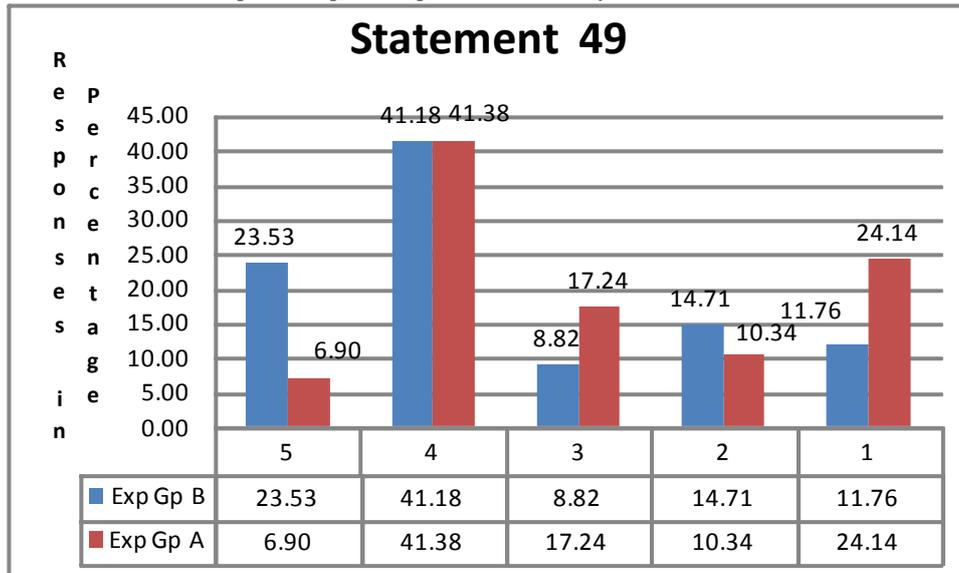
Statement 50: Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.

Table 52: Responses for statement 50

Points	Response of Exp B	Response of Exp A
5	10	11
4	17	9
3	3	4
2	2	4
1	2	2

Chi-square statistics = 3.08
Degree of freedom = 4
Probability of chance =.544
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 50: Graphical Representation of analysis of statement 50

	5	4	3	2	1
Exp Gp B	29.41	50.00	8.82	5.88	5.88
Exp Gp A	36.67	30.00	13.33	13.33	6.67
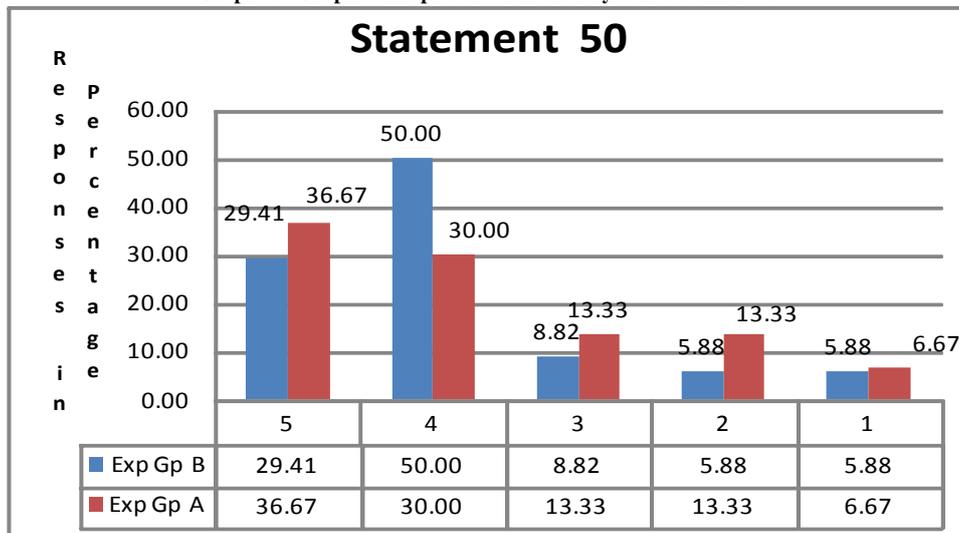
Statement 51: Discussion with mathematics teacher is needed along with CAI.

Table 53: Responses for statement 51

Points	Response of Exp B	Response of Exp A
5	1	1
4	5	4
3	2	6
2	7	7
1	17	11

Chi-square statistics = 3.26
Degree of freedom = 4
Probability of chance =.516

Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 51: Graphical Representation of analysis of statement 51

	5	4	3	2	1
Exp Gp B	3.13	15.63	6.25	21.88	53.13
Exp Gp A	3.45	13.79	20.69	24.14	37.93
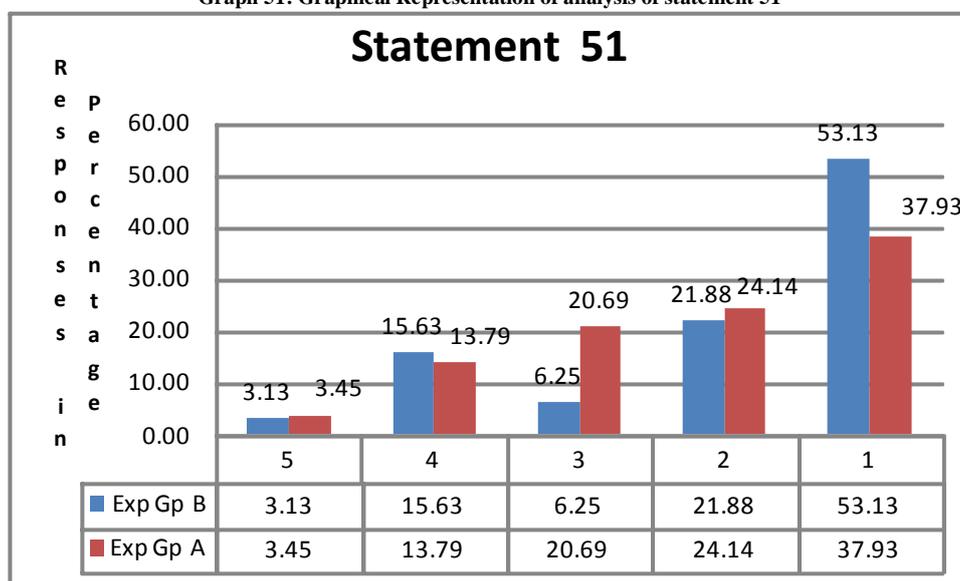
Statement 52: Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.

Table 54: Responses for statement 52

Points	Response of Exp B	Response of Exp A
5	9	9
4	15	12
3	4	7
2	1	1
1	5	2

Chi-square statistics = 2.30
Degree of freedom = 4
Probability of chance =.680
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 52: Graphical Representation of analysis of statement 52

	5	4	3	2	1
■ Exp Gp B	26.47	44.12	11.76	2.94	14.71
■ Exp Gp A	29.03	38.71	22.58	3.23	6.45
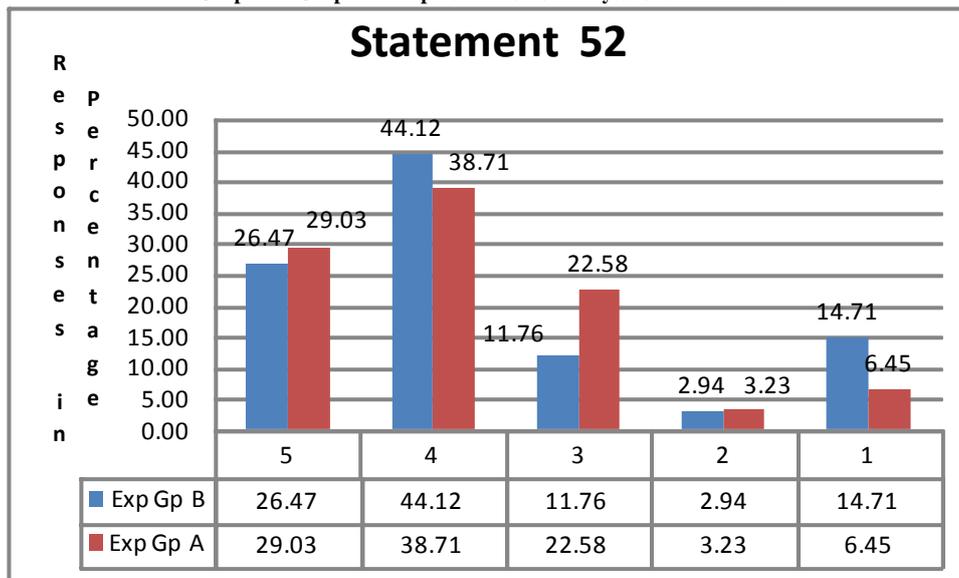
Statement 53: Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.

**Table 55: Responses for statement 53**

Points	Response of Exp B	Response of Exp A
5	6	7
4	16	12
3	4	8
2	1	1
1	6	1

Chi-square statistics = 5.32
Degree of freedom = 4
Probability of chance = .256

Table value of chi square at 4df at .05 significance level is 9.488. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 53: Graphical Representation of analysis of statement 53

	5	4	3	2	1
■ Exp Gp B	18.18	48.48	12.12	3.03	18.18
■ Exp Gp A	24.14	41.38	27.59	3.45	3.45
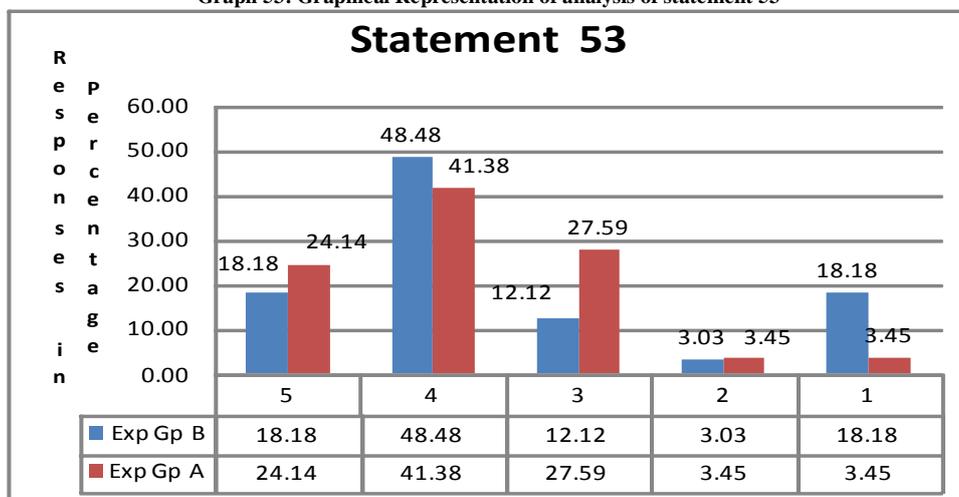
Statement 54: Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.

Table 56: Responses for statement 54

Points	Response of Exp B	Response of Exp A
5	5	7
4	12	14
3	5	5
2	1	1
1	10	2

Chi-square statistics = 5.59
Degree of freedom = 4
Probability of chance =.232
Table value of chi square at 4df at .05 significance level is 9.488.Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that there is no significant difference observed between Experimental group A and Experimental group B towards effectiveness of the developed CAI for the given statement.

Graph 54: Graphical Representation of analysis of statement 54

	5	4	3	2	1
Exp Gp B	15.15	36.36	15.15	3.03	30.30
Exp Gp A	24.14	48.28	17.24	3.45	6.90
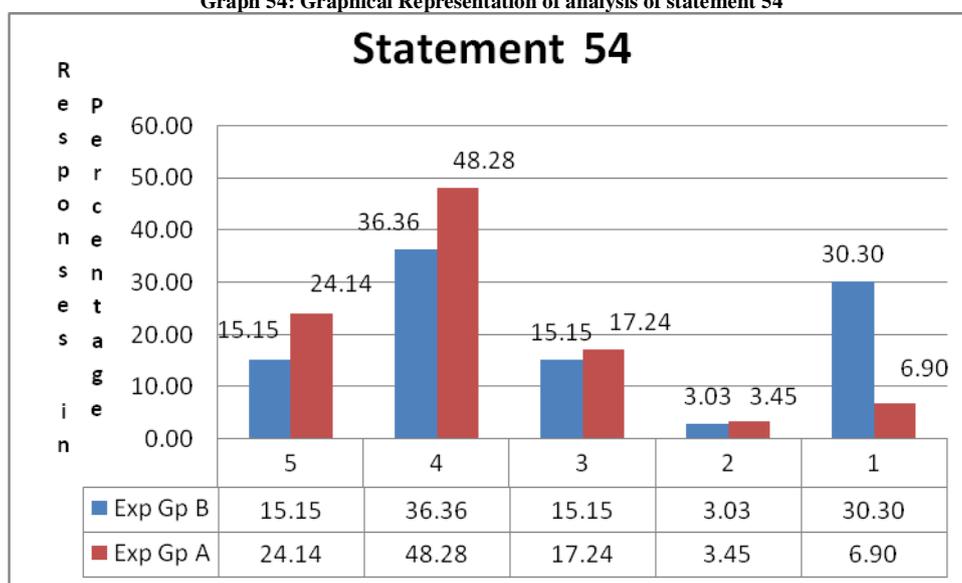
V.   FINDINGS OF THE STUDY

Out of 54 statements for four statements (1,2,29, 41) the chi square value is found to be significant which means the Significant difference was observe between Experimental group A and Experimental group B while for remaining 50 statements chi square value is not found to be significant which means that both the group liked the respective way of teaching .

VI.   EDUCATIONAL IMPLICATION OF THE PRESENT STUDY

Students enjoyed learning mathematics through CAI and it helped students as a supplementary material. Self learning material should be developed in mathematics where ever possible for all classes and should be used along with the conventional method to make learning enjoyable pleasant experience.

VII.   CONCLUSION

Comparing the overall responses of both the groups it seems that out of 54 responses given to the 54 statements on the reaction scale, in four responses for four statements the chi square value is found to be significant which means Significant difference was observe between Experimental group A and Experimental group B while for remaining 50 statements chi square value is not found to be significant. Only CAI is as effective as CAI with simultaneous discussion. Overall responses of the students and from observations of the investigators it was found that students enjoyed learning mathematics through CAI. So it can be concluded that CAI is one of the effective way to teach and learn mathematics.

VIII. ACKNOWLEDGEMENTS

REFERENCE

[1]   R. McCabe, *Underprepared students.* San Jose, CA: The National Center for Public Policy and Higher Education. Retrieved from http://measuringup2008.highereducation.org/print/NCPPHEMUNationalRpt.pdf   articles/UnderpreparedStudents.cfm#TPE   on 13.10.12, 2000.

[2]   ,R Ramani and H. Patadia, *Computer Assisted Instruction in Teaching of Mathematics*. IOSR Journal of Humanities and Social Science (JHSS).Volume 2, Issue I(Sep-Oct 2012). ISSN-2279-0837, ISBN-2279-0845 , pp 39-42. Retrived from www.iosrjournals.org on 14.10.12, 2012.

[3]   M.E. Patel, *Factors Influencing Higher Secondary Students For* Selection of Commerce and Rejection of Science Stream in Vadodara *City*: An Unpublished M.Ed Dissertation, Vadodara: CASE, The Maharaja Sayajirao University of Baroda, 2006.

[4]   G.Ravindra Researches on Curriculum and teaching:Mathematics: A Trend Report. In NCERT(Ed.)*Sixth Survey of Educational Research* 1993-2000, Vol.II, NCERT. New Delhi, 2006.

[5]   R Ramani, and H Patadia,. *Computer Assisted Instruction in Teaching of Mathematics*. IOSR Journal of Humanities and Social Science (JHSS).Volume 2, Issue I(Sep-Oct 2012). ISSN-2279-0837, ISBN-2279-0845 , pp 39-42. Retrived from www.iosrjournals.org on 14.10.12, 2012.

[6]   S.L Jain,.; G.L. Burad. "Low Results in Mathematics at Secondary Examination in Rajasthan", Independent Study. Udaipur: State Institute of Educational Research and training, India, 1988.

[7]   Chel, M.M. *Diagnosis and remediation of under achievement in compulsary Maths of Madynamic examination in West Bengal.* In NCERT (1992). Fifty Survey of Research in Education, New Delhi:NCERT, 1990.

[8]   P.Jeyamani, *Effectiveness of simulation modes of teaching through CAI*. In NCERT (1992). Fifth Survey of Research in Education, New Delhi: NCERT, India, 1991.est Bengal." In NCERT(1992). Fifty Survey of Research in Education, New Delhi: NCERT,India, 1990.

[9]   V. Rose Antony Stella, *Effectiveness of Computer Assisted Instruction with Special reference to underachivers*. In NCERT(1992). Fifth Survey of Research in Education, New Delhi: NCERT, India, 1992.

[10]   R. Adhikari, *Development of Computer Aided Instruction Material on cell and cell   reproduction for class IX*. In Goel, D. R. (2000). Educational Media in India. Delhi: Bharatiya Kala Prakashan, India, 1992.

[11]   H. Barot, *To study the effectiveness of CAI in Sanskrit for std. VIII students.* An unpublished M.Ed. dissertation. Vadodara: CASE. The Maharaja Sayajirao University of   Baroda, India, 2005.

[12]   N. Dalwadi, *Development of Computer Assisted Instruction in science for the students of   standard IX*. An unpublished M.Ed. dissertation. Vadodara:CASE. The Maharaja Sayajirao   University of Baroda, India, 2001.

[13]   S. Helaiya, *Developing and Implementation of CAI package for teaching statistics to B.Ed. Students*. An unpublished M.Ed. dissertation. Vadodara:CASE. The Maharaja Sayajirao University of Baroda, India, 2004.

[14]   A.Khirwadkar, *Development of Computer software for learning chemistry at standard XI.* An unpublished Ph.D, Thesis, Vadodara: CASE, The M.S.University of Baroda, India, 1998.

[15]   M.Rathwa,   *Development and Implementation of Multimedia Package for teaching Gujarati subject*. An unpublished M.Ed. dissertation. Vadodara: CASE. The Maharaja Sayajirao University of Baroda, India, 2007.

[16]   D. Sharma, *A study of the effectiveness of Computer Assisted Learning (CAL) in chemistry for the students of standard XI*. An unpublished M.Ed. dissertation. Vadodara: CASE. The Maharaja Sayajirao University of Baroda, India, 2003.

[17]   R.D. Singh, *To study the effectiveness of teaching mathematics through Computer Assisted Instruction and conventional method of cognitive and non cognitive variables.* In NCERT.(ed.) fifth Survey of Research in Education, New Delhi : NCERT, India, 1992.

[18]   S. Yadav, *A study of the effectiveness of the Computer Software for students of standard I*. An unpublished M.Ed. dissertation. Vadodara: CASE. The Maharaja Sayajirao University of Baroda, India, 2000.

[19]   M.M. Zyoud, *Development of Computer assisted English language teaching of VIII standard students*. An unpublished Ph.D. Thesis. Vadodara: CASE. The Maharaja Sayajirao University of Baroda, India, 1999.

[20]   F.S. Vansia, *Effectiveness of Computer with Peer Interaction for Math's learning in urban area*. . International Referred Research Journal,   September,   2011,   ISSN-0975-3486:Rajbil   2001/30097,   Vol-II   Issue   24   in http://www.ssmrae.com/admin/images/f76c407be2bb7e5c6eef3071f8c9abd5.pdf   , date:13/7/12

[21]   Spradlin, Kathy Dye and Ackerman, Beth, *The Effectiveness of Computer- Assisted Instruction in Developmental Mathematics*, 2010.   *Faculty Publications and Presentations.* Paper 195. date: 12.10.2012 http://digitalcommons.liberty.edu/educ_fac_pubs/195

[22]   http://www.physics.csbsju.edu/stats/contingency_NROW_NCOLUMN_form.html date: 30.09.2012