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

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Abstract   Investigators have conducted a true experimental study to compare the academic performance of students of class VIII in one of the English medium school of Vadodara, India. A comparison was made among traditional instruction, only Computer Assisted Instruction (CAI) and Computer Assisted Instruction with simultaneous discussion. The design used in this study was post-test only control group design. Three sections of class VIII were selected and the groups were randomly assigned. Students studied in their respective methods till the completion of the selected units. Reaction Scale was developed and administered to the students to know the effectiveness of the developed CAI. Data was analysed using Chi Square and percentage. From the comparative analysis of the reaction scale it was found that students liked their respective ways of learning. Investigators observed that students enjoyed learning mathematics through CAI.

Keywords   Computer Assisted Instruction, Effectiveness, Self-Learning Material and Auto Instruction

1. Introduction

Education gives skill and competency to the individual for a successful living. It is an instrument of social change, modernization, development, economic and social development of a country. The 21st century world can be called a scientific world, advancing rapidly in information technology, medicine, engineering, space communication, astronomy, astrophysics, artificial intelligence, robotics and many other disciplines.

Our country requires technically skilled manpower. For all disciplines mathematics is the base. India has a rich Mathematical heritage. An Instrument was actually used for drawing circles in the Indus valley as early as 2500 BC. Several significant contributions to the world of mathematics have been made during the last two millennia, for example, by Aryabhata I(475 AD), Brahma Gupta(7th Century), Mahavira(850AD), Bhaskara II(1150), Madhava(14th Century), Ramanujan(1887-1920).[1] also emphasizes that mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulate logically, apart from being a specific subject it should be treated as concomitant to any subject involving analysis and reasoning. Yet many school students find difficulty with learning of mathematics and fail in mathematics. A major reason for the failure is that the teachers quite often pay no attention to the basic concepts and generally adopt methods of solving questions with crammed up formulae. 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. Researchers have developed the Computer Assisted Instruction for teaching and learning mathematics for class VIII students in arithmetic part and tested the reaction of students on the developed material.

2. Importance of Mathematics

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Epistemologically mathematics means mathema-explaining and understanding, tics-techniques such as counting, ordering, sorting, and measuring. Right from pre historic period there have been problems to solve. Problems may be over basic requirements like food, water, shelter or accomplishment like constructing multi-storied building. Mathematics is part and parcel of daily life. Mathematics is used in learning almost all subjects. We cannot imagine learning engineering disciplines without mathematics. Biology, medicine, computer, science, economics etc. all use mathematics. The revolution in information and technology is due to advancement in mathematics. Statistics uses mathematics for analyzing of data. Different commissions have given different views on the place of mathematics. Arithmetic is an important part of mathematics. Its forms the base of algebra so we can conclude that learning arithmetic thoroughly helps students to learn algebra easily. In this modern era we cannot think of a field, where calculation or computation is not used. Knowingly or unknowing we use mathematics in our day to day life. It ranges from household to industries, business, education, science and technology, art and craft and even in music, dance etc.

3. Computer Assisted Instruction in Learning Mathematics

ICT (Information and Communication Technology) has great potential for teaching and learning process at all levels. The use of ICT has enriched the teaching learning process with the help of computer. It has brought a great change, innovativeness, and creativity in teachers in teaching learning process. Mathematics and computer are both important in today's life as they open the gate of ample opportunities in this modern world. Mathematics is widely used in computers both in hardware and software. Computer helps in improving the knowledge of mathematics. Computer helps in making classroom teaching lively.

Computer can play vital role in learning process as it can work with the imagination of students. Any concept in mathematics can be explained with the help of pictures and this visual image can help in understanding the concept at ease. In paper pencil method student can get bored easily and can find it difficult to practice the sum again and again. CAI works as a change and increases the curiosity of students and they can learn interestingly without any difficulty. Also whatever is learnt through computer aided instructions, the contents can be retained for longer time as they use more senses of the students.[2] CAI brings with it several potential benefits as a teaching/learning medium. These include self-paced learning, self-directed learning, the exercising of various senses and the ability to represent content in a variety of media. Humans are multi-sensory animals. Certain chapters like Profit and loss, Simple and compound interest can be explained very easily using CAI. Varity of exercises can be provided and this ensures active involvement of the students. The material can be provided according to the needs of the students.

4. Rationale of the Study

Many studies have been conducted on low achievements in mathematics. [3]Author has 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. [4]Author has found that 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. Many studies have been conducted to find out the effectiveness of CAI in terms of achievement of the students in learning. [5]Author found that experimental group performed better on post test. The studies conducted by [6-16] authors showed that CAI was effective than conventional method. [17] Author in his study found that mathematics learning through CAI with Peer Instruction (CAIPI) was effective on post-test. [18] Author found that there was no statistically significant difference in the post-test scores of students receiving traditional instruction and traditional instruction supplemented with computer assisted instruction.

Results of the present study may initiate changes in teaching and learning mathematics, in the instructional modes in order to enhance mathematical achievement for all students. With information about the potential impact of computer assisted instruction, institutions can invest their resources wisely. In addition, it may lead to investigation on students' highest achievement in the various delivery formats.

5. Methodology of the Study

5.1. The Present Study Entitles

Comparative Analysis on Reaction of Students on Developed Computer Assisted Instruction for Teaching Arithmetic。

5.2. Objectives of the Study

1). To study the effectiveness of the developed CAI in terms of Experimental Group A (only CAI) (Exp A) students' response to the reaction scale.

2). 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.

3). 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).

5.3. 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.

5.4. 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.

5.5. Design of the Study

The study adopts the post test only control group design.

5.6. 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.

5.7. 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 28 students and experimental group B consisted of 25 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 53 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 for both the groups.

5.8. Tools for Data Collection

1) Computer Assisted Instruction developed by the Investigator and modified according to the comments given by experts in mathematics, mathematics education, English and Computer Science

2) Reaction Scale developed by the Investigator and modified according to the comments given by the expert in English.

5.9. 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 a month for the completion of the selected arithmetic unit.

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

6. Data Analysis

Data was analysed through the statistical technique χ2.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 X2:

$$X^2 = \frac{(x_1 - E_1)^2}{E_1} + \frac{(x_2 - E_2)^2}{E_2} + ... + \frac{(x_k - E_k)^2}{E_k}$$

$$= \sum_{i=1}^{k} \frac{(x_i - E_i)^2}{E_i}$$

6.1. 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	10	7
4	9	11
3	1	3
2	4	6
1	0	0

Chi-square statistics = 1.96 (calculated using table 3)
Degree of freedom = 3
Probability of chance =0.581

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 reveals 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.

Statement 1

	5	4	3	2	1
Exp Gp B	41.67	37.5	4.17	16.67	0
Exp Gp A	25.93	40.74	11.11	22.22	0
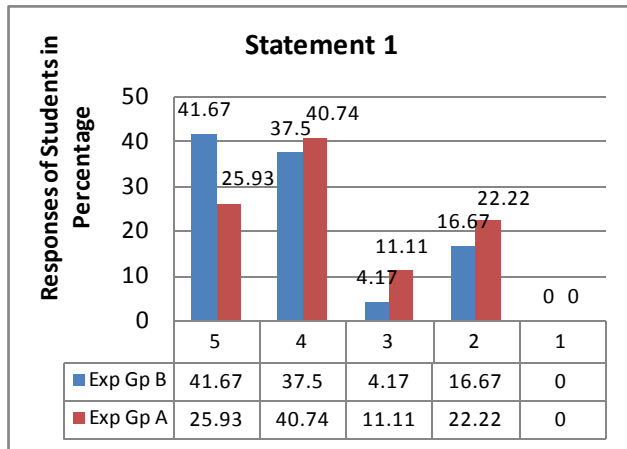
Percentage is calculated using table 3. From the above graph 1 it can be seen that 41.67%(a maximum) of the students responded that they *strongly agree* with statement 1.
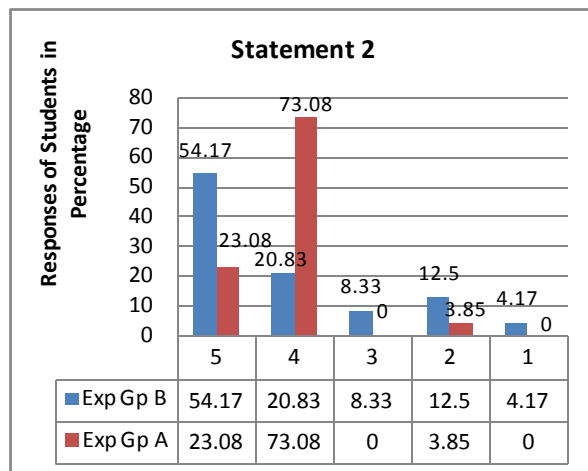
Graph 1.   Graphical Representation of analysis of statement 1

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	13	6
4	5	19
3	2	0
2	3	1
1	1	0

Chi-Square statistics = 14.7 (calculated using table 4)
Degrees of freedom = 4
Probability of chance = 0.005

Statement 2

	5	4	3	2	1
Exp Gp B	54.17	20.83	8.33	12.5	4.17
Exp Gp A	23.08	73.08	0	3.85	0

Percentage is calculated using table 4. From the above graph 2 it can be seen that 73.08%(a maximum) of the students responded that they *agree* with statement 2.

Graph 2.   Graphical Representation of analysis of statement 2

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.

20.83% students' of Exp B 'agree' where as 73.08% 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.

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	4	2
4	3	16
3	12	7
2	3	1
1	2	2

Chi-Square statistics= 11.6 (calculated using table 5)
Degrees of freedom = 4
Probability of chance = 0.020

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.

12.50% students' of Exp B 'agree' where as 57.14% students' of the Exp A 'agree' with the statement 3. More load is on 'agree' of the Exp A which implies that they found CAI more effective than the Exp B.

Statement 3

	5	4	3	2	1
Exp Gp B	16.67	12.5	50	12.5	8.33
Exp Gp A	7.14	57.14	25	3.57	7.14
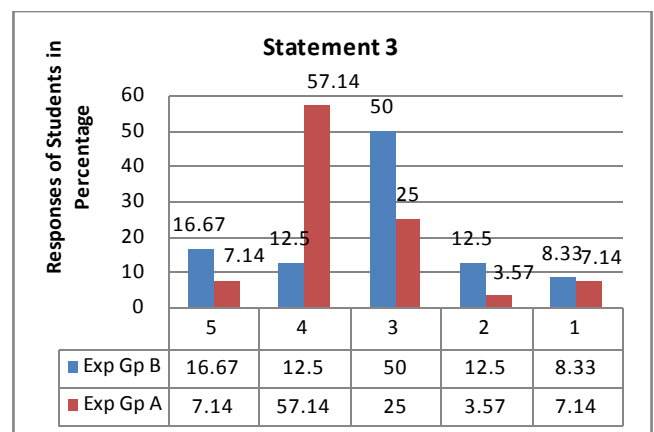
Percentage is calculated using table 5. From the above graph 3 it can be seen that 57.14 %(a maximum) of the students responded that they dis*agree* with statement 3.

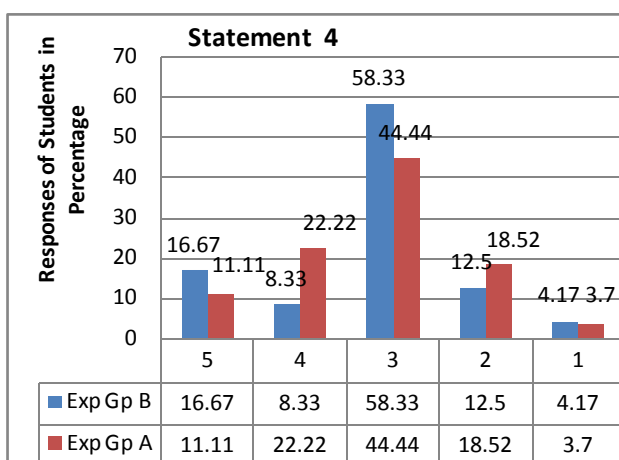**Graph 3.**   Graphical Representation of analysis of statement 3

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	4	3
4	2	6
3	14	12
2	3	5
1	1	1

Chi-Square statistics = 2.63 (calculated using table 6)
Degrees of freedom = 4
Probability of chance = 0.622

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.

	5	4	3	2	1
Exp Gp B	16.67	8.33	58.33	12.5	4.17
Exp Gp A	11.11	22.22	44.44	18.52	3.7

Percentage is calculated using table 6. From the above graph 4 it can be seen that 58.33 %(a maximum) of the students responded that they have *not decided* with statement 4.

Graph 4. Graphical Representation of analysis of statement 4

Statement 5: I can learn with my own speed.
Data: contingency table.

Table 7. Response for statement 5

Points	Response of Exp B	Response of Exp A
5	14	12
4	7	9
3	2	2
2	0	2
1	1	1

Chi-Square statistics= 2.33(calculated using table 7)
Degrees of freedom = 4
Probability of chance = 0.676

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.

	5	4	3	2	1
Exp Gp B	58.33	29.17	8.33	0	4.17
Exp Gp A	46.15	34.62	7.69	7.69	3.85
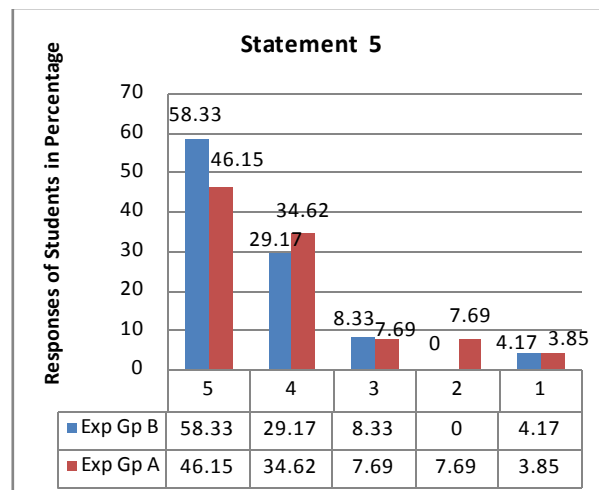
Percentage is calculated using table 7. From the above graph 5 it can be seen that 58.33 %(a maximum) of the students responded that they *strongly agree* with statement 5.

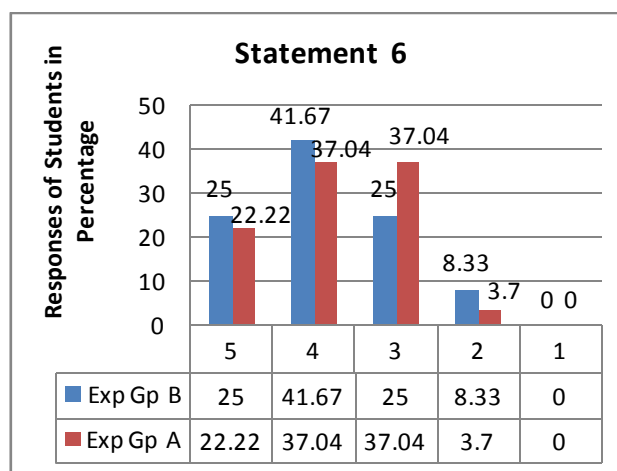**Graph 5.** Graphical Representation of Analysis of Statement 5

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	6	6
4	10	10
3	6	10
2	2	1
1	0	0

Chi-Square statistics= 1.16 (calculated using table 8)
Degrees of freedom = 3
Probability of chance = 0.762

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.

	5	4	3	2	1
Exp Gp B	25	41.67	25	8.33	0
Exp Gp A	22.22	37.04	37.04	3.7	0

Percentage is calculated using table 8. From the above graph 6 it can be seen that 41.67 %(a maximum) of the students responded that they *agree* with statement 6.

Graph 6. Graphical Representation of analysis of statement 6

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	6
4	7	11
3	3	7
2	3	2
1	1	1

Chi-Square statistics = 3.52 (calculated using table 9)
Degrees of freedom = 4
Probability of chance= 0.474

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.

Statement 7	1	2	3	4	5
Exp Gp B	41.67	29.17	12.5	12.5	4.17
Exp Gp A	22.22	40.74	25.93	7.41	3.7
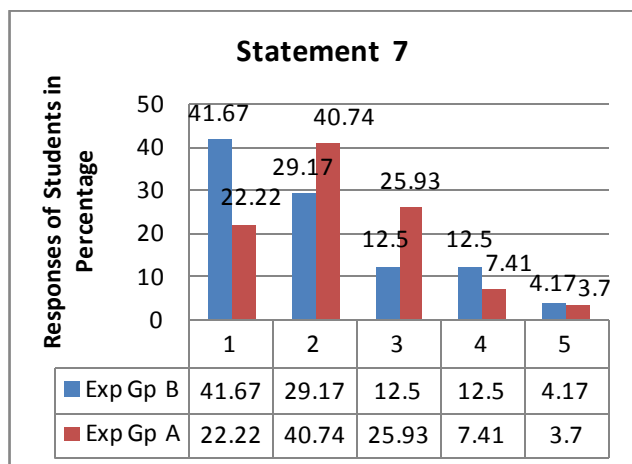
Percentage is calculated using table 9. From the above graph 7 it can be seen that 41.67 %(a maximum) of the students responded that they strongly *agree* with statement 7.

Graph 7.   Graphical Representation of analysis of statement 7

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	6	5
4	3	5
3	8	12
2	5	4
1	2	1

Chi-Square statistics = 1.66 (calculated using table 10)
Degrees of freedom = 4
Probability of chance = 0.797

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.

Statement 8	5	4	3	2	1
Exp Gp B	25	12.5	33.33	20.83	8.33
Exp Gp A	18.52	18.52	44.44	14.81	3.7
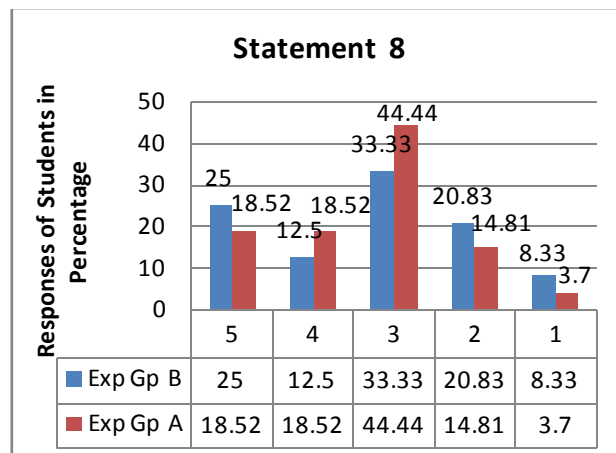
Percentage is calculated using table 10. From the above graph 8 it can be seen that 44.44 %(a maximum) of the students responded that they have *not decided* with statement 8.

Graph 8.   Graphical Representation of analysis of statement 8

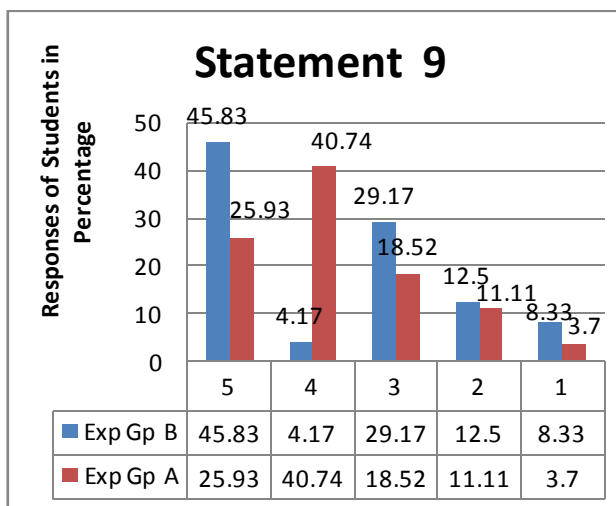Statement 9: Learning mathematics is fun in this CAI method.

Table 11.   Response for statement 9

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

Chi-Square statistics = 9.75(calculated using table 11)
Degrees of freedom = 4
probability of chance = 0.045

Statement 9	5	4	3	2	1
Exp Gp B	45.83	4.17	29.17	12.5	8.33
Exp Gp A	25.93	40.74	18.52	11.11	3.7

Percentage is calculated using table 11. From the above graph 9 it can be seen that 45.83 %(a maximum) of the students responded that they *strongly agree* with statement 9.

Graph 9.   Graphical Representation of analysis of statement 9

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.

45.83% students' of Exp B 'strongly agree' where as 25.93% students' of the Exp A 'strongly agree' with the statement 9. More load is on 'strongly agree' of the Exp B which implies that they found CAI more effective than the Exp A.

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

Chi-Square statistics = 6.25 (calculated using table 12)
Degrees of freedom = 4
Probability of chance = 0.182

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.
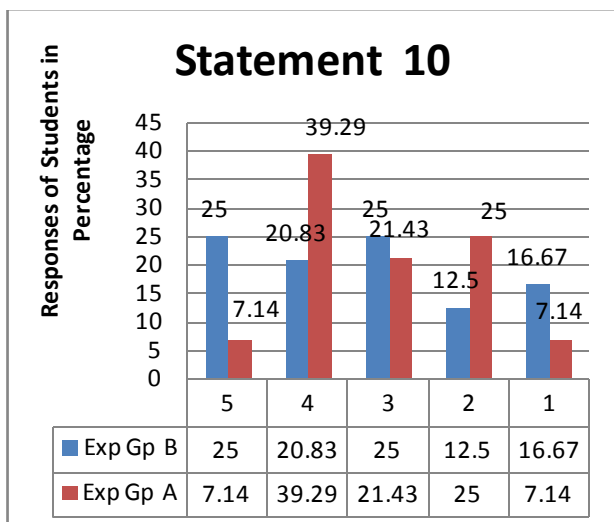
Percentage is calculated using table 12. From the above graph 10 it can be seen that 39.29 %(a maximum) of the students responded that they *disagree* with statement 10.

Graph 10. Graphical Representation of analysis of statement 10

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	5	8
4	8	10
3	3	2
2	6	7
1	2	0

Chi-Square statistics = 3.03 (calculated using table 13)
degrees of freedom = 4
probability of chance = 0.554

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.
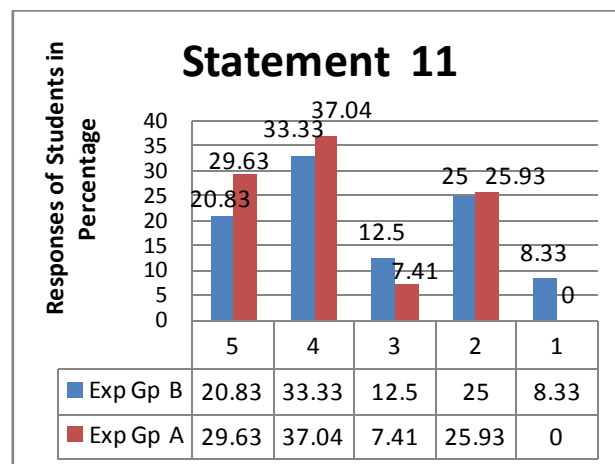
Percentage is calculated using table 13. From the above graph 11 it can be seen that 37.04 %(a maximum) of the students responded that they *agree* with statement 11.

Graph 11. Graphical Representation of analysis of statement 11

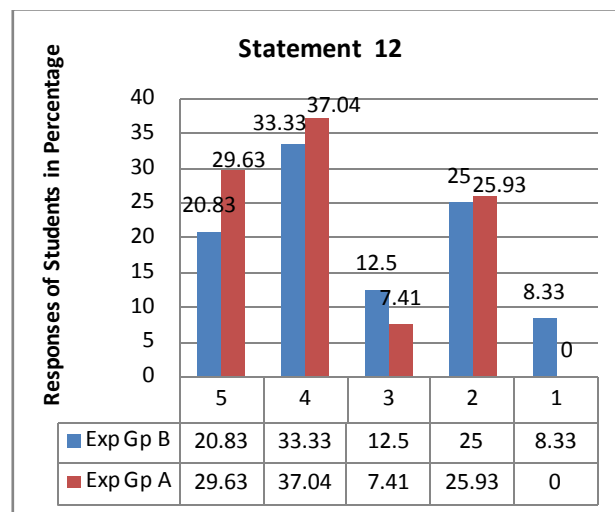Statement 12: Matter presented in CAI is not very clear.

Table 14. Response for statement 12

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

Chi-Square statistics= 7.81 (calculated using table 14)
Degrees of freedom = 4
Probability of chance = 0.099

Percentage is calculated using table 14. From the above graph 12 it can be seen that 37.04 %(a maximum) of the students responded that they dis*agree* with statement 12.

Graph 12. Graphical Representation of analysis of statement 12

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.

Statement 13: CAI is easy to understand.

Table 15.   Response for statement 13

Points	Response of Exp B	Response of Exp A
5	7	10
4	7	9
3	5	6
2	4	3
1	1	0

Chi-Square statistics = 1.72 (calculated using table 15)
Degrees of freedom = 4
Probability of chance= 0.788

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.

	5	4	3	2	1
Exp Gp B	29.17	29.17	20.83	16.67	4.17
Exp Gp A	35.71	32.14	21.43	10.71	0
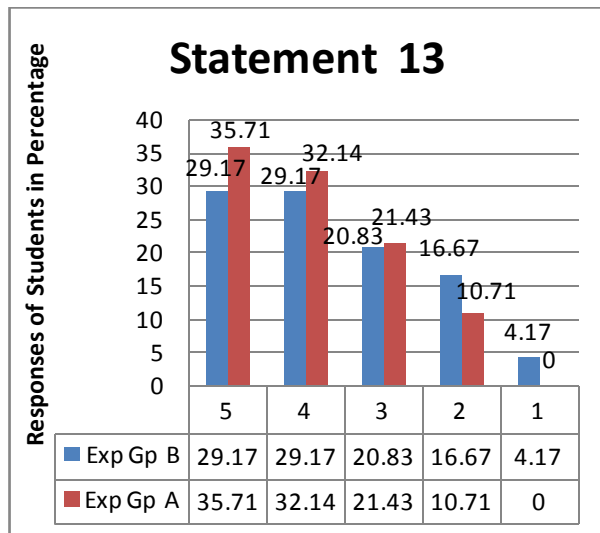
Percentage is calculated using table 15. From the above graph 13 it can be seen that 35.71 %(a maximum) of the students responded that they *strongly agree* with statement 13.

Graph 13.   Graphical Representation of analysis of statement 13

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	11	3
4	3	7
3	2	9
2	2	5
1	6	4

Chi-Square statistics = 10.5 (calculated using table 16)
Degrees of freedom = 4
Probability of chance = 0.033

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.

45.83% students of Exp B '*Strongly Disagree*' where as 10.714% students of the Exp A '*Strongly Disagree*' with the statement with the statement viz Animations are distracting in understanding the concept. More load is on '*strongly disagree*' of the Exp B which implies they found CAI more effective than the Exp A.

	5	4	3	2	1
Exp Gp B	45.83	12.5	8.33	8.33	25
Exp Gp A	10.71	25	32.14	17.86	14.29
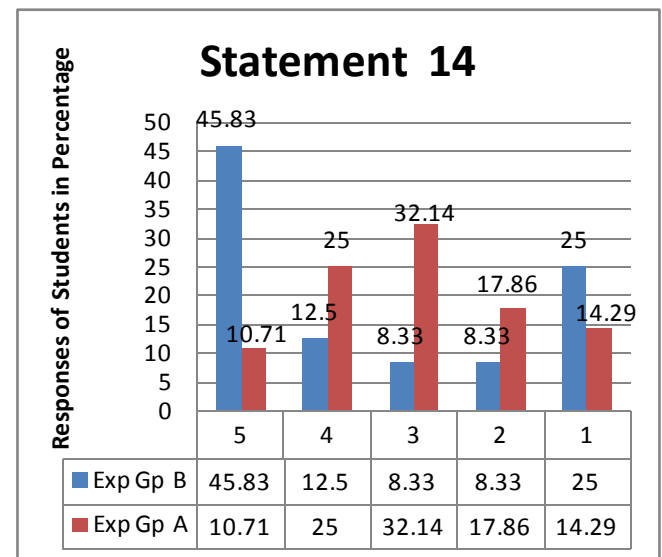
Percentage is calculated using table 16. From the above graph 14 it can be seen that 45.83 %(a maximum) of the students responded that they *strongly disagree* with statement 14.

Graph 14.   Graphical Representation of analysis of statement 14

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	8	5
4	4	7
3	5	7
2	4	3
1	3	6

Chi-Square statistics = 2.69 (calculated using table 17)
Degrees of freedom = 4
Probability of chance = 0.610

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
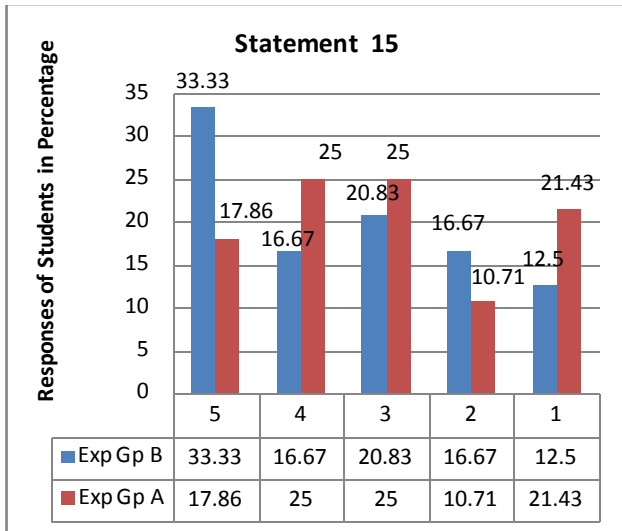
Percentage is calculated using table 17. From the above graph 15 it can be seen that 33.33 %(a maximum) of the students responded that they *strongly disagree* with statement 15.

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	6	7
4	8	9
3	2	4
2	6	5
1	2	3

Chi-Square statistics= 0.790 (calculated from table 18)
Degrees of freedom = 4
Probability of chance = 0.940

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
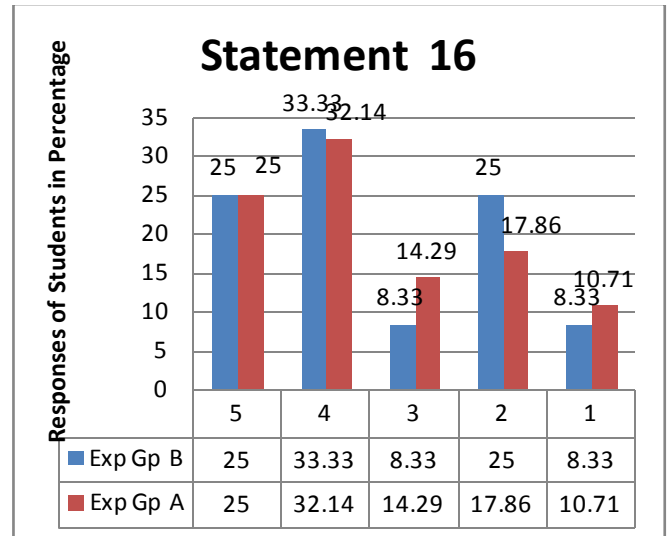
Percentage is calculated using table 18. From the above graph 16 it can be seen that 33.33 %(a maximum) of the students responded that they *agree* with statement 16.

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	5	9
4	5	10
3	8	6
2	3	1
1	3	2

Chi-Square statistics = 4.01 (calculated using table 19)
Degrees of freedom = 4
Probability of chance= 0.404

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 group towards effectiveness of the developed CAI for the given statement.

Statement 17

Points	5	4	3	2	1
Exp Gp B	20.83	20.83	33.33	12.5	12.5
Exp Gp A	32.14	35.71	21.43	3.57	7.14

Percentage is calculated using table 19. From the above graph 17 it can be seen that 35.71 %(a maximum) of the students responded that they *agree* with statement 17.

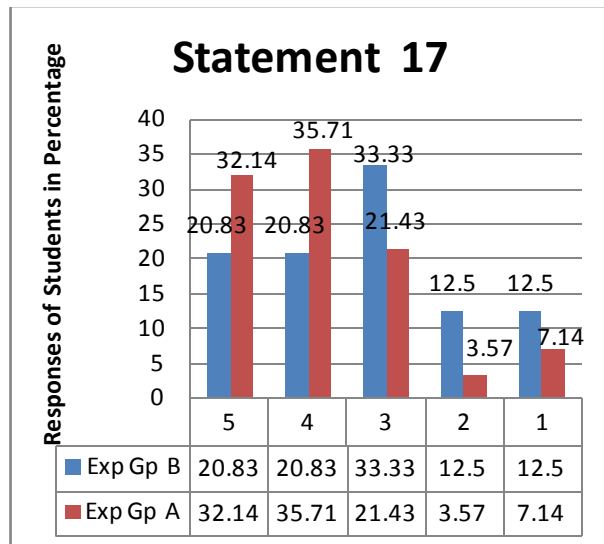**Graph 17.**   Graphical Representation of analysis of statement 17

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	5	2
4	3	14
3	11	9
2	1	4
1	4	0

Chi-Square = 14.1 (calculated using table 20)
Degrees of freedom = 4
Probability = 0.007

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.

12.5% students of Exp B '*Disagree*' where as 48.28% students of the Exp A '*Disagree*' with the statement 'Learning through CAI was waste of time'. More load is on '*disagree*' of the Exp A which implies that Exp A found CAI

more effective than the Exp B.

Statement 18

Points	5	4	3	2	1
Exp Gp B	20.83	12.5	45.83	4.17	16.67
Exp Gp A	6.9	48.28	31.03	13.79	0
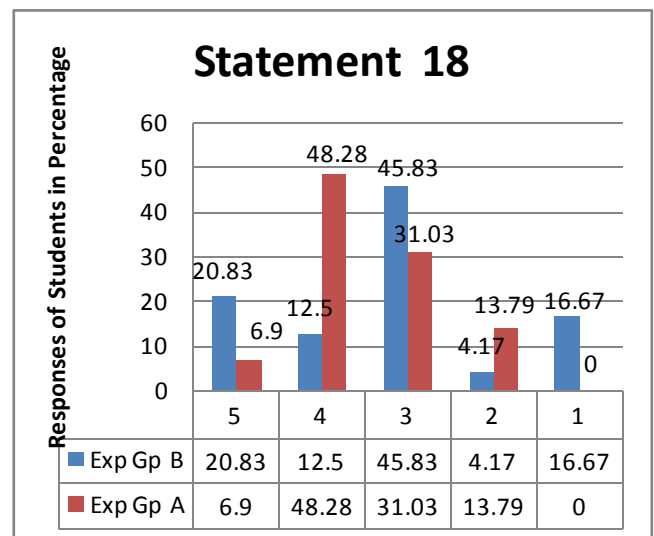
Percentage is calculated using table 20. From the above graph 18 it can be seen that 48.28 %(a maximum) of the students responded that they *disagree* with statement 18.

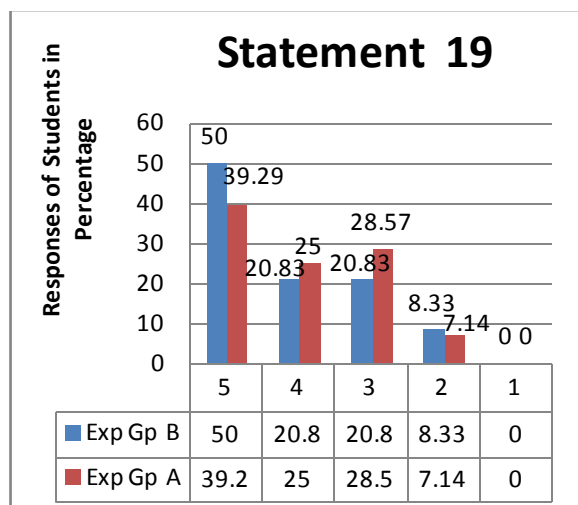**Graph 18.**   Graphical Representation of analysis of statement 18

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	12	11
4	5	7
3	5	8
2	2	2
1	0	0

Chi-Square statistics = 0.766 (calculated using table 21)
Degrees of freedom = 3
Probability of chance = 0.858

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.

Statement 19

	5	4	3	2	1
Exp Gp B	50	20.8	20.8	8.33	0
Exp Gp A	39.2	25	28.5	7.14	0

Percentage is calculated using table 21. From the above graph 19 it can be seen that 50 %(a maximum) of the students responded that they *strongly agree* with statement 19.
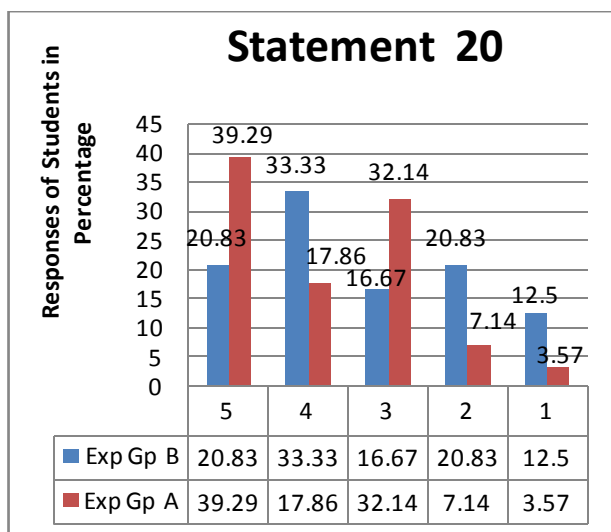
Graph 19.   Graphical Representation of analysis of statement 19

Statement 20: Classroom teaching is more enjoyable.

Table 22.   Responses for statement 20

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

Chi-Square statistics= 7.00 (calculated using table 22)
Degrees of freedom = 4
Probability of chance= 0.136

Statement 20

	5	4	3	2	1
Exp Gp B	20.83	33.33	16.67	20.83	12.5
Exp Gp A	39.29	17.86	32.14	7.14	3.57

Percentage is calculated using table 22. From the above graph 20 it can be seen that 39.29 %(a maximum) of the students responded that they *strongly disagree* with statement 20.

Graph 20.   Graphical Representation of analysis of statement 20

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.

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	11	7
4	3	17
3	5	5
2	6	0
1	0	0

Chi-Square = 16.5 (calculated using table 23)
Degrees of freedom = 3
Probability = 0.001

Table value of Chi Square at 3df at .05 significance level is 7.815. 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.

12% students of Exp B '*agree*' where as 58.62% students of Exp A '*agree*' with the statement 'The language used in CAI is easy and simple to understand.' More load is on '*agree*' of Exp A which implies that they found CAI more effective than the Exp B.

Statement 21

	5	4	3	2	1
Exp Gp B	44	12	20	24	0
Exp Gp A	24.1	58.6	17.2	0	0
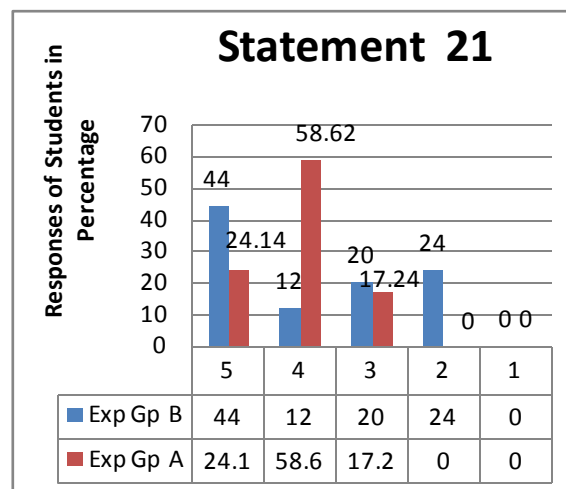
Percentage is calculated using table 23. From the above graph 21 it can be seen that 58.62 %(a maximum) of the students responded that they *strongly agree* with statement 21.

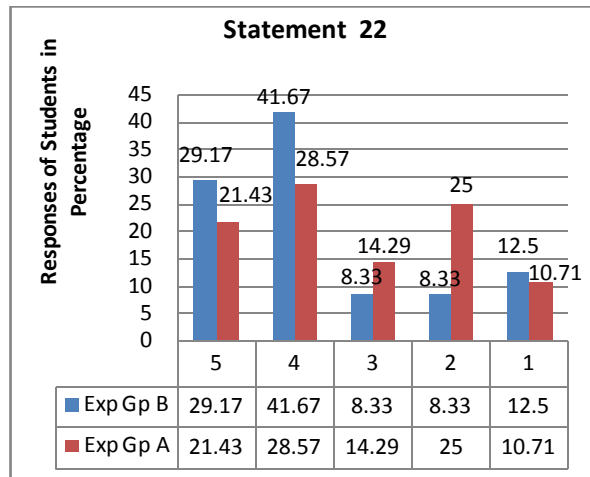**Graph 21.**   Graphical Representation of analysis of statement 21

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	7	6
4	10	8
3	2	4
2	2	7
1	3	3

Chi-Square statistics= 3.46 (calculated using table 24)
Degrees of freedom = 4
Probability of chance = 0.485

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.
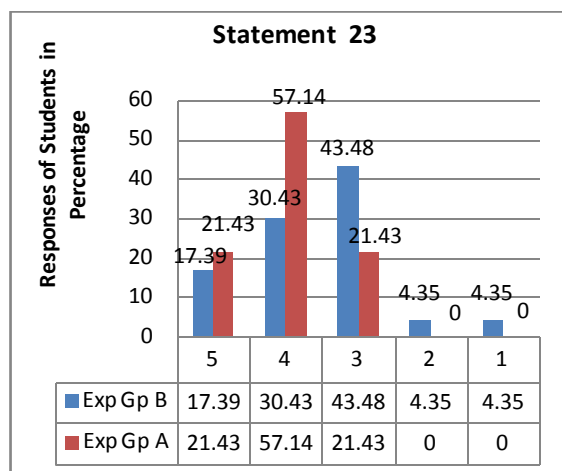

Graph 22.   Graphical Representation of analysis of statement 22

Statement 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	4	6
4	7	16
3	10	6
2	1	0
1	1	0

Chi-Square statistics= 6.49 (calculated using table 25)
Degrees of freedom = 4
Probability of chance = 0.165

Percentage is calculated using table 25. From the above graph 23 it can be seen that 57.14 %(a maximum) of the students responded that they *agree* with statement 23.

Graph 23.   Graphical Representation of analysis of statement 23

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.

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	6	3
4	7	9
3	4	4
2	4	6
1	3	6

Chi-Square statistics = 2.36 (calculated using table 26)
Degrees of freedom = 4
Probability of chance = 0.671

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.
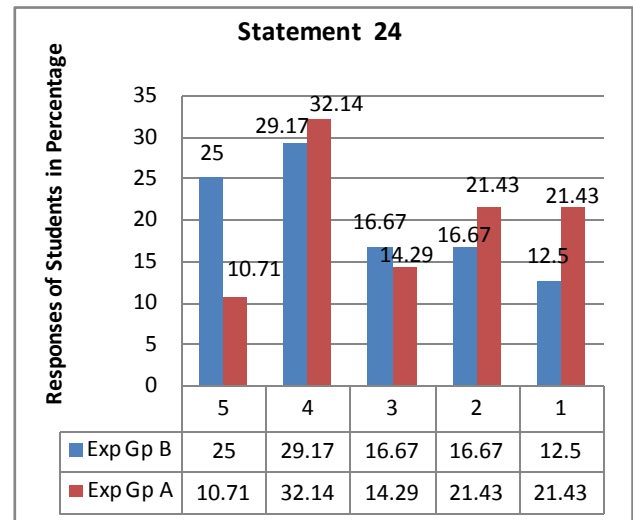

Percentage is calculated using table 26. From the above graph 24 it can be seen that 32.14 %(a maximum) of the students responded that they *disagree* with statement 24.

Graph 24.   Graphical Representation of analysis of statement 24

Table 27.   Responses for statement 25

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

Chi-Square statistics= 11.7 (calculated using table 27)
Degrees of freedom = 4
Probability of chance = 0.020

Statement 25: The exercises helped in understanding the chapter in depth.

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.

12.5% students of Exp B '*not decided*' where as 53.571% of the Exp A '*not decided*' with the statement 'The exercises helped in understanding the chapter in depth'. More load is on '*not decided*' of the Exp A which implies they found CAI more effective than the Exp B.

Statement 25

	5	4	3	2	1
Exp Gp B	33.33	20.83	12.5	29.17	4.17
Exp Gp A	10.71	21.43	53.57	10.71	3.57
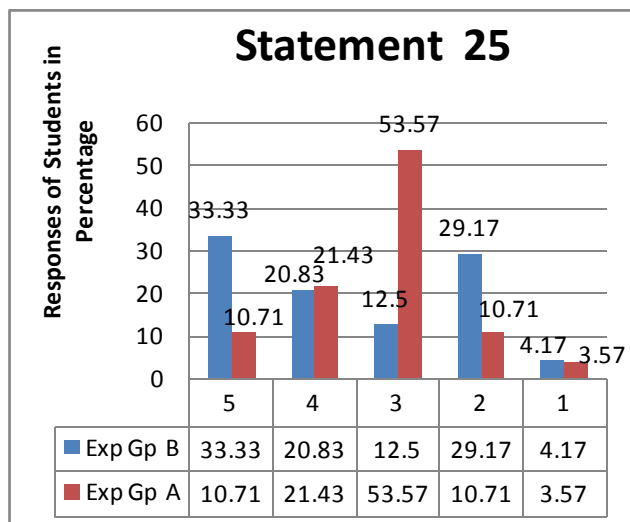
Percentage is calculated using table 25. From the above graph 25 it can be seen that 53.57 %(a maximum) of the students responded that they have *not decided* with statement 25.

Graph 25.   Graphical Representation of analysis of statement 25

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	9	3
4	4	12
3	2	4
2	5	5
1	3	4

Chi-Square statistics = 7.39 (calculated using table 28)
Degrees of freedom = 4
Probability of chance = 0.117

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.

Statement 27: Break given in CAI helped me to refresh my mind.

Statement 26

	5	4	3	2	1
Exp Gp B	39.13	17.39	8.7	21.74	13.04
Exp Gp A	10.71	42.86	14.29	17.86	14.29
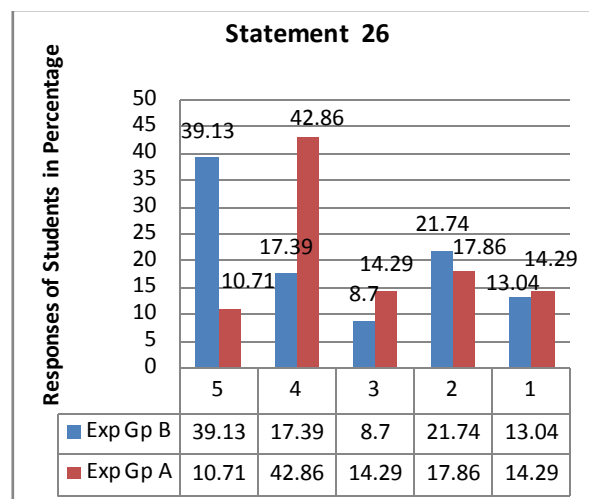
Percentage is calculated using table 28. From the above graph 26 it can be seen that 42.86 %(a maximum) of the students responded that they *disagree* with statement 26.
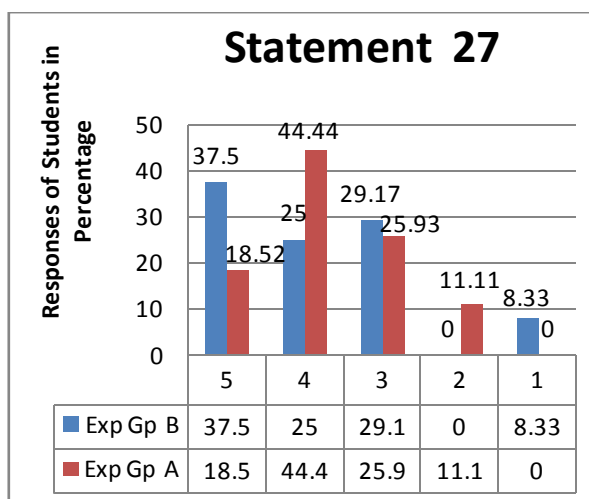
Graph 26.   Graphical Representation of analysis of statement 26

Table 29.   Responses for statement 27

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

Chi-Square of statistics = 7.99 (calculated using table 27)
Degrees of freedom = 4
Probability of chance= 0.092

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.

Statement 27

	5	4	3	2	1
Exp Gp B	37.5	25	29.1	0	8.33
Exp Gp A	18.5	44.4	25.9	11.1	0

Percentage is calculated using table 29. From the above graph 27 it can be seen that 44.44 %(a maximum) of the students responded that they *agree* with statement 27.

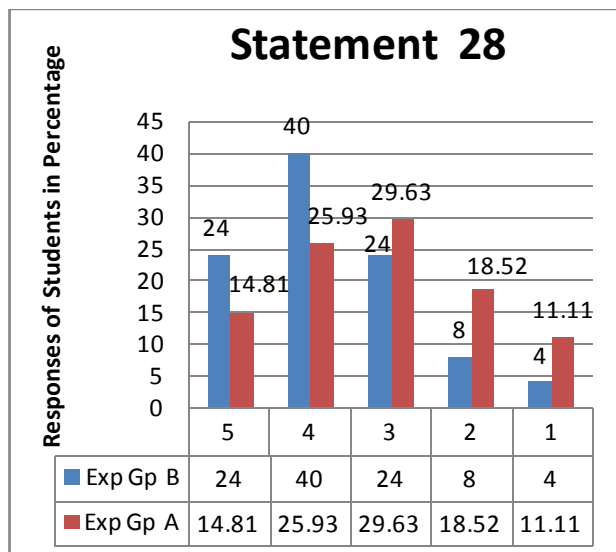**Graph 27.**   Graphical Representation of analysis of statement 27

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	4
4	10	7
3	6	8
2	2	5
1	1	3

Chi-Square statistics = 3.43 (calculated using table 30)
Degrees of freedom = 4
Probability of chance = 0.489

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.

Percentage is calculated using table 30. From the above graph 28 it can be seen that 40 %(a maximum) of the students responded that they *disagree* with statement 28.

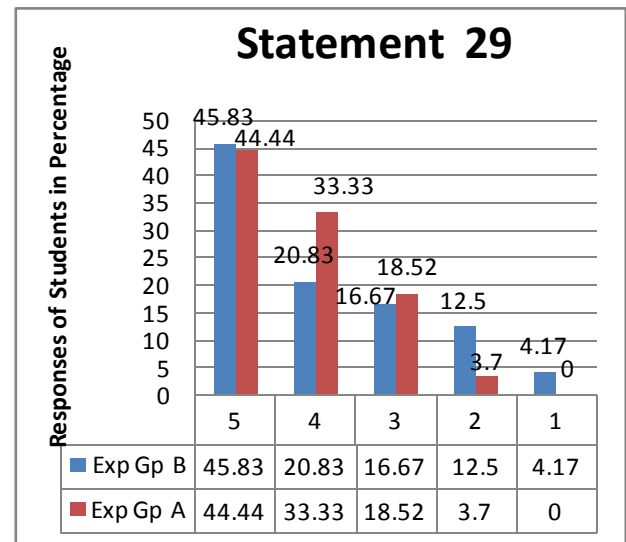**Graph 28.** Graphical Representation of analysis of statement 28

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	11	12
4	5	9
3	4	5
2	3	1
1	1	0

Chi-Square statistics = 3.13 (calculated using table 31)
Degrees of freedom = 4
Probability of chance = 0.536

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.

Percentage is calculated using table 31. From the above graph 29 it can be seen that 45.83 %(a maximum) of the students responded that they *strongly agree* with statement 29.

Graph 29. Graphical Representation of analysis of statement 29

Statement 30: Topic is not introduced properly.

Table 32. Responses for statement 30

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

Chi-Square statistics= 9.83 (calculated using table 32)
Degrees of freedom = 4
Probability of chance = 0.043

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.

44% students of the Exp B '*strongly disagree*' whereas 14.81% students of Exp A '*strongly disagree*' with the statement 'Topic is not introduced properly. More load is on 'strongly disagree' of the Exp B than Exp A.

Statement 30

	5	4	3	2	1
Exp Gp B	44	16	24	8	8
Exp Gp A	14.8	40.7	25.9	18.5	0
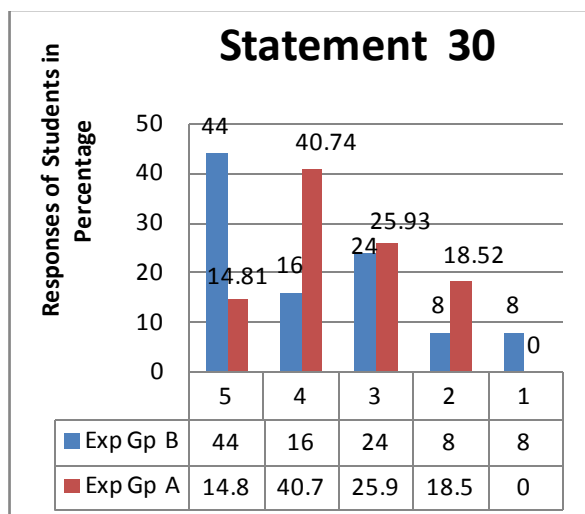
Percentage is calculated using table 32. From the above graph 30 it can be seen that 44 %(a maximum) of the students responded that they *strongly disagree* with statement 30.
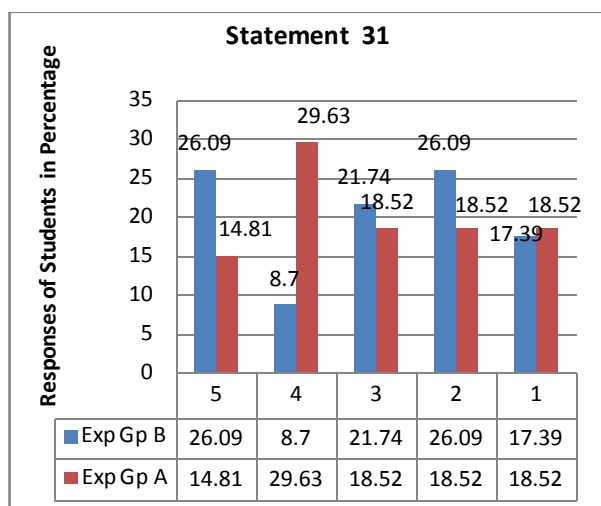
Graph 30. Graphical Representation of analysis of statement 30

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	4
4	2	8
3	5	5
2	6	5
1	4	5

Chi-Square statistics= 3.91 (calculated using table 33)
Degrees of freedom = 4
Probability of chance = 0.419

Statement 31

	5	4	3	2	1
Exp Gp B	26.09	8.7	21.74	26.09	17.39
Exp Gp A	14.81	29.63	18.52	18.52	18.52

Percentage is calculated using table 33. From the above graph 31 it can be seen that 29.63 %(a maximum) of the students responded that they *disagree* with statement 31.

Graph 31. Graphical Representation of analysis of statement 31

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.

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	5	5
4	4	5
3	6	4
2	3	6
1	7	7

Chi-Square statistics= 1.44 (calculated using table 34)
Degrees of freedom = 4
Probability of chance = 0.838

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.
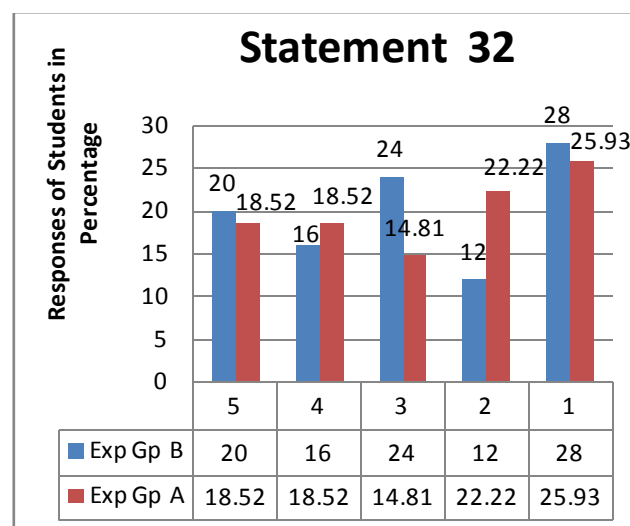
Statement 32

	5	4	3	2	1
Exp Gp B	20	16	24	12	28
Exp Gp A	18.52	18.52	14.81	22.22	25.93

Percentage is calculated using table 34. From the above graph 32 it can be seen that 28 %(a maximum) of the students responded that they *strongly agree* with statement 32.

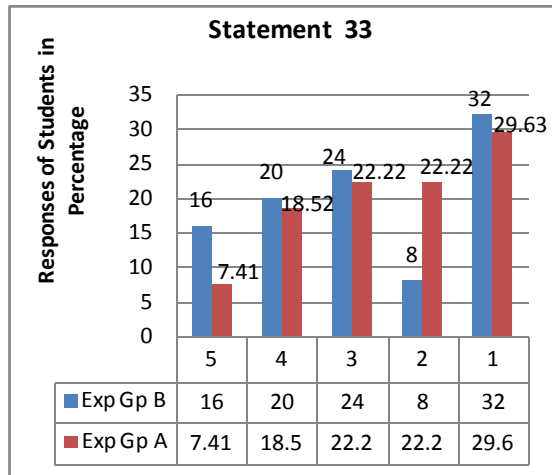**Graph 32.** Graphical Representation of analysis of statement 32

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	2
4	5	5
3	6	6
2	2	6
1	8	8

Chi-Square statistics = 2.59 (calculated using table 35)
Degrees of freedom = 4
Probability of chance = 0.628

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.

Statement 33

Graph 33. Graphical Representation of analysis of statement 33

Percentage is calculated using table 35. From the above graph 33 it can be seen that 32 %(a maximum) of the students responded that they *strongly agree* with statement 33.
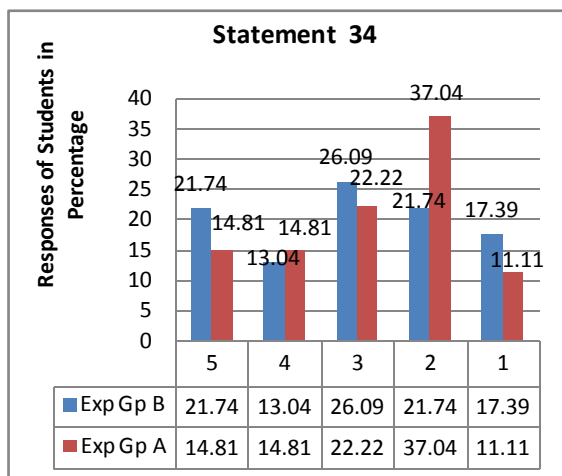
Statement 34: Enough revision is not done in CAI after the topic profit and loss.

Table 36.   Responses for statement 34

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

Chi-Square statistics = 1.75 (calculated using table 36)
Degrees of freedom = 4
Probability of chance= 0.781

Statement 34

Graph 34. Graphical Representation of analysis of statement 34

Percentage is calculated using table 36. From the above graph 34 it can be seen that 37.04 %(a maximum) of the students responded that they *agree* with statement 34.

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.

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	5	3
4	2	6
3	3	8
2	7	8
1	6	2

Chi-Square statistics = 6.56 (calculated using table 37)
Degrees of freedom = 4
Probability of chance = 0.161

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.
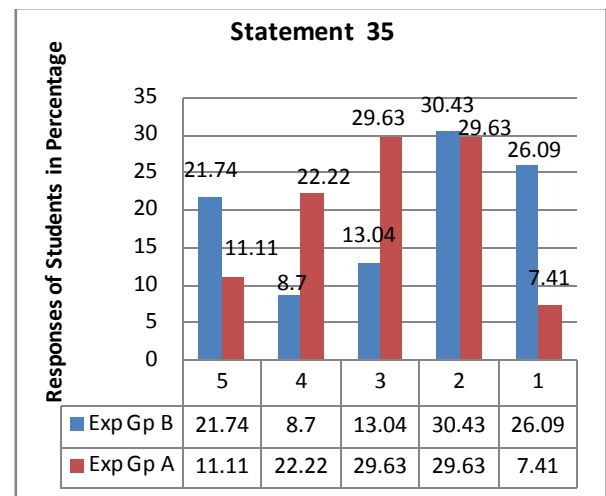
Statement 35

Percentage is calculated using table 37. From the above graph 35 it can be seen that 30.43 %(a maximum) of the students responded that they *agree* with statement 35.

Graph 35. Graphical Representation of analysis of statement 35

Table 38.   Responses for statement 36

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

Chi-Square statistics = 0.436 (calculated using table 38)
Degrees of freedom = 4
Probability of chance = 0.979

Statement 36: I had to read the slide many times to understand what is being said as there was no clarity in understand.

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.

Percentage is calculated using table 38. From the above graph 36 it can be seen that 33.33 %(a maximum) of the students responded that they *agree* with statement 36.

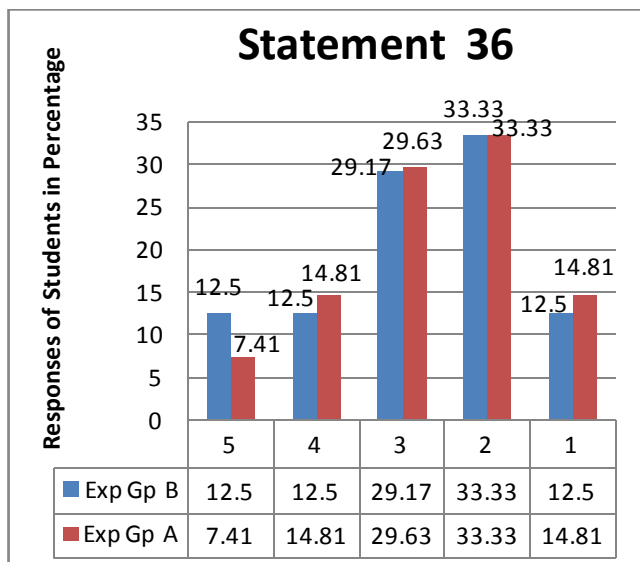**Graph 36.** Graphical Representation of analysis of statement 36

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	10	11
4	5	8
3	5	4
2	0	3
1	3	1

Chi-Square = 4.56 (calculated using table 39)
Degrees of freedom = 4
Probability = 0.335

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.
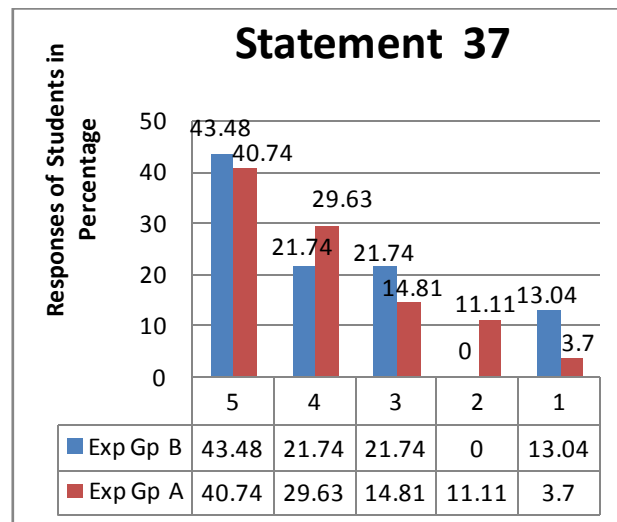
Percentage is calculated using table 39. From the above graph 37 it can be seen that 43.48 %(a maximum) of the students responded that they *strongly agree* with statement 36.

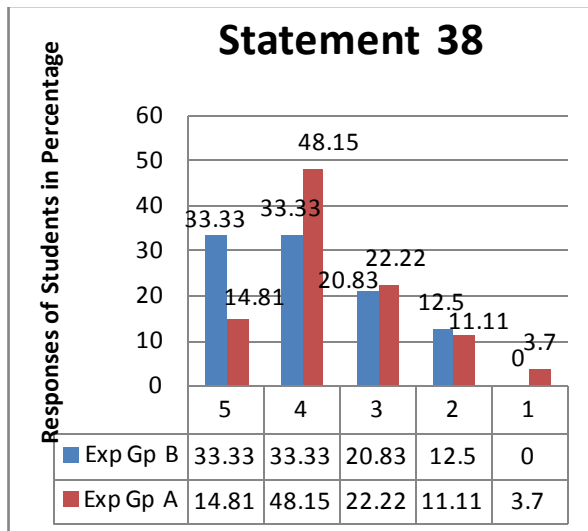**Graph 37.** Graphical Representation of analysis of statement 37

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	8	4
4	8	13
3	5	6
2	3	3
1	0	1

Chi-Square statistics = 3.45(calculated using table 40)
Degrees of freedom = 4
Probability of chance = 0.485

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.

Statement 38

	5	4	3	2	1
Exp Gp B	33.33	33.33	20.83	12.5	0
Exp Gp A	14.81	48.15	22.22	11.11	3.7

Percentage is calculated using table 40. From the above graph 38 it can be seen that 48.15 %(a maximum) of the students responded that they *agree* with statement 38.
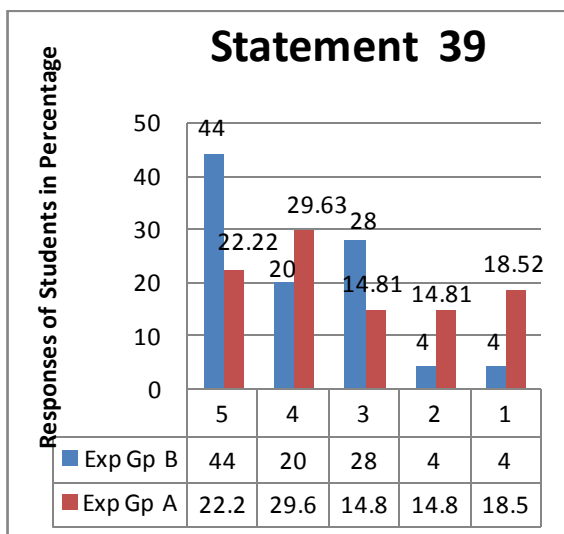
Graph 38.   Graphical Representation of analysis of statement 38

Statement 39: Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.

Table 41.   ponses for statement 39

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

Chi-Square statistics = 7.38 (calculated using table 41)
Degrees of freedom = 4
Probability of chance = 0.117

Statement 39

	5	4	3	2	1
Exp Gp B	44	20	28	4	4
Exp Gp A	22.2	29.6	14.8	14.8	18.5

Percentage is calculated using table 41. From the above graph 39 it can be seen that 44 %(a maximum) of the students responded that they *strongly agree* with statement 38.

Graph 39.   Graphical Representation of analysis of statement 39

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.

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	7	3
4	3	6
3	6	6
2	3	8
1	5	4

Chi-Square statistics = 4.82 (calculated using table 42)
Degrees of freedom = 4
Probability of chance = 0.306

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.
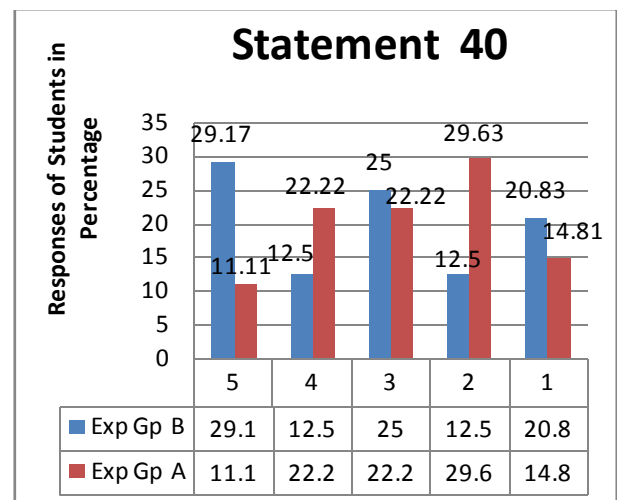
Statement 40

	5	4	3	2	1
Exp Gp B	29.1	12.5	25	12.5	20.8
Exp Gp A	11.1	22.2	22.2	29.6	14.8

Percentage is calculated using table 42. From the above graph 40 it can be seen that 29.63 %(a maximum) of the students responded that they *agree* with statement 40.

Graph 40.   Graphical Representation of analysis of statement 40

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	6	1
4	3	11
3	7	4
2	5	5
1	3	6

Chi-Square statistics = 9.82 (calculated using table 43)
Degrees of freedom = 4
Probability of chance = 0.044

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.

12.5% students of Exp B 'disagree' where as 40.74% students of Exp A 'Disagree' with the statement 'Independent learning is not possible through CAI'. More load is on 'disagree' of the Exp A than Exp B.

Statement 41

	5	4	3	2	1
Exp Gp B	25	12.5	29.17	20.83	12.5
Exp Gp A	3.7	40.74	14.81	18.52	22.22
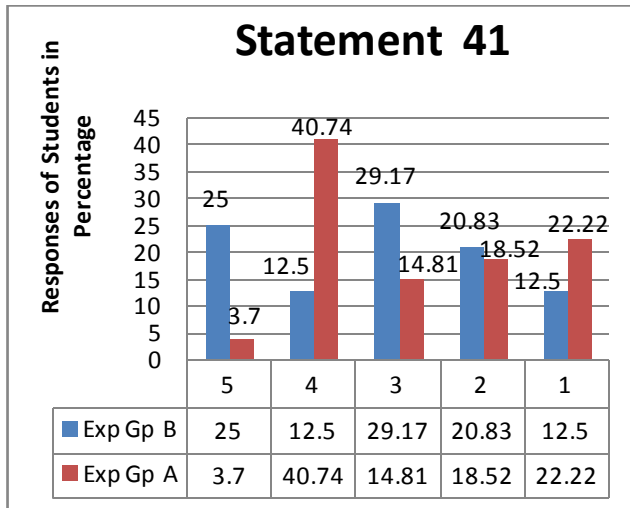
Percentage is calculated using table 43. From the above graph 41 it can be seen that 40.74 %(a maximum) of the students responded that they *disagree* with statement 41.

Graph 41. Graphical Representation of analysis of statement 41

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	12	4
4	2	12
3	6	9
2	1	2
1	3	0

Chi-Square statistics= 15.0 (calculated using table 44)
Degrees of freedom = 4
Probability of chance = 0.005

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.

50% students of Exp B 'strongly agree' where as % students of Exp A 'strongly agree' with the statement 'Evaluation is done objectively (objective questions) so no partiality is involved in scoring'. More load is on 'strongly agree' of the Exp B than Exp A.

Statement 42

	5	4	3	2	1
Exp Gp B	50	8.33	25	4.17	12.5
Exp Gp A	14.81	44.44	33.33	7.41	0
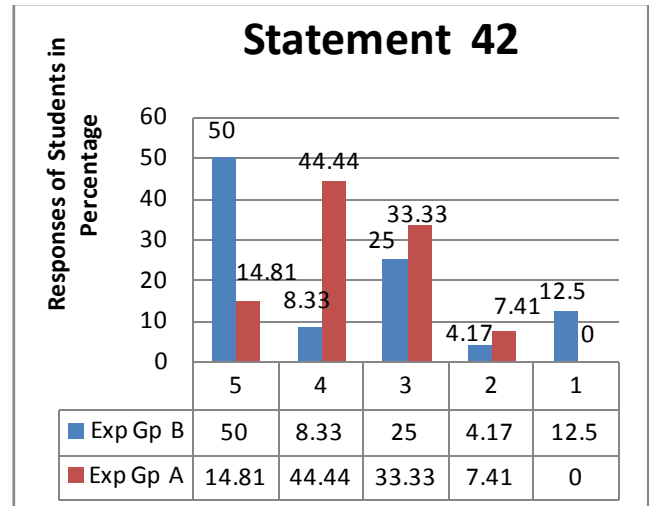
Percentage is calculated using table 44. From the above graph 42 it can be seen that 50 %(a maximum) of the students responded that they *strongly agree* with statement 42.
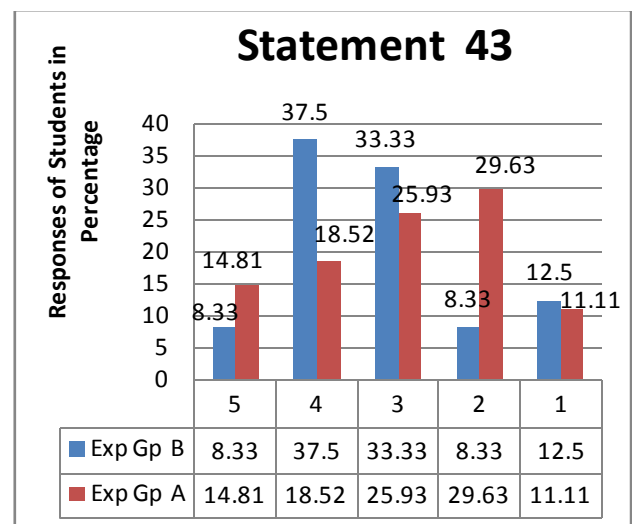
Graph 42. Graphical Representation of analysis of statement 42

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	2	4
4	9	5
3	8	7
2	2	8
1	3	3

Chi-Square statistics = 5.78 (calculated using table 45)
Degrees of freedom = 4
Probability of chance= 0.216

Statement 43

	5	4	3	2	1
Exp Gp B	8.33	37.5	33.33	8.33	12.5
Exp Gp A	14.81	18.52	25.93	29.63	11.11

Percentage is calculated using table 45. From the above graph 43 it can be seen that 37.5 %(maximum) of the students responded that they *disagree* with statement 43.

Graph 43. Graphical Representation of analysis of statement 43

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.

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	14	5
4	3	11
3	3	8
2	3	3
1	1	0

Chi-square statistics = 11.972 (calculated using table 46)
Degree of freedom = 4
Probability of chance =.0176

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.

58.33% students of the Exp B '*strongly agree*' where as 17.86% students of Exp A '*strongly agree*' with the statement 'Instruction given in each slide of CAI is easy and clear to follow with the statement.' More load is on '*strongly agree*' of the Exp B than Exp A.

Statement 44

	5	4	3	2	1
Exp Gp B	58.33	12.5	12.5	12.5	4.17
Exp Gp A	18.52	40.74	29.63	11.11	0
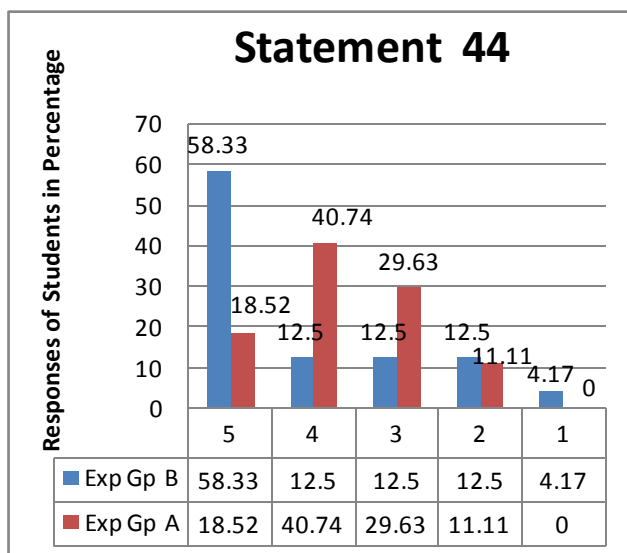
Percentage is calculated using table 46. From the above graph 44 it can be seen that 58.33 %(maximum) of the students responded that they *strongly agree* with statement 44.

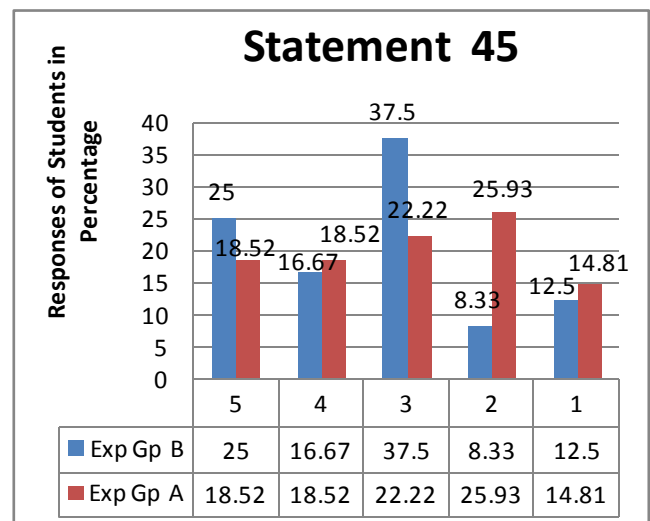**Graph 44.**   Graphical Representation of analysis of statement 44

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	5
4	4	5
3	9	6
2	2	7
1	3	4

Chi-square statistics = 3.558 (calculated using table 47)
Degree of freedom = 4
Probability of chance =.4690

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.

Statement 45

	5	4	3	2	1
Exp Gp B	25	16.67	37.5	8.33	12.5
Exp Gp A	18.52	18.52	22.22	25.93	14.81

Percentage is calculated using table 47. From the above graph 45 it can be seen that 37.5 %(maximum) of the students responded that they have *not decided* with statement 45.

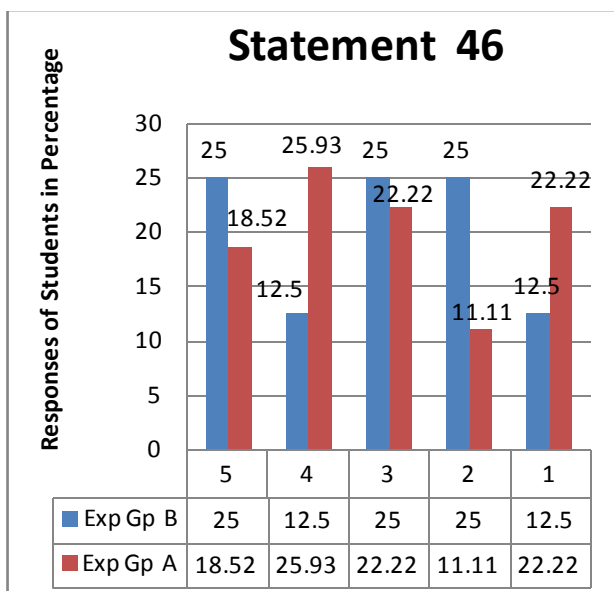**Graph 45.**   Graphical Representation of analysis of statement 45

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	6	5
4	3	7
3	6	6
2	6	3
1	3	6

Chi-square statistics = 3.527 (calculated using table 48)
Degree of freedom = 4
Probability of chance =.4738

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.

Statement 46

	5	4	3	2	1
Exp Gp B	25	12.5	25	25	12.5
Exp Gp A	18.52	25.93	22.22	11.11	22.22

Percentage is calculated using table 48. From the above graph 46 it can be seen that 25.93 %(maximum) of the students responded that they *agree* with statement 46.
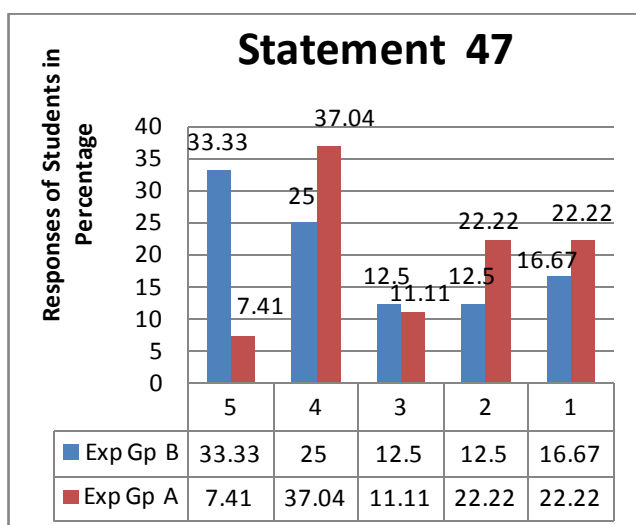
Graph 46.   Graphical Representation of analysis of statement 46

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	8	2
4	6	10
3	3	3
2	3	6
1	4	6

Chi-square statistics = 5.844 (calculated using table 49)
Degree of freedom = 4
Probability of chance =.2111

Statement 47

	5	4	3	2	1
Exp Gp B	33.33	25	12.5	12.5	16.67
Exp Gp A	7.41	37.04	11.11	22.22	22.22

Percentage is calculated using table 49. From the above graph 47 it can be seen that 37.04 %(maximum) of the students responded that they *disagree* with statement 47.

Graph 47.   Graphical Representation of analysis of statement 47

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.

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	1
4	3	4
3	4	10
2	7	4
1	3	9

Chi-square statistics = 10.789 (calculated using table 50)
Degree of freedom = 4
Probability of chance =.0290

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.

16.67% students of Exp B '*not decided*' whereas 35.71% students of the Exp A '*not decided*' with the statement 'To get the correct answer I had to go back to the slide/s many times for topic Compound interest.'. More load is on '*not decided*' of the Exp A than Exp B.

Statement 48

	5	4	3	2	1
Exp Gp B	29.17	12.5	16.67	29.17	12.5
Exp Gp A	3.57	14.29	35.71	14.29	32.14
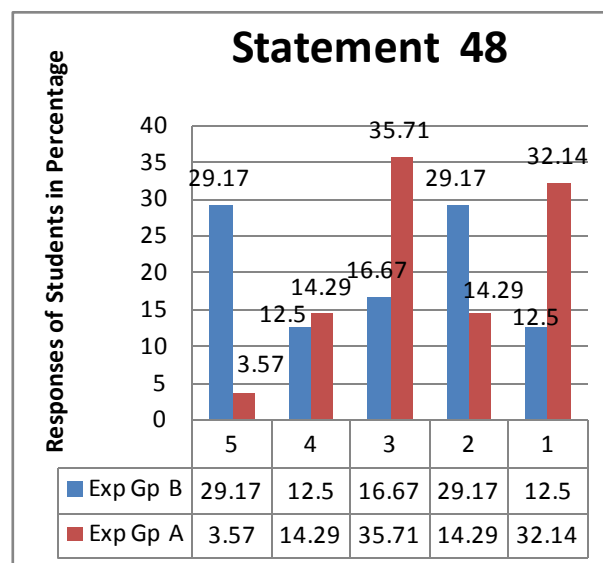
Percentage is calculated using table 50. From the above graph 48 it can be seen that 35.71 %(maximum) of the students responded that they have *not decided* with statement 48.

Graph 48.   Graphical Representation of analysis of statement 48

Statement 49: To get the correct answer I had to go back to the slide/s many times for topic profit and loss.
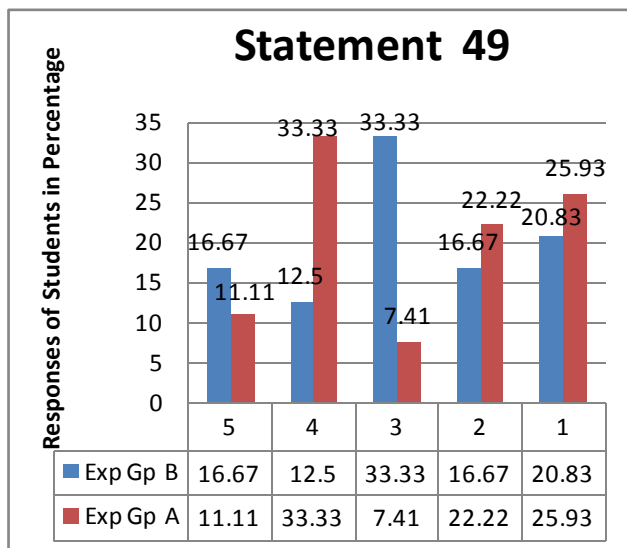
Table 51.   Responses for statement 49

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

Chi-square statistics = 7.325 (calculated using table 51)
Degree of freedom = 4
Probability of chance =.1197

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.

Statement 49

	5	4	3	2	1
Exp Gp B	16.67	12.5	33.33	16.67	20.83
Exp Gp A	11.11	33.33	7.41	22.22	25.93

Percentage is calculated using table 51. From the above graph 49 it can be seen that 33.33 % of the students responded that they *disagree* with statement 49.

Graph 49.   Graphical Representation of analysis of statement 49

Table 52.   Responses for statement 50

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

Chi-square statistics = 5.535 (calculated using table 52)
Degree of freedom = 4
Probability of chance =.2367

Statement 50: Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.

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.

Statement 50

	5	4	3	2	1
Exp Gp B	41.67	20.83	25	4.17	8.33
Exp Gp A	22.22	29.63	37.04	11.11	0
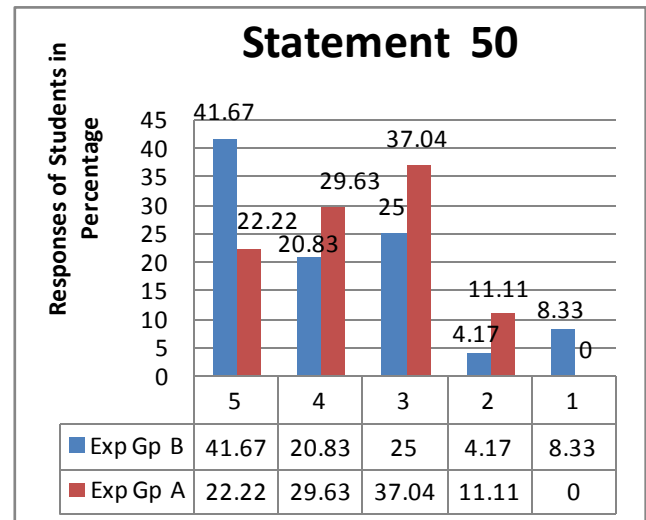
Percentage is calculated using table 52. From the above graph 50 it can be seen that 41.67 %(maximum) of the students responded that they *strongly agree* with statement 50.

Graph 50.   Graphical Representation of analysis of statement 50

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	4	7
4	5	3
3	6	3
2	1	7
1	8	7

Chi-square statistics = 6.732 (calculated using table 53)
Degree of freedom = 4
Probability of chance =.1508

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.

Statement 51

	5	4	3	2	1
Exp Gp B	16.67	20.83	25	4.17	33.33
Exp Gp A	25.93	11.11	11.11	25.93	25.93
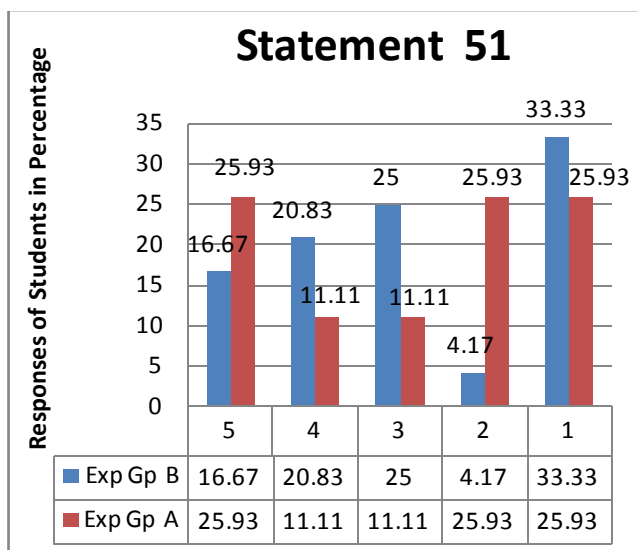
Percentage is calculated using table 53. From the above graph 51 it can be seen that 33.33 %(maximum) of the students responded that they *strongly disagree* with statement 51.
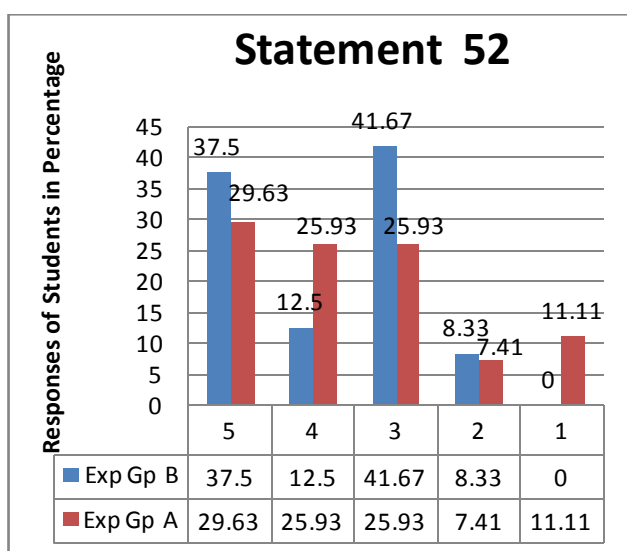
Graph 51.   Graphical Representation of analysis of statement 51

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	8
4	3	7
3	10	7
2	2	2
1	0	3

Chi-square statistics = 5.029 (calculated using table 54)
Degree of freedom = 4
Probability of chance =.2843

Statement 52

	5	4	3	2	1
Exp Gp B	37.5	12.5	41.67	8.33	0
Exp Gp A	29.63	25.93	25.93	7.41	11.11

Percentage is calculated using table 54. From the above graph 52 it can be seen that 41.67 %(maximum) of the students responded that they have *not decided* with statement 52.

Graph 52.   Graphical Representation of analysis of statement 52

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.
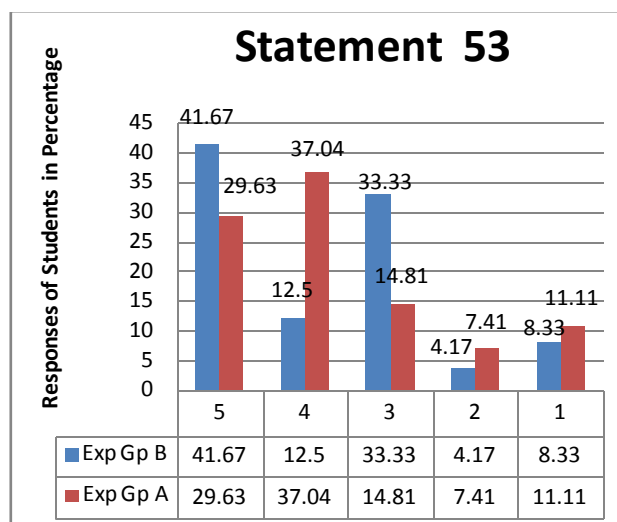
Statement 53: Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.

Table 55.   Responses for statement 53

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

Chi-square statistics = 5.701(calculated using table 55)
Degree of freedom = 4
Probability of chance =.2226

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.

Statement 53

	5	4	3	2	1
Exp Gp B	41.67	12.5	33.33	4.17	8.33
Exp Gp A	29.63	37.04	14.81	7.41	11.11

Percentage is calculated using table 55. From the above graph 53 it can be seen that 41.67 %(maximum) of the students responded that they *strongly agree* with statement 53.

Graph 53.   Graphical Representation of analysis of statement 53

Statement 54: Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.

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.
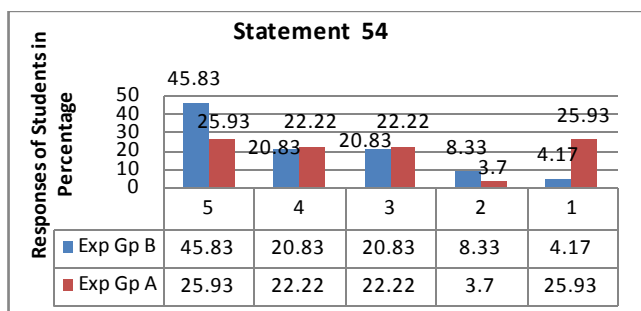
Table 56.   Responses for statement 54

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

Chi-square statistics = 5.747 (calculated using table 56)
Degree of freedom = 4
Probability of chance =.2188

	5	4	3	2	1
Exp Gp B	45.83	20.83	20.83	8.33	4.17
Exp Gp A	25.93	22.22	22.22	3.7	25.93

Percentage is calculated using table 56. From the above graph 54 it can be seen that 45.83 %(maximum) of the students responded that they *strongly agree* with statement 54.

Graph 54.   Graphical Representation of analysis of statement 54

7. Findings of the Study

Out of 54 statements for twelve statements (2,3, 9,14,18,21,25,30,41,42, 44 and 48) the chi square value is found to be significant. This means that significant difference was observe between the response of Experimental group A and that of Experimental group B. However for the remaining 42 statements chi square value is not found to be significant.

8. Discussion

The literature and the findings of the current study reveal several interesting observations concerning class VIII mathematics and computer-assisted instruction. The results of this study indicate that students learn equally well with the help of computer assisted instruction with or without the presence of teacher. Computers have the potential to be useful tools to improve learning. As supported by reaction scale responses, students displayed interest in using CAI for a variety of reasons. Educators can tap into this interest by using CAI to deliver instruction and assess learning. Technological advances have made computers more powerful and less expensive, which has resulted in more students having access to computers. Computer learning systems provide educators the opportunity to present topics in a variety of alternative forms as compared to the traditional lecture in order to address the different learning styles and preferences of students. Educators using the traditional method of teaching may consider supplementing their method of teaching with the help of CAI so as to enhance students learning and motivation.

9. 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 an enjoyable and pleasant experience.

10. Conclusions

[20–22] Authors concluded that CAI offers students an opportunity to be actively engaged in the learning process, to receive instruction through a variety of multimedia, to choose the place and time to learn, to work at their own pace, and to receive immediate and accurate feedback. [23-25] Authors have studied the effectiveness of using CAI in teaching and learning mathematics. In the current study judging from the overall response 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 ways to teach and learn mathematics.

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