

**DEVELOPMENT AND IMPLEMENTATION OF COMPUTER ASSISTED
INSTRUCTION IN MATHEMATICS FOR STANDARD VIII STUDENTS**

A

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EDUCATION

Guide

Prof. Dr. (Mrs.) Harsha J. Patadia

Investigator

Ms. Pramila Gururajan



**CENTRE OF ADVANCED STUDY IN EDUCATION
FACULTY OF EDUCATION AND PSYCHOLOGY
THE M.S. UNIVERSITY OF BARODA
VADODARA 290 002**

April 2013

DECLARATION**DECLARATION**

I, Pramila Gururajan do hereby declare that the thesis on 'Development and Implementation of Computer Assisted Instruction in Mathematics for Standard VIII Students' is my original work and has not been submitted by me for the award of any degree or diploma before.

Vadodara
April 2013

R. Pramila
Ms. Pramila Gururajan

CERTIFICATE

CENTRE OF ADVANCED STUDY IN EDUCATION
DEPARTMENT OF EDUCATION
FACULTY OF EDUCATION AND PSYCHOLOGY
THE M. S. UNIVERSITY OF BARODA
VADODARA - 2

25-04-13

CERTIFICATE

This is to certify that **Ms. Pramila Gururajan** has worked for her PhD degree under my guidance on the topic "Development and Implementation of Computer Assisted Instruction in Mathematics for Standard VIII Students" to my satisfaction. Her work is original and has not been submitted elsewhere for the award of any other degree. **Also she has fulfilled the criteria of O. Ph.D. 3 (i) regarding the attendance and O Ph.D. 7 (i) regarding the publication required at the M. S. University of Baroda, Vadodara.**

**Date: April 2013
Vadodara**

H. J. Patadia
**Prof. Dr. Harsha J. Patadia
Professor of Education,
CASE, FEP
The M. S. University of Baroda, Vadodara**

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Table of Contents

DECLARATION	i
CERTIFICATE	ii
ACKNOWLEDGEMENT	iii
Table of Contents	iv
Tables and Figures	vii
List of Tables	vii
List of Figures.....	xv
CHAPTER I-INTRODUCTION	1
1.01 Introduction	1
1.02 Nature of Mathematics	2
1.03 Importance of Mathematics	5
1.04 Aims and Objectives of Teaching Mathematics at School Level	5
1.05 Computer Assisted Instruction (CAI).....	6
1.06 CAI in Learning Mathematics.....	7
1.6.1 Advantages of CAI in learning Mathematics	7
1.6.2 Steps to be followed in CAI	8
1.07 Necessity of CAI	9
1.08 Challenges for Preparing CAI.....	11
1.09 Rationale of the Present Study	11
1.10 Statement of the Study.....	13
1.11 Objectives of the Study.....	13
1.12 Hypothesis.....	14
1.13 Explanation of the Terms	14
1.14 Operationalization of Terms.....	14
1.15 Delimitation of the Study	14
1.16 Organisation of the Thesis	15
CHAPTER II- REVIEW OF RELATED LITERATURE FOR THE STUDY.....	16
2.01 Purpose of the review	16
2.02 Research on high failure rates in mathematics	17
2.03 Review of related studies in mathematics for Improvement of Learning and Teaching of Mathematics.....	18
2.04 Studies Conducted for Mathematical Weakness.....	20
2.05 Review of literature related to Programmed Learning Material (PLM)	22
2.06 Related literature in the field of Computer Assisted Instruction conducted in India	30
2.07 The related literature in the field of Computer Assisted Instruction conducted Abroad	43
2.08 Related literature in Education act	53

2.09 Analytical Review of Related Literature	54
2.10 Flow Chart of the Reviewed Studies	113
2.11 Analysis of Reviewed Literature	114
2.11.1 Classification of Reviewed Studies Related to Mathematics	114
2.11.2 Year Wise Classification of Reviewed Studies	115
2.11.3 Research Study Wise Classification of Reviewed Studies Related to PLM	119
2.11.4 Research Study Wise Classification of Reviewed Studies Related to CAI Conducted in India	121
2.11.5 Research Study Wise Classification of Reviewed Studies Related to CAI Conducted Abroad.....	124
2.11.6 Research Level Wise Classification of Reviewed Studies	126
2.11.7 Research Finding Wise Classification of Reviewed Studies	129
2.12 Discussions Based on Reviewed Literature to Locate Research Gaps and its Implications for the Present Study	132
CHAPTER III - PLAN AND PROCEDURE OF THE STUDY	139
3.01 Introduction	139
3.02 Plan of the Study	139
3.03 Methodology	143
3.3.1 Design of the Study	144
3.3.2 Population of the Study	145
3.3.3 Sample of the Study.....	145
3.3.4 Procedure for Data Collection.....	145
3.3.5 Data Analysis	145
3.04 Details of Developed CAI.....	145
3.05 Actual Implementation of CAI.....	149
3.06 An Overview	151
CHAPTER IV- DATA ANALYSIS AND INTERPRETATION OF DATA.....	152
4.01 Introduction	152
4.02 Procedure for Matched Groups for Conducting the Study	152
4.03 Data Collection for the study	154
4.04 Analysis of Data using ANOVA for Initial Try-out.....	155
4.05 Findings of the ANOVA Result for Initial Try-out.....	158
4.06 Analysis of Data using ANOVA for Final Try-out.....	158
4.07 Findings of the ANOVA Result for Final Try-out	161
4.08 Statement wise Analysis of Reaction Scale for Initial Try-out.....	161
4.09 Comprehensive Analysis of Reaction Scale for Initial Try-out.....	323
4.10 Findings from the Analysis of Reaction Scale for Initial Try-out	328
4.11 Statement wise Analysis of Reaction Scale for Final Try-out	329
4.12 Comprehensive Analysis of Reaction Scale for Final Try-out.....	492

4.13 Findings from the Analysis of Reaction Scale for Final Try-out.....	497
4.14 Interpretation of Results.....	498
4.14.1 Interpretation of ANOVA Result for Initial Try-out	498
4.14.2 Interpretation of ANOVA Result for Final Try-out	499
4.14.3 Interpretation of Result of Reaction Scale	500
4.15 Discussion	500
4.16 Conclusion	503
4.17 Implications for the Present Study	503
4.18 Suggestions for Further Scope of the Study	504
CHAPTER –V SUMMARY	505
5.01 Introduction	505
5.02 Rationale of the Study	506
5.03 Statement of the Problem.....	508
5.04 Objectives of the Study.....	509
5.05 Hypothesis.....	509
5.06 Explanation of Terms	509
5.07 Operationalization of Terms	510
5.08 Delimitation of the Study.....	510
5.09 Methodology of the Study	510
5.9.1 Design of the Study	510
5.9.2 Population of the Study	511
5.9.3 Sample of the Study.....	511
5.10 Tools for Data Collection.....	511
5.11 Data Analysis	512
5.12 Major Findings	512
5.12.1 Findings from the Analysis of the ANOVA Result for Initial Try-out.....	512
5.12.2 Findings from the Analysis of the ANOVA Result for Final Try-out.....	512
5.12.3 Findings from Analysis of Reaction Scale for Initial Try-out.....	512
5.12.4 Findings from Analysis of Reaction Scale for Final Try-out.....	514
5.13 Conclusion	515
5.14 Suggestion.....	515
Bibliography	517
APPENDICES	529
Appendix 1 Content Analysis	529
Appendix 2 Sanction Letter for Data Collection	533
Appendix 3 Tools for the Present Study.....	535
Appendix 4 Research Papers Published in the Referred Journals	545

Tables and Figures

List of Tables

Table 2.1 Analytical Review of Studies Related to Programmed Learning Material Conducted in India	54
Table 2.2 Analytical Review of Studies Related to Computer Assisted Instruction conducted in India	67
Table 2.3 Analytical Review of Studies Related to Computer Assisted Instruction Conducted in Abroad	99
Table 2.4 Studies Conducted in India Related to PLM in Mathematics	114
Table 2.5 Studies Conducted in India Related to CAI in Mathematics	114
Table 2.6 Studies Conducted in Abroad Related to CAI in Mathematics	115
Table 2.7 Year Wise Classification of Indian Studies in PLM Conducted During 1966-2012	115
Table 2.8 Year Wise Classification of Indian Studies in CAI Conducted During 1988-2011	116
Table 2.9 Five Year Interval Wise Classification of Indian Studies in CAI Conducted During 1988-2011	117
Table 2.10 Year Wise Classification of Studies Related to CAI Conducted abroad during 1991-2011	118
Table 2.11 Research Study Wise Classification of the Indian Studies Related to PLM	119
Table 2.12 Research Design Wise Classification of the Indian Studies Related to PLM	120
Table 2.13 Data Analysis Wise Classification of the Indian Studies Related to PLM	120
Table 2.14 Research Study Wise Classification of Studies Related to CAI Conducted in Indian	121
Table 2.15 Sampling Method Wise Classification of the Indian Studies Related to CAI	122
Table 2.16 Research Design Wise Classification of the Indian Studies Related to CAI	122
Table 2.17 Data Analysis Wise Classification of the Indian Studies Related to CAI	123
Table 2.18 Research Study Wise Classification of the Abroad Studies Related to CAI	124
Table 2.19 Sampling Method Wise Classification of the Studies Conducted Abroad Related to CAI	124
Table 2.20 Research Design Wise Classification of the Abroad Studies Related to CAI	125
Table 2.21 Data Analysis Wise Classification of the Abroad Studies Related to CAI	126
Table 2.22 Research Level Wise Classification of the Indian Studies Related to PLM	126
Table 2.23 Research Level Wise Classification of the Indian Studies Related to CAI	127
Table 2.24 Research Level Wise Classification of the Abroad Studies Related to CAI	128
Table 2.25 Classification of Indian studies related to PLM according to findings	129
Table 2.26 Classification of studies related to CAI conducted in India according to findings	130
Table 2.27 Classification of studies related to CAI conducted Abroad according to findings	131
Table 3.1: Post Test Only Control Group Design	144
Table 4.1 Formation of Equivalent Groups using VII Standard Marks for the purpose of AVONA for Initial Try-out	153
Table 4.2: Formation of Equivalent Group using Mathematics Achievement Test Marks for the purpose of AVONA for Final Try-out	154
Table 4.3: Post-test score of the students (Marks out of 100) in Initial Try-out	155
Table 4.4: Post-test score of the students (Marks out of 100) for Final Try-out	155
Table 4.5: Data Summary for Initial Try-out	156
Table 4.6: ANOVA Summary for Initial Try-out	156
Table 4.7 Result of Tukey HSD Test for Initial Try-out	158
Table 4.8 Data Summary for Final Try-out	159
Table 4.9 ANOVA Summary for Final Try-out	159
Table 4.10: Result of Tukey HSD Test for Final Try-out	161
Table 4.11 Points for Positive polarity statements	161
Table 4.12 Points for Negative polarity statements	161
Table 4.13 Responses of Exp Gp A students in percentage for statement 1 for Initial Try-out	162
Table 4.14 Responses of Exp Gp B students in percentage for statement 1 for Initial Try-out	163
Table 4.15 Chi Square Table for Exp Gp A for Statement 1 for Initial Try-out	165
Table 4.16 Chi Square Table for Exp Gp B for Statement 1 for Initial Try-out	165
Table 4.17 Responses of Exp Gp A students in percentage for statement 2 for Initial Try-out	166
Table 4.18 Responses of Exp Gp B students in percentage for statement 2 for Initial Try-out	166
Table 4.19 Chi Square Table for Exp Gp A for Statement 2 for Initial Try-out	168
Table 4.20 Chi Square Table for Exp Gp B for Statement 2 for Initial Try-out	168
Table 4.21 Responses of Exp Gp A students in percentage for statement 3 for Initial Try-out	169
Table 4.22 Responses of Exp Gp B students in percentage for statement 3 for Initial Try-out	169
Table 4.23 Chi Square Table for Exp Gp A for Statement 3 for Initial Try-out	171

Table 4.421 Chi Square Table for Exp Gp A for Statement 48 for Final Try-out	473
Table 4.422 Chi Square Table for Exp Gp B for Statement 48 for Final Try-out.....	473
Table 4.423 Responses of Exp Gp A students in percentage for statement 49 for Final Try-out.....	474
Table 4.424 Responses of Exp Gp B students in percentage for statement 49 for Final Try-out.....	474
Table 4.425 Chi Square Table for Exp Gp A for Statement 49 for Final Try-out	476
Table 4.426 Chi Square Table for Exp Gp B for Statement 49 for Final Try-out.....	476
Table 4.427 Responses of Exp Gp A students in percentage for statement 50 for Final Try-out.....	477
Table 4.428 Responses of Exp Gp B students in percentage for statement 50 for Final Try-out.....	477
Table 4.429 Chi Square Table for Exp Gp A for Statement 50 for Final Try-out	479
Table 4.430 Chi Square Table for Exp Gp B for Statement 50 for Final Try-out.....	479
Table 4.431 Responses of Exp Gp A students in percentage for statement 51 for Final Try-out.....	480
Table 4.432 Responses of Exp Gp B students in percentage for statement 51 for Final Try-out.....	480
Table 4.433 Chi Square Table for Exp Gp A for Statement 51 for Final Try-out	482
Table 4.434 Chi Square Table for Exp Gp B for Statement 51 for Final Try-out.....	482
Table 4.435 Responses of Exp Gp A students in percentage for statement 52 for Final Try-out.....	483
Table 4.436 Responses of Exp Gp B students in percentage for statement 52 for Final Try-out.....	483
Table 4.437 Chi Square Table for Exp Gp A for Statement 52 for Final Try-out	485
Table 4.438 Chi Square Table for Exp Gp B for Statement 52 for Final Try-out.....	485
Table 4.439 Responses of Exp Gp A students in percentage for statement 53 for Final Try-out.....	486
Table 4.440 Responses of Exp Gp B students in percentage for statement 53 for Final Try-out.....	486
Table 4.441 Chi Square Table for Exp Gp A for Statement 53 for Final Try-out	488
Table 4.442 Chi Square Table for Exp Gp B for Statement 53 for Final Try-out.....	488
Table 4.443 Responses of Exp Gp A students in percentage for statement 54 for Final Try-out.....	489
Table 4.444 Responses of Exp Gp B students in percentage for statement 54 for Final Try-out.....	489
Table 4.445 Chi Square Table for Exp Gp A for Statement 54 for Final Try-out	491
Table 4.446 Chi Square Table for Exp Gp B for Statement 54 for Final Try-out.....	491
Table 4.447 Analysis of responses on Reaction Scale given by the Experimental Group A for Final Try-out	492
Table 4.448 Analysis of responses on Reaction Scale given by the Experimental Group B for Final Try-out	495

List of Figures

Figure 2.1 Flow Chart of the Reviewed Studies	113
Figure 2.2 Year Wise Classification of Studies Related to PLM Conducted in India	116
Figure 2.3 Year Wise Classification of Studies Related to CAI Conducted in India.....	117
Figure 2.4 Five-year Interval wise classification of Studies Related to CAI conducted in India	118
Figure 2.5 Year Wise Classification of the Studies Related to CAI Conducted Abroad	119
Figure 2.6 Research Study Wise Classification of Indian Studies Related to PLM	119
Figure 2.7 Research Design Wise Classification of the Indian Studies Related to PLM.....	120
Figure 2.8 Data Analysis Wise Classification of the Indian Studies Related to PLM	121
Figure 2.9 Research Study Wise Classification of the Indian Studies Related to CAI.....	121
Figure 2.10 Sampling Method Wise Classification of the Indian Studies Related to CAI	122
Figure 2.11 Research Design Wise Classification of the Indian Studies Related to CAI.....	123
Figure 2.12 Data Analysis Wise Classification of the Indian Studies Related to CAI	123
Figure 2.13 Research Study Wise Classification of the Abroad Studies Related to CAI	124
Figure 2.14 Sampling Method Wise Classification of the Abroad Studies Related to CAI.....	125
Figure 2.15 Research Design Wise Classification of the Abroad Studies Related to CAI.....	125
Figure 2.16 Data Analysis Wise Classification of the Abroad Studies Related to CAI	126
Figure 2.17 Research Level Wise Classification of Studies Related to PLM Conducted in India.....	127
Figure 2.18 Research Level Wise Classification of India Studies Related to CAI.....	127
Figure 2.19 Research Level Wise Classification of Abroad Studies Related to CAI.....	128
Figure 2.20 Classification of Studies Related to PLM Conducted in India according to Findings.....	129
Figure 2.21 Classification of Studies Related to CAI conducted in India according to Findings.....	131
Figure 2.22 Classification of Studies Related to CAI conducted Abroad according to Findings.....	132
Figure 4.1 Graphical Representation of ANOVA Result of Final Try-out.....	157

Figure 4.2 Graphical Representation of ANOVA Result of Final Try-out.....	160
Figure 4.3 Graphical Representation of analysis of statement 1 in Percentage for Exp Gp A for Initial Try-out.....	164
Figure 4.4 Graphical Representation of analysis of statement 1 in Percentage for Exp Gp B for Initial Try-out.....	164
Figure 4.5 Graphical Representation of analysis of statement 2 in Percentage for Exp Gp A for Initial Try-out.....	167
Figure 4.6 Graphical Representation of analysis of statement 2 in Percentage for Exp Gp B for Initial Try-out.....	167
Figure 4.7 Graphical Representation of analysis of statement 3 in Percentage for Exp Gp A for Initial Try-out.....	170
Figure 4.8 Graphical Representation of analysis of statement 3 in Percentage for Exp Gp B for Initial Try-out.....	170
Figure 4.9 Graphical Representation of analysis of statement 4 in Percentage for Exp Gp A for Initial Try-out.....	173
Figure 4.10 Graphical Representation of analysis of statement 4 in Percentage for Exp Gp B for Initial Try-out.....	173
Figure 4.11 Graphical Representation of analysis of statement 5 in Percentage for Exp Gp A for Initial Try-out.....	176
Figure 4.12 Graphical Representation of analysis of statement 5 in Percentage for Exp Gp B for Initial Try-out.....	176
Figure 4.13 Graphical Representation of analysis of statement 6 in Percentage for Exp Gp A for Initial Try-out.....	179
Figure 4.14 Graphical Representation of analysis of statement 6 in Percentage for Exp Gp B for Initial Try-out.....	179
Figure 4.15 Graphical Representation of analysis of statement 7 in Percentage for Exp Gp A for Initial Try-out.....	182
Figure 4.16 Graphical Representation of analysis of statement 7 in Percentage for Exp Gp B for Initial Try-out.....	182
Figure 4.17 Graphical Representation of analysis of statement 8 in Percentage for Exp Gp A for Initial Try-out.....	185
Figure 4.18 Graphical Representation of analysis of statement 8 in Percentage for Exp Gp B for Initial Try-out.....	185
Figure 4.19 Graphical Representation of analysis of statement 9 in Percentage for Exp Gp A for Initial Try-out.....	188
Figure 4.20 Graphical Representation of analysis of statement 9 in Percentage for Exp Gp B for Initial Try-out.....	188
Figure 4.21 Graphical Representation of analysis of statement 10 in Percentage for Exp Gp A for Initial Try-out.....	191
Figure 4.22 Graphical Representation of analysis of statement 10 in Percentage for Exp Gp B for Initial Try-out.....	191
Figure 4.23 Graphical Representation of analysis of statement 11 in Percentage for Exp Gp A for Initial Try-out.....	194
Figure 4.24 Graphical Representation of analysis of statement 11 in Percentage for Exp Gp B for Initial Try-out.....	194
Figure 4.25 Graphical Representation of analysis of statement 12 in Percentage for Exp Gp A for Initial Try-out.....	197
Figure 4.26 Graphical Representation of analysis of statement 12 in Percentage for Exp Gp B for Initial Try-out.....	197
Figure 4.27 Graphical Representation of analysis of statement 13 in Percentage for Exp Gp A for Initial Try-out.....	199
Figure 4.28 Graphical Representation of analysis of statement 13 in Percentage for Exp Gp B for Initial Try-out.....	200
Figure 4.29 Graphical Representation of analysis of statement 14 in Percentage for Exp Gp A for Initial Try-out.....	202
Figure 4.30 Graphical Representation of analysis of statement 14 in Percentage for Exp Gp B for Initial Try-out.....	203

Figure 4.205 Graphical Representation of analysis of statement 48 in Percentage for Exp Gp A for Final Try-out.....	472
Figure 4.206 Graphical Representation of analysis of statement 48 in Percentage for Exp Gp B for Final Try-out.....	472
Figure 4.207 Graphical Representation of analysis of statement 49 in Percentage for Exp Gp A for Final Try-out.....	475
Figure 4.208 Graphical Representation of analysis of statement 49 in Percentage for Exp Gp B for Final Try-out.....	475
Figure 4.209 Graphical Representation of analysis of statement 50 in Percentage for Exp Gp A for Final Try-out.....	478
Figure 4.210 Graphical Representation of analysis of statement 50 in Percentage for Exp Gp B for Final Try-out.....	478
Figure 4.211 Graphical Representation of analysis of statement 51 in Percentage for Exp Gp A for Final Try-out.....	481
Figure 4.212 Graphical Representation of analysis of statement 51 in Percentage for Exp Gp B for Final Try-out.....	481
Figure 4.213 Graphical Representation of analysis of statement 52 in Percentage for Exp Gp A for Final Try-out.....	484
Figure 4.214 Graphical Representation of analysis of statement 52 in Percentage for Exp Gp B for Final Try-out.....	484
Figure 4.215 Graphical Representation of analysis of statement 53 in Percentage for Exp Gp A for Final Try-out.....	487
Figure 4.216 Graphical Representation of analysis of statement 53 in Percentage for Exp Gp B for Final Try-out.....	487
Figure 4.217 Graphical Representation of analysis of statement 54 in Percentage for Exp Gp A for Final Try-out.....	490
Figure 4.218 Graphical Representation of analysis of statement 54 in Percentage for Exp Gp B for Final Try-out.....	490

CHAPTER I-INTRODUCTION

1.01 Introduction

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. For all disciplines stated above mathematics is the base. Economics was considered as separate subject free from mathematics but now mathematics considered as the integral part of Economics. (Wikipedia Foundation, 2012) Mathematics allows economists to form meaningful, testable propositions about many wide-ranging and complex subjects, which could not be adequately expressed informally. Further, the language of mathematics allows economists to make clear, specific, positive claims about controversial or contentious subjects that would be impossible without mathematics. Much of economic theory is currently presented in terms of mathematical economic models, a set of stylized and simplified mathematical relationships that clarify assumptions and implications. This is one of the examples of the usefulness of mathematics. Mathematics is also useful in our day today life. (Ramani & Patadia, Computer Assisted Instruction in Teaching of Mathematics, 2012) Mathematics is an abstract subject and has symbolic language. 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 s/he learns mathematics. Students find it difficult to understand mathematics because of symbols and abstractness. Mathematics plays an important role to provide technically skilled manpower in our country. (NCERT, 2000) recommended mathematics as a compulsory subject for all school students till tenth standard. Thus, mathematics enjoys a unique status in the school curriculum. (NPE, 1992) Mathematics should be visualized as the vehicle to train a child to think, reason, analyse and to articulate logically. Apart from being a specific subject, it should be treated as a concomitant to any subject involving analysis and reasoning. With the recent introduction of computers in schools, educational computing and the emergence of learning through the understanding of cause-effect relationships and the interplay of variables, the teaching of mathematics will be suitably redesigned to bring it in line with modern technological devices. Yet many school students find difficulty with learning of mathematics and fail in mathematics. (Ravindra, 2006) 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.

Ours and previous few generations have failed to produce good mathematics teachers at school level in adequately large numbers. 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. This is so since teaching mathematics to impressionable young minds is a specialized task that many mathematicians may not measure. Mathematics is a hard task master that demands implicit and whole attention from the disciple. (Patel M. , 2006) 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.

(The National Research Council, 2001) points out the principles for helping students with learning difficulties: (1) Learning with understanding involves connecting and organizing knowledge; (2) Learning builds on what children already know; and (3) Formal school instruction should take advantage of children's informal everyday knowledge of mathematics. 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. This aspect is elaborated in topics that follow.

1.02 Nature of Mathematics

(American Association for the Advancement of Science, 1990) Mathematics relies on both logic and creativity, and it is pursued both for a variety of practical purposes and for its intrinsic interest. For some people, and not only professional mathematicians, the essence of

mathematics lies in its beauty and its intellectual challenge. For others, including many scientists and engineers, the chief value of mathematics is how it applies to their own work. Because mathematics plays such a central role in modern culture, some basic understanding of the nature of mathematics is requisite for scientific literacy. To achieve this, students need to perceive mathematics as part of the scientific endeavour, comprehend the nature of mathematical thinking, and become familiar with key mathematical ideas and skills.

Language of mathematics is symbolic and less verbose. In modern world we use mathematics where we have to be more and more exact and more accurate to the split of a second and we use terms and quantities that require large calculations which demands minute mathematical understanding. Mathematics is the science of patterns and relationships. As a theoretical discipline, mathematics explores the possible relationships among abstractions without concern for whether those abstractions have counterparts in the real world. The abstractions can be anything from strings of numbers to geometric figures to sets of equations.

(American Association for the Advancement of Science, 1990) Mathematics is also an applied science. Many mathematicians focus their attention on solving problems that originate in the world of experience. They too search for patterns and relationships, and in the process they use techniques that are similar to those used in doing purely theoretical mathematics. The results of theoretical and applied mathematics often influence each other. The discoveries of theoretical mathematicians frequently turn out sometimes decades later to have unanticipated practical value. Studies on the mathematical properties of random events, for example, led to knowledge that later made it possible to improve the design of experiments in the social and natural sciences.

(Sidhu, 1995), “Mathematics is the science of number and space. Mathematics is the science of measurement, quantity and magnitude. Mathematics is also called science of logical reasoning. Mathematics may also be defined as the science of abstract and imaginative form.”

(Report of the Education Commission, 1964-1966) “One of the outstanding characteristics of science culture is qualification of Mathematics”.

- Mathematics is hierarchical in nature.
- Mathematics is science of logical reasoning.
- Mathematics is more than computation

- Mathematics has peculiar language and symbolism. It has a different language and syntax and uses many words from day today life but in different sense.
- Mathematics is abstract in nature.
- Mathematics is the science of patterns and relationships. As a theoretical discipline. Mathematics explores the possible relations among abstractions without concern for whether those abstractions have counterparts in the real world.
- Mathematics is also an applied science. Many mathematicians focus their attention on solving problems that originate in the world of experience. They too search for patterns and relationships, and in the process they use techniques that are similar to those used in doing purely theoretical mathematics.

According to (Sharma R. , 2005)Characteristics of Mathematics is listed as follows:

- It is the science of number and space.
- It is the science of calculation.
- It is the science of measurement, quantity and magnitude.
- It is systemized, organized and exact branch of science.
- It deals with quantitative facts and relationship.
- It is the abstract form of science.
- It is science of logical reasoning.
- It settles in the mind the habit of reasoning.
- It is an inductive and experimental science.
- It has its own language, consists mathematical terms, mathematical concepts, formulae, theories, principles, signs etc.
- It involves conservation of abstract concepts in to concrete form.
- It helps in developing scientific attitude among children.
- It gives reliable and accurate knowledge.
- Its knowledge is exact, systematic, logical and clear so that once it is captured it can never be forgotten.
- Its rules, laws and formulae are universal and that can be verified at any place and time.
- It develops the ability of induction, deduction and generalization
- Its language is well defined, useful and clear.
- Its knowledge is applied in the study of science and its different branches; example Physics, Chemistry, Biology and other sciences.

- It is not only useful for different branches of science but also helps in its progress and organization.
- It is the gate way and key of all science.

1.03 Importance of Mathematics

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. Now the Communications revolution that is sewing humanity, symbolised by Internet and mobile cell- phones would not have been possible without a copious application of Mathematics. 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., 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 analysing of data. Different commissions have given different views on the place of mathematics. Everybody uses mathematics whether they realize it or nor, for example a cook uses mathematics to modify amount according to the number of persons or to modify recipe. Shopkeeper uses mathematics to calculate change, tax, and sales prices. Travellers use mathematics to plan their trips, they calculate time of arrival and departure. Even homeowners use mathematics to determine the cost of materials when doing projects.

1.04 Aims and Objectives of Teaching Mathematics at School Level

As per the (NCERT, 2005) the goals of teaching of Mathematics are mentioned below:

The main goal of mathematics is the mathematisation of the child thought processes. As per (Wheeler, 1982) “It is more useful to know how to mathematise than to know a lot of mathematic.” According to (George, 1969), there are two kinds of aims for school education: a good and narrow aim that of turning out employable adults who (eventually) contribute to social and economic development and a higher aim that of developing the inner resources of the growing child. With regard to school mathematics, the former aim specifically relates to

numeracy. Primary schools teach numbers and operations on them, measurement of quantities, fractions, percentages and ratios: all these are important for numeracy.

In developing a child's inner resources, the role that mathematics plays is mostly about thinking. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise. There are many ways of thinking, and the kind of thinking one learns in mathematics is an ability to handle abstractions. Mathematics offers the way of doing things: to be able to solve mathematical problems and to have right attitude of problem solving and to be able to attack all kind of problems in a systematic manner.

1.05 Computer Assisted Instruction (CAI)

The different definition referred by the investigator are given as follows (McGraw-Hill Dictionary, 2003)The use of computers to present drills, practice exercises, and tutorial sequences to the student, and sometimes to engage the student in a dialog about the substance of the instruction. Abbreviated as CAI also known as computer-aided instruction; computer-assisted learning (CAL).

(ThefreeDictionary, 2008) Use of instructional material presented by a computer. Since the advent of microcomputers in the 1970s, computer use in schools has become widespread, from primary schools through the university level and in some preschool programs. Instructional computers either present information or fill a tutorial role, testing the student for comprehension. By providing one-on-one interaction and producing immediate responses to input answers, computers allow students to demonstrate mastery and learn new material at their own pace. A disadvantage is that computerized instruction cannot extend the lesson beyond the limits of the programming.

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 in both 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 repeatedly. CAI works as a change in teaching learning method, increases the curiosity of students and they can learn interestingly without any difficulty. In addition, whatever is learnt through computer aided instructions, the contents can be retained in the memory of students for longer time as they use more senses of the students. Certain chapters

like Profit and loss, Simple and compound interest can be explained very easily using CAI. Variety 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.

1.06 CAI in Learning Mathematics

Investigator has referred the definition of CAI in learning mathematics and it is stated as follows (Initiative, 2010) Computer Assisted Instruction (CAI) software for maths: Computer Assisted Instruction, or CAI, software refers to instruction via a computer for the purpose of skill development or learning, in this case aiding in the development of maths skills.

Computer Assisted Instruction software typically:

- is interactive and can illustrate different concepts via animation, sound and demonstration. For example, learners are able to hear, see and take action to complete simple arithmetic, demonstrate concepts, solve problems and learn from their mistakes)
- offers immediate feedback by noting incorrect responses to questions and allows user to progress at own pace
- summarises performance
- generates exercises for worksheets and tests at a range of different levels (i.e. from simple counting through to advanced university level mathematical concepts).

1.6.1 Advantages of CAI in learning Mathematics

In this age of technology the teacher should be aware of student's need. CAI can help to satisfy the needs of the students. CAI lessens the workload of the teachers, besides it has many other advantages such as it provides wide range of experiences, it provides motivation, it can provide individualized instruction, interactive learning. Each of these uses is explained further.

Provides Wide Range of Experiences

CAI helps the teacher to provide a wide range of experience s/he can give many examples and illustrations and can make the concept clear. Concept can be explained using Word Problem, Play, Audio Visual aids, three-dimensional figures etc.

Provides Motivation

It can sustain the motivation of the students as the topic can be presented in an enjoyable manner as concepts can be presented systematically, interestingly and immediate feedback can be given which sustains the motivation of the students. Graphics and pictures can be presented which can attract and retain student attention. Children get reinforcement when

they answer the question correctly and the topic is presented in a systematic manner in an increasing order of difficulty. When student attempts a question correctly the screen showing “GOOD KEEP IT UP” with claps can be displayed.

Individualized Instruction

CAI is an individualized instruction as it caters to the individual difference. Some students are slow learners and some are fast learners. The Indian classroom is a heterogeneous group. Some students need more time to learn while others need less time, so learning speed differs from learner to learner. CAI also provides different learning experience according to the understanding level of the students. It also provides facilities like selecting the topics of their own interest. It provides individual attention to each and every student and thus enhances the quality of teaching learning process and thus we can overcome the problems faced in a overcrowded classroom. Slides can be arranged in the increasing order of difficulty so that a fast learner can skip the slides and go to a slide s/he finds it challenging whereas a slow learner can move from one slide to another without skipping.

Interactive Learning

CAI provides immediate feedback to the students and thus constantly interacts with them. In CAI students actively take part in the learning process. As it contains many examples and diagrams it makes the learning process interesting. As the student progresses from one level to another, slides showing “CONGRADULATIONS LEVEL 1 IS SUCCESFULLY COMPLETED BY YOU” can be displayed to make them understand the successful completion of that level.

1.6.2 Steps to be followed in CAI

For designing CAI the following steps may be adopted for achieving the objective, user friendly and need centred.

Practice: CAI enables the students to practice as many times as they like so this will enable them to achieve the required competencies. Students come from different background it is a heterogeneous group so their understanding level differs from student to student so a single teacher cannot cater such heterogeneous group so there is a need of right learning tool and a supporting environment. Practice makes a man perfect. Many psychologists like Thorndike support the usefulness of practice in learning.

Immediate feedback: CAI enables the students to see the correct answer immediately as soon as they answer a particular question so that they can correct themselves. If the answer is correct then they will get immense happiness and added confidence. If the answer is wrong

they can correct themselves immediately. In traditional classroom teaching, teacher gives students homework for practice. The child comes to know of any mistake when the teacher checks the homework and corrects the mistake. Normally teachers do not provide the correct answer during checking, so child knows that his answer is wrong but does not know the correct answer. If the teacher does sometimes provide the correct answer, the child may not pay due attention to the corrected answer and may consider it as a part of his work is to complete the homework and would proceed with the next homework.

Self-Evaluation: CAI enables the students to find their strengths and weaknesses and student can overcome his weaknesses before proceeding further.

Reinforcement: CAI reward students immediately whenever they answer the question correctly immediate reinforcement gives immense pleasure as indicated by many psychologists.

Immediate Evaluation: As soon as each concept is completed students should answer questions related to that particular concept this enables immediate evaluation.

1.07 Necessity of CAI

To achieve mastery learning

Mastery is a recent innovation introduced in the sphere of education. Mastery learning implies a systematic approach to the process of teaching or instruction. It is based on the idea that all students are potential learners, and that every child can learn equally well, provided the teacher presents the subject matter in a systematic manner. In mastery learning, instruction or teaching is matched to the learner. The chief objective of mastery learning is to promote excellence in learning. This objective is achieved through systematic planning, proper motivation, better methods and materials for learning, self-guided instruction and objectives based evaluation.

‘Learning for mastery’ is a technique of instruction developed by Bloom and his associates. He developed an instructional plan based upon the guiding principle that the learner should achieve mastery of one unit of the subject matter before going on to the next unit.

Individual differences

Each and every child is different. In a classroom teacher teaches to a group of students. Some students are slow learners, some are medium, and some are gifted. Classroom group is a heterogeneous group they come from different family background and with different interest.

Some are extrovert and some are introvert. So to cater to each and every child in a classroom a supplement is necessary.

To make learning continuous

When the child is absent on the previous day he cannot understand the lesson taught on that day because of lack of continuity and whatever is taught on that day he finds difficult to comprehend. CAI helps him to understand the concept without any difficulty whenever he misses a class.

Span of attention

The time span the student remains attentive in a class. This is different for different students.(Dandapani, 2001)Definition of attention

“Attention may be described as the selective activity of the human organism whereby one’s consciousness is focused upon a specific, narrow field to the exclusion of everything else in the environment.”

In typical Indian classroom teacher hardly gets time period between 35 to 40 minutes for teaching mathematics. Hence teacher spends approximately 5 minutes for introduction, 15 to 20 minutes for content explanation, 10 to 15 minutes for question and answers to heterogeneous groups verification and confirmation either at the end or continuously along with teaching. Thereafter, the teacher recapitulates all the subtopics. It is not possible to interact with all students, so teacher interacts with about 4 to 5 students. Having confirmed that these 4 to 5 students have understood the content explanations, the teacher assumes that the entire class has followed the content (rest of more than 40 students). Some students are mere spectators because they did not get a chance to answer. Sometimes students nod their head even though they didn’t understand this behaviour makes teacher to assume that all students understood the concept. In this process teacher cannot cater to slow learners, obviously the teacher does not have time. This is not the teacher’s fault but the System’s fault. Certain students cannot grasp the contents fully. So it is not possible for the Teacher to cater to all the students. Certain methodology and supporting methods are needed hence there is a need for development of CAI.

- CAI helps in learning mathematics.
- It reduces the burden of teaching and learning.
- It makes learning an enjoyable experience.
- Considering the heavily crowded heterogeneous classroom and nature of CAI it can be concluded that CAI is necessary to solve the problem faced by the students and teacher.

- It should be developed and used wherever possible.

1.08 Challenges for Preparing CAI

In order to prepare CAI there are some challenges such as the person should have content mastery in the topic s/he is preparing CAI, sound psychological background of the learners, written communication skill, creativity, technical knowledge related to computers and programming CAI.

- Constructing CAI needs a highly specialized such as logical sequencing of the content, user-friendly language, graphics and pictures.
- The designer of CAI should have thorough knowledge of the subject matter so that s/he can construct CAI according to the level of the learners and many illustrations can be given in the selected topic.
- The learner may get demotivated if s/he commits more mistakes while going through CAI. In order to avoid this situation the steps of CAI should be constructed from simple to complex in a suitable sequential manner along with enough illustrative examples so that error-rate of a learner can be minimized.

1.09 Rationale of the Present Study

Mathematics is an important subject to be learnt at school level. According to the (NCERT, 2005), “Mathematics education in our schools is beset with problems. We identify the following core areas of concern: A sense of fear and failure regarding mathematics among a majority of children.” Analyses on the above areas of concern have led (NCERT, 2005) to recommend engaging every student with a sense of success, to change modes of assessment to examine student’s mathematisation abilities rather than procedural knowledge and to enrich teachers with a variety of mathematical resources. The investigator has attempted to address the above concerns and analyses in her study. As mentioned in (NCERT, 2005)for mathematics curriculum in upper primary stage, “Mathematics is amazingly compressible: one may struggle a lot, work out something, perhaps by trying many methods. But once it is understood, and seen as a whole, it can be filed away, and used as just a step when needed. The insight that goes into this compression is one of the great joys of mathematics. A major goal of the upper primary stage is to introduce the student to this particular pleasure. The compressed form lends itself to application and use in a variety of contexts. Thus, mathematics at this stage can address many problems from everyday life, and offer tools for

addressing them. Indeed, the transition from arithmetic to algebra, at once both challenging and rewarding, is best seen in this light.”

There is huge gap between prescription and practice of a mathematical curriculum. Most of the time the classrooms of mathematics are preoccupied with routine teaching that leads to mechanical learning of problem solving of mathematics without bothering for the link between the process and product. Students hardly ask questions in a mathematics classroom underlining the need for a more responsive system. The teacher education colleges in India prepare the mathematics teachers at secondary level and unfortunately, some of the teachers educating colleges have teacher educators in mathematics who had not studied mathematics as a subject at degree level or have experience of teaching mathematics at school level.

(Kapoor, 1997) stated that, “ Quality of research is good, but quantity is poor. In Mathematics education both research and development should go together and it was time that the utilization of research should be considered as important as research.” Developmental research is important in two ways. First it increases the applicability of educational practices in specific situations, and secondly in generating better insight into the instructional process. Thus application of research in mathematics education is very important at all levels. Many a times teacher adopts the conventional method rather than interesting methods of teaching that will not enable active involvement of students. In this scenario CAI plays an important role in helping students to learn mathematics at upper primary level without stress, so that students become independent and they can learn by themselves, at their own pace and also apply the mathematical content in their day to day life.

Students in class VIII are in Formal operational stage (adolescence and into adulthood): as stated by Jean Piaget. In this stage, (Wikipedia, Piaget's theory of cognitive development), “Intelligence is demonstrated through the logical use of symbols related to abstract concepts. At this point, the person is capable of hypothetical and deductive reasoning. During this time, people develop the ability to think about abstract concepts. Logic: Piaget believed that deductive logic becomes important during the formal operational stage. This type of thinking involves hypothetical situations and is often required in science and mathematics. Abstract thought emerges during the formal operational stage. Children tend to think very concretely and specifically in earlier stages. Children begin to consider possible outcomes and consequences of actions. Problem-Solving is when children use trial-and-error to solve problems. The ability to systematically solve a problem in a logical and methodical way emerges.”

CAI is one of the methods to learn mathematics; it is especially helpful to slow learners and gifted learners who can learn at their own pace. Thus, CAI leads to a better appreciation and understanding of mathematics and thereby develops a sense of self-esteem and self-confidence among learners. This would also help students to lessen their dependency on tuition classes and would definitely encourage self-study and thereby encourage self-directed learning. Arithmetic is the oldest and most elementary branch of mathematics, used by almost everyone, for tasks ranging from simple day-to-day counting to advanced science and business calculations, such as addition, subtraction, multiplication, and division. As discussed in the reviewed studies it is found that students are weak in mathematics because of concept gaps, confusion in understanding mathematical language, stereotype way of presenting contents and lack of openness in teaching. Also from the reviewed studies, it was found that studies related to CAI in arithmetic at upper primary level were not conducted. Such studies are very important and needed because of the overcrowded and heterogeneous classrooms in Indian scenario. All the eleven studies reviewed related to mathematics in CAI; there are only two studies in arithmetic topic of mathematic. These studies are conducted for lower primary level; therefore, there is a great need to study the effectiveness of CAI in the arithmetic topic of mathematics, considering its importance as stated above.

1.10 Statement of the Study

Development and Implementation of Computer Assisted Instruction in Mathematics for Standard VIII Students

1.11 Objectives of the Study

- To develop the CAI in Mathematics for Standard VIII GSHSEB (Gujarat State Secondary and Higher Secondary Education Board) students.
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with one of the experimental groups of standard VIII students.
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with another experimental group of standard VIII students along with treatment of simultaneous discussion.
- To study the relative effectiveness of learning mathematics in class VIII among the three groups A, B and C (Where C is the control group and A and B are experimental groups) in terms of achievement of the students.

- To study the reaction of the students belonging to experimental groups about the mode of learning mathematics at the end of the experimentation.

1.12 Hypothesis

- There will be no significant difference in the achievement scores of group C students and group A students.
- There will be no significant difference in the achievement scores of group C students and group B students.
- There will be no significant difference in the achievement scores of group A students and group B students.

1.13 Explanation of the Terms

- **CAI with Discussion:** The learners will learn arithmetic unit with the help of CAI along with the simultaneous discussion led by the investigator with students where ever and whenever needed.
- **Reaction of Students:** The belief of the students of experimental groups regarding the learning mode of arithmetic unit.

1.14 Operationalization of Terms

- **CAI:** For this study CAI means Computer Assisted Instruction, which will be a self-learning software package, developed by the investigator after observation of mathematics classroom to understand the student's ability, potential, grasping power and other learning behaviour.
- **Achievement in Mathematics:** The marks scored by each student in the test constructed by the investigator on the arithmetic unit will be the achievement of that student.
- **Effectiveness:** In the context of the present study effectiveness refers to two things viz. (1) Relative increase in the scholastic achievement of the two experimental group students compared to that of control group students and (2) Overall positive reactions obtained from the students of two experimental group on a reaction scale given to them.

1.15 Delimitation of the Study

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

1.16 Organisation of the Thesis

Chapter I deal with introduction. It begins with importance of education in general, importance of mathematics, nature of mathematics, aims and objectives of teaching mathematics at school level sand all details of the study like rationale of the study etc.,

Chapter II deals with Review of related literature the chapter begins with an introduction and review of studies conducted for high failure rates in mathematics, studies conducted in the improvement of learning and teaching of mathematics, studies conducted for mathematics weakness, review related to PLM, studies conducted in the field of CAI in India, Studies conducted in the field of CAI in Abroad. This chapter ends with a discussion based on review of related literature and its implication for the present study.

Chapter III deals with Plan and Procedure of the study the chapter begins with an introduction followed by methodology, design of the study, population, sample, tools, Development of CAI, Implementation of CAI, and Procedure for data collection, Data Analysis and conclusion.

Chapter IV deals with Data Analysis and Interpretation of data. The chapter begins with an introduction, effectiveness of CAI, Major Findings and conclusion.

Chapter V deals with Summary and Major Findings related to different aspects of the study.

CHAPTER II- REVIEW OF RELATED LITERATURE FOR THE STUDY

2.01 Purpose of the review

Koul, L (2008) stated the following purpose,
 “Review of the related literature; besides, allowing the researcher to acquaint himself with current knowledge in the field or area in which he is going to conduct his research, serves the following specific purpose:

- It helps the researcher to understand particular trend and locate the gaps in research areas of his/her interest.
- The review of related literature enables the researcher to define the limits of his field.
- By reviewing the related literature the researcher can avoid unfruitful and useless problem areas. He can select those areas in which positive findings are very likely to result and his endeavour would be likely to add to the knowledge in a meaningful way.”

Educational technology is an important aspect of educational system. It is extensively used to provide effective teaching learning process in the classroom. Realizing the importance of CAI as an instructional tool various researches were conducted and its effectiveness was tested. In this section investigator has provided available related literature keeping the present study in view. A total of 61 studies have been reviewed to develop a holistic perspective of the objectives and findings of these studies and to arrive at the implications to support the present study.

The researcher has reviewed various national studies conducted in the area of present study, which enabled the researcher to think in the line of the study.

The order of arrangement of review of related literature

1. Research on high failure rates in mathematics
2. Review of related studies in mathematics for improvement of Learning and Teaching of Mathematics
3. Studies conducted for mathematical weakness
4. Review of literature related to PLM
5. The related literature in the field of Computer Assisted Instruction conducted in India
6. The related literature in the field of Computer Assisted Instruction conducted in abroad

2.02 Research on high failure rates in mathematics

(Jain & Burad 1988) in their study, Low results in mathematics at secondary examinations in Rajasthan. Problem of the study: The study centres upon the problem of low results in compulsory mathematics at the secondary level examination in the state of Rajasthan. Objective: To find out the causes related to low results and give suggestions to remove them. Methodology The sample of the study comprised rural and urban boys and girls of 100 government and private schools with lower results than those of the private students of Rajasthan. The heads of the institutions, the subject teachers and the students of those schools were also involved. The tools used to collect data included questionnaires for subject experts, for heads of the institution, for subject teachers and for students. Major Findings: (1) Non-availability of mathematics teachers due to late appointment and frequent transfers, lack of appropriate classroom blackboards and other physical facilities, irregular attendance of students, teachers habit of leaving the headquarters daily, and lack of residential facilities in some difficult areas were the administrative causes.(2) A low standard in the lower classes, non-availability of textbooks, lack of timely correction of homework, an overburden and uninteresting curriculum, lack of child centred teaching, overcrowded classrooms, lack of sufficient periods for the subject, use of 'pass books' and guidebooks by most of the students, scarcity of teaching material for mathematics, lack of proper supervision were the academic causes.

(Kasat, 1991) conducted a study on "In-depth study of the causes of the large failures in mathematics at S.S.C. examination of Marathi medium high school students in Plaghar Tahsil", for M.Phil., Edu. Pune: Indian Institute of Education. Problem: The study attempts to identify the causes of the large failures in mathematics at S.S.C. examination of Marathi medium high school students in Palghar Tahsil. Objectives: (i) To find out whether low intelligence and poor numerical ability are the reasons for failures in mathematics, and (ii) to find out the student-related, teacher-related, subject-related, parent-related and school-related reasons for the failures in mathematics. Methodology: The sample of the study comprised 200 students (100 boys and 100 girls) of 25 Marathi medium high schools of Palghar Tehsil, between October 1988 and October 1989, who had failed in mathematics, Standardized tests of numerical ability and a self-made questionnaire for teachers were used to collect data. The collected data were treated with percentages, 't' ratio, frequency distribution, frequency polygon, mean, median, mode, standard deviation, quartile deviation, kurtosis and skewness. Findings: (1) Low intelligence, poor numerical ability, poor comprehension and recall ability, no interest in mathematics and poor study habits were the cause of large failures of boys and

girls. (2) It was found that techniques like the Dalton Plan and group work were not followed by the teachers while teaching. (3) The teachers found that mathematics curriculum was not child-centered. Topics such as percentage and shares were difficult in arithmetic; the circle, circle-arc and area, similarly, were difficult to teach in geometry. (4) Percentage, rational algebraic expression, variations, probability and statistics were difficult topics in mathematics. (5) The parents being illiterate could not help the children at home. There were no finances for audio-visual aids in the schools.

2.03 Review of related studies in mathematics for Improvement of Learning and Teaching of Mathematics

(Wagh, 1991) conducted a study on, Development of a Multimedia Instructional System for Remedial Measures in Fractional numbers for his PhD Education in Shivaji University. The problem is the study relates to the development of a multimedia Instructional system for remedial measures for class VIII students in fractional numbers. Objective of the study are (1) to develop a multimedia instructional system for remedial measures in fractional numbers, according to the multimedia instructional system for developing compulsory skills and (2) to compare the results of this approach to those of the traditional approach of remedial teaching and thus to find the difficulty levels of skills experienced by the students in fractional numbers. The methodology of the study: One hundred and twenty students of standard VIII (60 boys and 60 girls) were selected randomly from the secondary schools of Sangh district in Maharashtra. The tools used in collecting data included a Survey Test, a battery of English Diagnostic test, Structured Interview, questionnaire and lesson observation rating scale. The data were analysed using the mean, SD, analysis of variance and t test. Major findings of the study were (1) In fractional numbers and in their operations, students were found to commit common errors in the basic process, cross-multiplication, the terms used, and in mixed operation in addition, subtraction, multiplication and division. (2) The facilities, resources and raw materials for the instructional material were available but were not used in schools.

(Moila, 2006) in his study, the Use of Educational Technology in Mathematics Teaching and Learning: An Investigation of a South African Rural Secondary School for his M.Ed dissertation. The purpose of the study was to investigate the use of ICT in Phusela secondary school in Mathematics teaching and learning and to develop some strategies on the use of ICT in Mathematics teaching and learning for similar rural schools like Phusela Secondary Schools. Research questions were to what extent are ICT tools used in Mathematics teaching and learning at Phusela secondary school? What are teachers' and

learners' perceptions on the use of ICT tools in mathematics teaching and learning? How do learners' achievements in Mathematics compare to ICT tools usage in terms of the SOLO taxonomy? Researcher used mixed qualitative and quantitative method. Researcher used CASE study and found that only a handful of educators attended training on educational technology integration in teaching learning. There were also other problems that contributed to training not being done as planned. Due to financial constraints, online training could not be done and thus the face-to-face training was extended for a longer period.

(Anthony & Walshaw, 2009) in their study *Characteristics of Effective Teaching of Mathematics: A View from the West* have stated that in New Zealand a collaborative knowledge building strategy—The Iterative Best Evidence Synthesis Program—has been implemented at policy level. Drawing on findings from the mathematics Best Evidence Synthesis Iteration, and more recent research studies, this paper offers ten principles of effective pedagogical approaches that facilitate learning for diverse learners. In examining the links between pedagogical practices and a range of social and academic student outcomes we draw on the histories, cultures, language, and practices for the New Zealand context and comparable international contexts. The ten principles of effective pedagogy of mathematics are (1) An Ethic of Care: Caring Classroom Communities that are focused on Mathematics goals help develop students' Mathematical identities and proficiencies. (2) Arranging for learning: Effective teachers provide students with opportunities to make sense of ideas both independently and collaboratively. (3) Discourse in the classroom. (4) Mathematical language: The use of Mathematical language is shaped when the teacher models appropriate terms and communicates their meaning in a way that students understand. (5) Mathematical tasks (6) Making Connections: Effective teachers support students to create connections, between different ways of solving problems, between mathematical topics, and between mathematics and everyday experiences. (7) Tools and representations: Effective teachers carefully select tools and representations to provide support for students' thinking.(8) Teacher learning and knowledge. (9)Building on students thinking. (10) Mathematical Communication.

(Aguile.L, 2010) conducted a study on *Effectiveness of Selected Teaching Strategies in the Remediation of Process Errors Committed by Senior Secondary School Students in Mathematics*. The purpose of the study was to determine the effectiveness of selected teaching strategies in the remediation of process errors committed by students in mathematics in senior secondary schools. The study employed the quasi-experimental design. Sample for the study consisted of two hundred and seven (207) students drawn from six senior secondary

schools randomly selected from the three hundred and sixty senior secondary schools in Edo State. The Diagnostic Test on Mathematics (DIATOM) was used to collect data for the study. Data collected were analysed using analysis of covariance (ANCOVA) and z-test for two population proportions. Results of data analysis revealed that the direct instruction was a more effective strategy for the remediation of process errors committed by students in mathematics. Sex and school location were shown not to have had any significant influence on the effectiveness of either strategy. The study recommended that enough practice activities should be given to students during class sessions to assist them develop mastery of content taught.

2.04 Studies Conducted for Mathematical Weakness

(Chel M. , 1990) in his work diagnosis and remediation of underachievement in compulsory mathematics of madhyamik examination in West Bengal for his PhD., Sc. Univ. of Calcutta. Problem: The study attempts to diagnose and suggest remediation of underachievement in the compulsory mathematics of the madhyamik examination in West Bengal. Objectives: (i) To identify different kinds of difficulties related to underachievement of students in mathematics from classroom observation from classroom observations of mathematics lessons. (ii) to seek out the types of errors which are identified from the performances of the students in their answer scripts. (iii) to find out the factors, according to the opinion of students, teachers and guardians, that are responsible for underachievement in mathematics at secondary school level, (iv) to know the extent to which the procedure of evaluation is responsible for underachievement. (v) to know the reinforces and noises in communicating mathematical principles to learning, (vi) to find out the remediation programme that should be suggested for students, teachers, and other for obtaining better achievement in mathematics at secondary level, and(vii) to find out what should be the role of the authority or management in implementing the remedial programme. Methodology: The sample comprised urban, semi-urban and rural students of Classes VI to X of West Bengal. The case study method was used in collecting the data. The statistics used to treat the collected data were mean and rank differences correlation. Major Findings: (1) The main difficulties faced by students included, concept gaps, confusion in understanding mathematical language, stereotype way of presenting contents and lack of openness in teaching. (2) The major mistakes found in the performances of students and teacher trainees in the areas include mathematisation of verbal problems, interpretations of mathematical results and learning new topics in mathematics. (3) Underachievement was caused due to lack

of understanding of the mathematical concepts of the earlier stage, and the abstract nature of mathematics. (4) Errors are caused due to the versatility and variability of contents. (6) Reinforcers in the channel of learning were readiness, interest, active involvement, use of effective materials of instruction and learning efficiency.

(Sashidharan, 1992) in his work on “Learning intellectual skills as an educational outcome in relation to students entry characteristics and quality of instruction” found that the initial deficiencies have a long term damaging effect because the content of education is organized in such a way that learning in each class is depend on prior learning. Weakness of students in mathematics can be major factors, which cause the gap between the expected achievement and actual achievement in mathematics. This hinders to achieve desirable outcomes in the instruction process of mathematics.

(Jayasree, 1997) identified the difficulties experienced by the pupils of standard VIII in expanding algebraic expression using identities with the help of a diagnostic test. The study revealed that the level of attainment is poor in the case of classification of open and closed sentences, finding the always-true sentences and product numbers using identities. The study also revealed that there is no mastery of the rules of signs and many pupils do not seem to have a clear grasp of identities.

(Vasudevan, 2003) conducted a Diagnostic Study to identify the difficulties experienced by pupils studying in Standard VIII, in the computation of negative numbers. The study revealed that majority of the students faced difficulty in carrying out the fundamental operations involving negative numbers due to the lack of clarity on rules of fundamental operations.

(Yasoda, 2009) conducted a study on problems in teaching and learning mathematics. The objectives of the study were (1) to identify the difficulty areas in secondary level mathematics as perceived by the pupils and teachers. (2) to identify the problems faced by the pupils in learning mathematics and by the teachers in teaching mathematics. (3) To study the attitudes of pupils towards learning mathematics and of teachers towards teaching the subject.(4) To study the variation in the problems and attitudes of the pupils of sub groups depending upon their personal and demographic variables. (5) to suggest the suitable strategies for the improvement of teaching-learning mathematics at the secondary level. The findings of the study were in VIII class text book the chapters ‘commercial mathematics’ and ‘mensuration’ are the most difficult chapters for the students whereas for the teachers along with the above two chapters ‘triangles and polygons’ and ‘circles and concurrent lines of triangles’ are respectively are most difficult chapters. Students are facing problems in

understanding the mathematical language, symbols and relation between different concepts in mathematics.

2.05 Review of literature related to Programmed Learning Material (PLM)

(Kulkarani & Yadav, 1966) conducted a comparative study of teaching by different methods of programming of different levels of pupils, department of Psychological Foundations, NCERT, New Delhi. The study attempted to know which method of programming could have better impact on instruction for the development of an ability for a given group of students, i.e. Branching, linear and simple programmes (without providing immediate knowledge of results) were tried out on below average, average and above average students. Investigators studied the relative effectiveness of different types of programmes on the development of knowledge, comprehension and application objectives for “solving simple equations”. The sample consisted of class VI students of an English Medium school in Delhi. Three matched groups on the basis of marks obtained by the students in the last examination were formed. These groups were then administered the different styles of programmes on ‘solving equations’. The treatment lasted for a week. To analyse results ‘treatment levels’ design of analysis was followed and F values were computed. The main findings were F values for the treatment were 3.15 and 5.14 respectively, which obviously showed that the treatment effects did not seem to be significantly different. Findings showed that the treatment effects did not seem to be significantly different; to arrive at certain conclusions replications with better control were needed.

(Sharma, 1966) conducted a study on “A comparative study of outcomes of teaching of Algebra by conventional classroom and method of programmed instruction”, Government Johari higher secondary school, Ladnun Rajasthan. The study aimed at comparing the programmed method of teaching algebra with the conventional classroom lecture method, with a delayed post-test to study the relative retention under the two methods. The sample consists of 80 students of class IX who were divided into upper middle and lower groups on the basis of marks in the terminal examinations and then they were randomly assigned to an experimental and control group. Besides usual pre-test and post-test a delayed post-test was also administered to study the effectiveness of the two methods in terms of retention. The findings of the study showed that (i) the mean achievement of the experimental group taught through PLM was 2.5 point higher than that of the control group taught by the teacher through the lecture method. (ii) the obtained mean gain was significant at .01 level. (iii) Sixty per cent of the experimental group secured cent per cent on the test, whereas only twenty per

cent of the control group could reach that high standard. (iv) the experimental group had a minimum score of four whereas the control group showed a minimum of zero and (v) the delayed post-test also showed better retention by the experimental group.

(Shah, 1969) conducted a study on “To Develop Auto Instructional Programmes in Algebra for standard VIII and to find out their Effectiveness in Relation to Different Variables” for PhD, Education, Gujarat University. The purpose of the study was (i) To examine the potentialities of the auto instructional programmes as a practical solution to some of today’s critical problems in education and (ii) to make the teachers conversant with the techniques of preparing auto-instructional programmes. The hypothesis of the study were (i) the total mean score achieved by experimental group, learning through auto-instructional programmes would be greater than that of control group taught by the conventional method, with a saving of time in learning, (ii) learning through auto-instructional programmes would work better with low achievers than the high achiever and (iii) the students of previous grades (grades below VIII) if they possessed the pre-requisite knowledge required for learning new topics (algebra). The involved the comparison of experimental and control groups. The control group was taught by conventional method and the experimental group was allowed to learn by auto-instructional method. Four schools of Ahmadabad were selected for the experiment. Two comparable classes of each school were taken for the research purpose. The auto-instructional programme covering the whole syllabus of algebra of standard VIII were developed. The whole syllabus of algebra was divided into seven units; a self-test which could give the idea of achievement of students as well as teachers, was prepared and given by the programmer to both the groups at the end of each units. The total mean score as well as the test wise mean scores of both the groups were compared to find out the effectiveness of auto-instructional programme. In order to study whether the programmed learning works better with low achievers, two way analysis of variance was utilized. Four classes of standard V of all the four groups under experiment were allowed to learn algebra through auto-instructional programme prepared for class VIII. The results of the study were (i) the total mean score achieved by the experimental group was higher than the total mean score achieved by the control group (ii) the average time taken by the experimental group was less than the average time allotted to the control group (iii) the order of difference between mean achievements for the two methods changed with the achievement levels. (iv) with some explanation of few technical terms, the standard V students can learn through the programme easily and could answer the ‘self-test’ given at the end of each unit quite satisfactory, but,

taking almost double time to go through the same content learnt by the students of standard VIII.

(Patel, 1975) developed Auto Instructional Programmes in Geometry for Std. IX and to find out their Effectiveness in relation to different variables for PhD Edu in Gujarat University. Fourteen classes of fourteen rural and urban high schools formed the sample of the study. The tools used in the study were (i) The Desai's Intelligence Test , the Kuppuswamy's Socio-Economic Status Scale, test of entering Behaviour, test of terminal behaviour , opinionnaire for students and interview schedule for interviewing teachers. The findings of the study were: (i) the PLM proved to be more effective than conventional method (ii) high and low IQ groups of students performed better with PLM than with conventional teaching (iii) the average time taken by the group learning through PLM was less than that of the group taught by the traditional method (iv) students from different strata of the society performed better with PLM than with conventional teaching.

(Patel A. , 1977) developed and tried out Auto Instructional Programmes in Some Units of Geometry for Class VIII and to study its Effectiveness in the Context of different Variables for PhD Education in SPU. The major objectives of the study were (i) to develop PLM in some units of Geometry for class VIII (ii) to compare the achievement in mathematics of students having different reading abilities, and learning through PLM and traditional way of teaching. The sample consisted of 810 students of class VIII studying in fourteen schools of Kaira District. The sample was selected in view the following criteria, strength of the school etc., the achievement of students was measured through teacher made test. For data analysis mean, SD and t test were used. It was found that the auto instructional material does not work well with pupils having low n Ach.; (ii) in case of highly motivated students the material was found to be working well; (iii) learning through PLM in case of students having poor reading ability was not more effective than the conventional method but it was superior in case of students who had good reading ability: (iv) more anxious students could learn better through PLM than their counterparts.

(Seshadri, 1980) conducted a study on "An Experiment in the Use of Programmed Instruction in Secondary Schools" for PhD Education in MSU of Baroda, Vadodara. The main objectives of the studies were (i) to identify different components of the instructional strategy. (ii) to develop software material to be utilized under different components, (iii) to study the effectiveness of each component in terms of students and parents reactions and teachers observation. (iv) to study the effectiveness of instructional strategy as a whole. She developed a linear program of 2074 frames for mathematics for class IX. The entire syllabus

as also a whole academic year was covered. The components identified were introduction by teacher, programmed learning material, exercises or assignment, tutorials summary, mathematical games or group activity, post-test and discussion of performance of post-test and feedback sessions. The tools of data collection were the criterion tests, Headmasters' Association examinations, semester and comprehensive examinations, questionnaire to know learners', parents' and school authorities' reaction. Other tools used were the Raven's Standard Progressive Matrices, Junior of Motivation (JIM Scale) and Palsane's Study Habit Inventory. The statistical techniques used were t-test, product moment coefficient of correlation and partial correlation. The main outcome was a duly validated instructional strategy having reproducible PLM as the major component and with established long-range effectiveness and feasibility for using in classroom situations was developed, achievement had positive correlation with intelligence, but not so with the scores on JIM scale and Study Habit Inventory. She found that the strategy having PLM as its major component worked better.

(Pandey, 1980) conducted a study on Use of programmed Instruction on Teaching Mathematics at Primary Level for PhD Education at Pat. University. The aim of the study was to see the relative effectiveness of the traditional method without home assignment and grading, a programmed text and the traditional method with regular home assignment and grading in teaching mathematics at primary level. The sample consisted of 60 students of class IV studying in the central school at Samchi (Butan). The subjects were randomly divided into three groups. The three groups were tested for homogeneity with regard to prerequisite and age. The programmed text prepared for the purpose consisted of 2,557 frames and divided into thirty units to be covered in thirty working periods. He found that the PLM was superior to other methods and that the high and the low-income group students following the PLM were distinctively superior to those who had traditional teaching with home assignment and grading.

(Trivedi, 1980) conducted a study on "Use of Branching Variety of Programmed Learning Material as Diagnostic and Remedial Tools" for PhD in Education M.S. University of Baroda. The major objectives of the study were (i) to develop Programmed Learning Material of the branching type in mathematics for classes V, VI and VII (ii) to compare the achievement of the students by the traditional methods of teaching with that of the students studying through programmed materials (iii) to diagnose students weakness in mathematics and (iv) to use programmed materials as remedial measures. It was an experiment using experimental control group design. The subjects in the two groups were selected on a random

basis. For each class, there were 40 students in experimental group (20 boys and 20 girls) and an equal number in the control group. The two treatments were the use of programmed learning materials of the branching type and the conventional method. Two-way analysis of variance was used for data analysis. In the design, pre-test score and intelligence were used as the covariates. The tools of research used were programmed materials developed for the selected units of mathematics, pre-test, post-test and Bhatt Test of Intelligence. The experiment was conducted by the teachers who were trained to use the programmed material. The major findings of the study were (i) for class VI, the programmed learning material was more effective than the conventional method of teaching whereas for classes V and VII, both the methods were equally effective in terms of pupils achievements. (ii) in the case of class VI girls learnt better than boys through the use of programmed material, whereas in the case of classes V and VII, there was no significant difference between the mean scores of boys and girls learning through programmed materials.

(Inamdar, 1981) conducted a study on “A Study of the Effectiveness of the Programmed Learning Strategy in the Subject of Mathematics for Standard VII in relation to some Psychological Correlates” for PhD Education in SPU. The thesis aimed at studying the effectiveness of the programmed learning strategy in the subject of mathematics in standard VII. The topic for the study was the unit on Simple Interest. The candidate selected seven students from three schools, of whom three were bright, three averages and one dull according to their achievement in their previous examination. The material was tried on thirty students of standard VII. An entry behaviour test was given to the students. The experimental and control groups were formed on the basis of these test. The sample consisted of 108 boys and 100 girls in the experimental group and same number of boys and girls in the control group. The experiment was conducted in twelve periods. The performance of the group was studied in relation to some psychological correlates such as general ability reasoning ability, reasoning ability and motivation towards school. Analysis and interpretation of the data were done to find out the relation between general ability and performance in achievement test in the PLM and the relation between motivation towards school and performance in achievement in PLM. It was found that the programmed learning technique was superior to the conventional technique.

(Shah, 1981) conducted a study on “To Develop and try Programmed Material in Mathematics for students of Class V in Gujarat State” for PhD Education in Gujarat Vidhyapeeth, Ahmedabad. The purpose of the study was (i) to develop programmed materials on various units of the mathematics syllabus of class V and (ii) to try the same on children of

class V from a few selected schools. The sample includes seven primary schools of Malpur, Bayad and Kapadvanjwere PLM was tried and four schools of Malpur which were taken as control group. The sample consisted of 250 students for PLM and 200 students for control group. For every unit criteria test was used. Questionnaire was used for students and teachers to know their reactions towards the programmed materials. The total time of the study was twenty four hours and forty minutes. Findings (i) the total mean score achieved by the experimental group was higher than the total mean score achieved by the control group (ii) the average time taken by the experimental group was less than the average time allotted to the control group. The reactions of the students and the teachers were favourable.

(Suthar , 1981) conducted a study on “A study of performance on Programmed Learning Material in relation to some Psychological Characteristic for PhD Education in SPU. The major objectives of the study were (i) to develop PLM in algebra of students with different study habits, learning through PLM and traditional way of learning.(iii) to compare the achievement of algebra of students with different reasoning abilities. (iv) to compare the achievement of students having positive and negative attitudes. Researcher developed algebra programme for class VIII covering set theory, rational numbers, real numbers powers and indices, equations and problems, and graphs. Study habits, attitude towards mathematics, learning abilities, motivation towards school, learning and entering behaviour were also analysed. The PLM emerged superior irrespective of different variables.

(Davies , 1982) conducted a study on “Effects of Different Modes of paring in programmed Learning of Mathematics on the Performance of Underachievers” for PhD Education in Madras University. The objectives of the study were (i) to test the differential effects of the three pairing modes in PLM, on the achievement of underachievers in mathematics. The sample consisted of 1092 students of standard IX drawn from ten randomly selected schools. The tools used were achievement test in mathematics, questionnaire on interest in mathematics, participation in extracurricular activities and academic self-concept (developed by the investigator). A PLM in statistics in Tamil was prepared and validated. The statistics used were t test, F- ratio, chi square test, ANOVA, multiple regression and factor analysis were used for data analysis. The main findings of the study were, the underachievers had 78% individual gains, underachievers in teacher’s choice and mixed pairs gained significantly in the post test and had significant residual gains over the predicted level of performance in mathematics.

(Rao, 1983) for PhD in Education, Osmania University, conducted a comparative study of PLM and conventional learning methods in the instruction of mathematics : a

psychological approach. The objective of the study was: (i) to find out the efficiency of PLM over the conventional learning method in the instruction of mathematics in school education. (ii) to determine the variation in learning gains in the pupils in the rural urban dimension. (iii) to determine whether there was any difference in learning due to sex variation of the pupils (iv) to investigate into variations in achievement gains of the pupils in mathematics owing to variation in their general mental ability level under Programmed Learning Instruction. (v) to find out the differential learning gains in the pupils owing to school climate, with special reference to private and government management of institutions. The design was an experimental cum field investigation. Two matched groups of students were exposed to PLM and conventional classroom teaching. The subjects were matched in the rural-urban sex IQ, state of instruction and management of schools. A sample of 300 students from grade V and 296 students from grade X were taken, equal number of students were assigned for PLM group and conventional learning groups in both the grades. The tools employed for data collection were the Hyderabad State Bureau of Education group test of Intelligence (1980) and interview schedule to know the attitude of students, and achievement tests in mathematics of students of grade V and X. The findings of the study were: (1) the mean performance scores of the PLM groups and conventional groups on achievement test were less than the normative means of the tests. (2) the mean performance scores of all the PLM groups were higher than those of the corresponding conventional learning groups. (3) The mean performance of urban subjects was superior to the performance of the rural subjects under the PLM; irrespective of grade (4) the mean performance scores of groups of subjects of high, average and low level of general mental ability were in the order of their categorization.

(Bhatia, 1992) conducted a study on identification and remedy of difficulties in learning fractions with Programmed instructional material in Indian Educational Review. Problem: The study tests the effectiveness of programmed instructional material as a remedial teaching tool. Objectives (1) to develop programmed instructional material on fractions for students of class V. (2) to use programmed instructional material a remedial tool. (3) to test the effectiveness of programmed instructional material in class room teaching for students of class V and (4) to test the significance of difference between the traditional method of teaching and teaching through PLM. Methodology: A sample of 50 students was selected from two M.C.D primary schools of Karol Bagh New Delhi twenty five students from each school; four criterion tests were administered as tools to collect data. The collected data were treated by using mean, SD and t-test. Major findings: (1) Teaching and learning through PLM

could definitely help both students and teachers. (2) Students receiving the PLM did better in post-test as compared to the other group. (3) The PLM worked effectively as a remedial tool. (4) PLM not only helped the students to learn better but also helped the teacher to know how the students learn better.

(Thatte, 1998) conducted a study on “An Experimental Study of the Relative Effectiveness of Programmed Learning and Learning Through Audio Visual Aids with reference to certain selected topics from the syllabus of Science for Std. V to VII in Greater Bombay” under University of Mumbai, Mumbai. Objectives of the study were 1. To compare the mean achievement scores of the students of Std. V, VI, and VII studying through AV Aids method, Programmed Learning Method and Traditional method. 2. To study the effect of treatment, sex, and their interaction on achievement. Sample of the study was eight Schools of Greater Mumbai were selected in all. Twenty four different classes were considered and the total number of students was 1381. Tools of the study were the question papers set by the investigator based on the topic were used as tools for data collection. Data were analysed using Central tendencies, percentile and percentile ranks, SD, ANCOVA and t test. Findings of the study were 1. AV aids method was found to be significantly more effective than the Programmed Learning Method and the Traditional method in terms of achievement at Std. V, VI, and VII. 2. Programmed Instruction Method was found to be significantly more effective than the Traditional Method in terms of achievement at Std. V, VI, and VII. 3. Programmed Learning Method and Audio Visual Method are more successful when the classes are small, at the same time they are more effective for average students. 4. Male students and female students, both, equally benefited through the AV method as well as Programmed Learning Method. No significant effect of interaction between treatment and sex was found on the achievement of student.

(Tare, 2001) conducted a study on “A Study of the Effectiveness of Branching Variety of Programmed Instructional Material as Diagnostic and Remedial Tool in Chemistry for Secondary Classes in Jabalpur Division” in Rani Durgavati University, Jabalpur. Objectives of the study were 1. To compare the achievements of the students of urban and rural areas of Jabalpur Division by the traditional method of teaching with that of studying through branching frames of programmed learning in Chemistry Subject. 2. To diagnose the weakness of the students of urban and rural areas with the help of PLM. Research Design used Experimental and Control Group Design was used for the purpose of this study. Sample 280 students were selected from different Government Higher Secondary Schools of urban and rural areas of Jabalpur Division. Tools and Techniques: A branching programme was

developed on Atomic Structure and Chemical Bonding and pre-test and post-test were constructed by the investigator. Data Analysis: ANOVA and t-test were used for data analysis. Findings 1. The achievement of the experimental group was found significantly greater than the achievement of the control group. 2. The achievement of the urban girls through PLM was found significantly higher than that of the urban boys. 3. No significant difference was found in the achievement of boys and girls of rural areas in the post-test on atomic structure and chemical bonding. 4. 135 boys out of 180 and 64 girls out of 99 wanted to continue the study with the PLM on both the topics. 5. The weakness of individual students were diagnosed and removed when branched frames on both the topics were administered.

(Ramani & Patadia, 2012) conducted a study on “Development and Try-out of the Programmed Learning Material in Mathematics for class XI students studying in schools affiliated to Gujarat Secondary and Higher Secondary Education Board (GSHSEB)”. The objectives of the study were 1. To develop programmed learning material in mathematics for XI standard students. 2. To implement the developed programmed learning material in mathematics to the XI Std. students studying in one of the English Medium Schools following the syllabus of GSHSEB. 3. To study the effectiveness of the developed programmed learning material. The methodology of the study was posttests only control group design, groups were matched using comparable mean and standard deviation, correlated t test was used for data analysis. The sample size consisted of fourteen students of XI standard. PLM was found to be effective in teaching probability to XI standard science stream s students as the achievement test score of experimental group students was found significantly higher than the achievement test score of the control group students.

2.06 Related literature in the field of Computer Assisted Instruction conducted in India

(Nagar, 1988) conducted a study on effectiveness of computers in teaching mathematics in school for his M.Phil., Education University of Delhi. The study attempts to ascertain how best a teacher can use the computers to improve learning in the classroom. The objectives are (1) to examine the usefulness of the computer in teaching mathematics. (2) to examine areas/aspects of mathematics which can be more effectively taught with the help of computers and (3) to examine the trends regarding the use of computer-aided teaching of mathematics. The methodology of the study: This study is based on survey of studies, which include; mainly, three projects and ten research studies conducted independently. The major findings are (1) Computer Assisted teaching (CAT) of mathematics benefited both the teacher and the learner. (2) CAT encouraged individualisation and practice without burdening the

teacher with repetitive and monotonous activity. (3) CAT helped the learners to use their creativity by exploring new areas not covered by the syllabus. (4) computer awareness was not sufficient in schools for CAT. (5) In India, we have gone in for the theoretical rather than the practical aspects of computer-based education. Project CLASS was not enough computers in schools, and not enough awareness regarding the computer. The computers that were available were not being put to the best possible use. Teachers had a great un trust of the computers and perceived it as an inconvenience rather than as an aid. Their negative attitude was a great hindrance in popularising the use of computer literacy in the educational system, especially at the secondary level of education.

(Jeyamani P. , 1991) conducted a study on effectiveness of the simulation model of teaching through Computer Assisted Instruction(CAI) for M Phil Education from Avinashilingam Institute of Home Science and Higher Education for Women, Coimbatore. The problem was to study effectiveness of the simulation model of teaching Physics to standard XI students through Computer Assisted Instructional Material. Objectives of the study were: (1) to find out the effectiveness the simulation model of teaching as compared to the traditional method and (2) to utilize the growing use of computers in education. Methodology of the study was the sample for this investigation consisted of students of standard XI of the two schools selected. The pre-test-post-test method was used. Mean, SD, and t test were used to treat the data. Major findings were: (1) the experimental group obtained a higher mean than the control group. (2) the sex-wise comparison proved to be insignificant, (3) There was no significant difference in learning level between Tamil-medium and English-medium students. (4) on the basis of the research findings, it was concluded that the experimental group performed significantly better than the control group.

(Singh, Ahluwalia, & Verma,1991) conducted a study on “Effectiveness of Computer Assisted Instruction (CAI) and Conventional method of instruction”. The study centres upon the problem of the effectiveness of Computer Assisted Instruction and of the conventional method of instruction in teaching mathematics, in terms of achievement of mathematics and direction of change in attitude towards mathematics of male and female students. Objectives: (i) To study the difference in mathematics achievement which occurs as a result of the difference in instructional strategy among boys and girls separately and as a group? (ii) To study the direction of change in attitudes of male and female students separately and as a group towards mathematics as a result of two different instructional strategies. The sample of the study consisted of 220 students from four selected higher secondary schools, covering the good, average and poor schools of the Bhilai steel plant, Bhilai (M.P.). Findings: (i) The

students who used the computer scored significantly higher than those taught mathematics through the conventional method. (ii) The students who used the computer showed significantly highly favourable attitude towards mathematics than those who did not use the computer (iii) Achievement in mathematics and change in attitude towards mathematics were found to be independent of the sex factor.

(Rose Antony Stella, 1992) tested the effectiveness of Computer Assisted Instruction with special reference to underachievers -PhD Education Bharathidasan University. Problem of the study throws light on the application of CAI and the teacher support system (TSS) for the optimum development of underachievers (UA). Objectives were: (1) To develop CAI software, (2) To find out the effectiveness of CAI with TSS and CAI without TSS with references to the learners variables viz sex, IQ and achievement level and (3) To find out the interaction of the learner variables and the treatment on the achievement score. Methodology: The randomised block design was followed in the selection of the samples, with IQ as the blocking variables. The samples consisted of three groups of size 32 each composed of students of standard IX selected from Tamil Nadu State Board schools covering one rural and two urban. The underachievers in the sample were identified by using the regression analysis. The tools used included CAI software on the language of sets, achievement test, and cultural fair, intelligent test by Cattell and cattell, study habits inventory by Patel, and Mathematics study attitude scale by Sundarrajan, Mean, S.D, t-test, Chi-square, one-way and two-way ANOVA were used to treat the collected data. Major findings were: (1) Both the CAI strategies were superior to the traditional method of instruction, and CAI with TSS was more effective than CAI without TSS for underachiever (UA). (2) Except achievement level, all the other learner variables combined with the treatment had no interaction effect on the achievement score. (3) There was no relationship between the post-treatment scores and the variables 'sex', 'locale' and 'achievement level' of the experimental group. In the case of the variables IQ, 'Study habits' and 'maths study attitude', the positive relationship between those variable and achievement at the pre-treatment level was found to be cancelled at the post-test. Similar results were obtained for UA.

(Singh, 1992) studied effectiveness of teaching mathematics through computer assisted instruction and conventional method of instruction on cognitive and non-cognitive variables-PhD Edu. Guru Ghasidas University. Problem: the present study aims to compare the results of computer assisted instruction CAI with the results of the conventional method of instruction in teaching mathematics in certain selected units of the mathematics curriculum. Objectives: (1) To compare the results of the two groups in mathematical

achievement. (2) To compare the results of the two groups in mathematical achievement sex wise and (3) To compare the attitudes towards mathematics of the two groups as whole and also sex wise. Methodology: The study was conducted in four higher secondary schools having facility of three to five BBC microcomputers. The students belonged to different socio-economic groups. Three units of the mathematics syllabus for class IX namely simultaneous equations in algebra, statistical representation in statistics, and triangles and their congruency in geometry were chosen for the study. The tools used in the study include rating scale by the researcher, general intelligent test of Mohsin, the attitude scale towards mathematics of Suydam, and the educational software prepared by the practising teachers. The statistical techniques used include mean, S.D and t-test. Major findings (1) The groups taught through CAI in all the schools showed a substantial progress. (2) The gains in achievement of the pupils of good schools are higher than those of pupils of average and poor schools. (3) The CAI method of teaching mathematics had proved to be more effective (4) Both boys and girls gained more from the computer treatment. (5) A significant favourable change in the attitude of the pupils of the experimental groups over the control groups was observed. (6) The change in attitude towards mathematics was independent of gender.

(Adhikari, 1992) conducted a study on “Development of Computer Aided Instructional Material on cell and cell reproduction for class IX” using BASICA software. Objectives of the study were: (1) To develop computer aided instructional material on cell reproduction and study its effectiveness in terms of (a) achievement of students, (b) reaction of students studying through computer aided instructional material. (2) To compare mean achievement scores of the students towards the computer aided instructional material and traditional method by taking intelligence as the co-variate. The design of the study was pre-test post-test control group design where 40 students were taken for experimentation. The findings of study were (1) the computer aided instructional material was found to be effective in terms of achievement of students. (2) Students showed positive reaction towards computer aided instructional material (3) computer aided instructional material is effective in achievement when both the groups were matched on intelligence.

(Das, 1998) conducted a study entitled “Exploring effectiveness of computer assisted learning materials on rhymes in different modes”. Objectives of the study were 1. to develop computer software on rhymes in text, graphics-text, text-music, graphics text music, and graphics-text-music- recital modes. 2. to study the effectiveness of CALM prepared in different modes for learning the Rhymes in terms of Word meaning (lexicon), Analytical understanding, Comprehensive understanding, Writing ability, Recitation ability and LSRW

ability. Hypotheses: 1. The adjusted mean of the achievement test score on word meaning, analytical Understanding. Comprehensive understanding, writing ability, recitation ability, and language learning of the students belonging to Text, Graphics Text, Text Music, Graphics Text Music, and GTMR modes will not differ significantly when class achievement test score in English language is considered as covariate. Sample: Seven rhymes were presented in 5 different modes, namely, T, GT, TM, GTM, and GTMR to 5 different groups of students, respectively, drawn from a total of 169 students of Second Standard of Baroda High School, Baggi Khana (1996-97) on the basis of systematic random sampling. Each group comprised of 20 students. Tools and Techniques: The investigator used two tools for the study, namely, the treatment tool. The investigator used two tools for the study, namely, the treatment tool and testing tool. The treatment tool was the Computer Assisted Learning Material (CALM) on rhymes developed by the researcher in different modes. Testing tool was an achievement test developed by the investigator. Data Analysis Technique Used ANCOVA was used considering English Language class achievement test scores as covariate. Findings of the Study: 1. Composite modes of presentation may not ensure higher cognitive language learning. 2. Intelligibility of a message is a function of sender, message, medium, mode, receiver, and the environment. Implications of the study 1. It is beneficial for the learners to learn through CALM. So, CALM should be developed and used for language learning. 2. Choice of a mode of instruction should be guided by the objectives of instruction.

(Khirwadkar, 1998) conducted a study entitled “Development of Computer Software for learning Chemistry at standard XI” for PhD from M.S. University of Baroda . Objectives of the study were: (1) To develop CAL package in subject of chemistry for standard XI science students, studying Gujarat State Board syllabus. (2) To study effectiveness of the software package in terms of instructional time and achievement of students. (3) To study the effectiveness of software package of students’ achievement in relation to students’ intelligence level, motivational level and attitude towards the package. (4) To study attitude of the students and teacher regarding the effectiveness of CAL package with regard to aspects of the software such as content of the software, presentation of the software, examples and illustration, graphs and figures, evaluation items, Utility of the software and instruction given in the instructional manual that are provided with the software. The sample for experiment was 30 students in experimental group and 30 students in control group randomly taken. The students of experimental group were expected to teach through software package prepared for chemistry subject. The control group was taught through traditional method by school chemistry teacher. The time duration was one month for both groups. Researcher had

collected data of achievement through structured post-test and pre-test and data about attitude towards package through structured and unstructured interview schedule. The data was quantitative as well as qualitative including teachers and students' opinion about the package. The data analysis was done by ANOVA, ANCOVA and content analysis. The findings of the study revealed that the CAI package was effective in terms of academic achievement of students and instructional time, the teacher and students had positive attitude about developed CAI. IQ, academic motivation and attitude affected achievement of students.

(Zyoud, 1999) conducted a study entitled "Development of Computer-Assisted English Language Teaching for VIII Standard Students" for Ph.D. (Edu.) from M.S. University of Baroda. The objectives of study were: (1) To develop a computer assisted English language teaching program for standard VIII Gujarati medium students. (2) To study the effectiveness of the computer assisted English language teaching program on students' achievement in terms of Vocabulary, Grammar and Comprehension by taking pre-test and IQ as covariates. (3) To study the effectiveness of the computer assisted English language teaching program in terms of students' achievement of all above mentioned with respect to their intelligence, motivation and attitude. Students studying in standard VIII Gujarati medium were taken from two schools to serve as the sample for the study. Students of one school i.e. Rosary school, Baroda formed the experimental group and students of the other school i.e. GEB School, Baroda formed the control group. The experimental group consisted of 66 students and control group consisted of 46 students. The tools used in the pilot study were also used in the final experiment, namely, Pre-test, Raven's progressive matrices, Junior Index of motivation by Frimer translated into Gujarati by Desai and the post-test developed by the investigator. For studying the attitude of the students towards the package, the researcher developed and administered an attitude scale on the experimental group only after the final experiment. To fulfil the first objective of the pilot study, the investigator conducted informal interviews with the students by asking them about the difficulties they faced. ANCOVA was applied for analysing the data. The findings of study were: (1) When the computer is used to its full potential, it can create an atmosphere where the students can learn and interact with the computer without being afraid of the teacher's presence. (2) The computerized exercises can help the student become familiar with significant amount of vocabulary, grammar and comprehension because it provides effective individualized instruction.

(Yadav, 2000) conducted a study entitled "A study of the effectiveness of the Computer Software for students of standard I". Researcher had selected the purposive

sampling method for school and taken the Baroda High School, Bagikhana, as sample. Researcher had selected the sample of students of standard-I, randomly for alphabet software and animal software. For the purpose of study tools constructed and used were pre-test, semi-structure interview for teacher and informal interview and observation for students. The findings of the study revealed that developed package helped the students in vocabulary and grammar whereas no effect in comprehension was observed. IQ had an impact on students' achievement, while motivation had not found impact on it. Students were found to have positive attitude towards the package. There was a significant gain in terms of mean achievement through CAL. Also CAL has evoked positive perceptions amongst teachers and students regarding computers.

(Dalwadi, 2001) conducted a study entitled "Development of Computer Assisted Instruction in Science for the students of standard IX" from M.S. University as a part of the M.Ed. degree. Objectives of the study were: (1) To develop Computer Assisted Instruction (CAI) in science for standard IX. (2) To study the effectiveness of CAI in terms of achievement of standard IX students and (3) To study opinion of the science teachers and students regarding the effectiveness of the developed CAI. The researcher found significant gain in terms of the achievement of students through CAI on "Light". CAI had evoked positive perception among the students. Though there were students who did not take interest in CAI due to coloured graphics, but they liked presentation of text with graphics. Majority of students had enjoyed learning with CAI and suggested to prepare CAI on other topics too. The students were of opinion that coloured animated graphics, sound effect in CAI would enhance learning. The teacher has also suggested developing CAI in other area of science. Both the teacher and student encouraged the computerized self-learning instead of stereotype classroom session.

(Patel, 2001) conducted a study on learning through Computer Assisted Learning Material in relation to selected production variables and contiguity from M.S. University of Baroda, as a part of the M.Ed. degree. Objectives: (i) To analyse CALM in relation to production variables and contiguity. (ii) To study the effectiveness of CALM in terms of mean achievement of students. (iii) To study the learning through various message items in relation to production variable and contiguity. Method: The research is an experimental type. In order to study the effectiveness of the developed CALM pre-test post-test single group design was used. A single group of thirty students was selected purposely as a sample for the present study. Findings: There has been found significant gain through interaction with the Computer Assisted Learning Material on Solar system and Magnet for Standard VIII through

the computed correlated t values. The status of the CALM in terms of production variable and contiguity vis-à-vis achievement has been found quite higher, except on a few teaching points where there was need to improve upon graphics, mode of presentation, spatial contiguity of text and animation and temporal contiguity of animation and narration.

(Sharma, 2003) conducted a study entitled “A study of the effectiveness of Computer Assisted Learning (CAL) in chemistry for the students of standard XI”. The objectives of the study are (1) To develop CAL in chemistry in terms of achievement of standard XI students. (2) To study the effectiveness of the CAL in chemistry in terms of achievement of standard XI students. (3) To study the opinion of the chemistry students regarding the effectiveness of the developed CAL. The researcher had found that CAL developed was effective for teaching Chemistry at standard XI. It helped the students to learn the topic of organic compound and clarified the concepts. Students were found to have a positive reaction towards the CAL. It was found to be favourable as far as the statements related to the interest, mode of presentation, content clarity and the question asked in the CAL. A chemistry teacher was found to have positive reaction towards developed CAL. Also, the data analysed revealed that teacher had given favourable statements regarding content, language clarity, mode of presentation, and clarity in graphics and evaluation procedure in developed CAL.

(Vasanthi & Hema, 2003) conducted a study on effectiveness of teaching Chemistry for 1 year B.E. students through Computer Assisted Instruction . Objectives: (i) To study the effectiveness of teaching chemistry through Computer Assisted Instruction over the traditional teaching Method. (ii) To study the effectiveness of the Computer Assisted Instruction over the traditional teaching method in pre-test scores and post-test scores. Method: The sample consisted of 60 students selected from 220 students of Sivnath Aditnagar College of Engineering, Tiruchendur, in Thoothukundi District on the basis of marks. Those students were divided into two equal groups of 30 each on the basis of marks obtained in the class test. One group was taken as the control group and the other group was taken as the experimental group. A pre-test and post-test parallel group experimental design was used. The experimental group was given the CAI software. Statistical technique like Mean, S.D and t-test computed to analyse the data collected. Findings: (i) There is significant difference between the mean gain score of the control group taught through TTM and the experimental group administrated by the CAI in all units put together. (ii) There is no significant difference between the mean scores of pre-test of control group taught through TTM and experimental group administrated by CAI in all units together (Electrochemical and bonding). (iii) There is no significant difference between the mean scores of post-test of

control group taught through TTM and experimental group administrated by CAI in all units put together.

(Helaiya, 2004) has conducted a study entitled “Developing and implementation of CAI package for teaching statistics to B.Ed. students”. CAI was developed using Visual Basic Software. The objectives of the study were: (1) To develop a CAI package for teaching statistics to B.Ed. students. (2) To study the effectiveness of CAI package in statistics in terms of B.Ed. students. (3) To study the reaction of the B.Ed. students regarding the effectiveness of the developed CAI package. 16 B.Ed. Students of the Department of Education, MSU, Baroda having Computer Education specialization constituted the sample for the study. Pre-test, treatment, post-test single group pre experimental design was used for the study. The treatment was found quite effective as evident through the mean gain scores and favourable reactions. Investigator observed that CAI was effective in teaching statistics to B.Ed. students than traditional method. Students had enjoyed learning with CAI and suggested to prepare CAI in other topics too.

(Ruttanathummatee, 2004) conducted a study on Effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental Study in South Gujarat University, Surat. Objectives of the study: 1. To develop Computer Assisted Instruction in the Subject of Thai language for the students of Pratom-3 and 6. 2. To know the effectiveness of Computer Assisted Instruction in the subject of Thai language developed by investigator for the students of Pratom-3. 3. To know the effectiveness of Computer Assisted Instruction in the subject of Thai language developed by investigator for the students of Pratom-6. 4. To know the effectiveness of Computer Assisted Instruction in the subject of English language developed by ONPEC for Pratom-3. 5. To know the effectiveness of Computer Assisted Instruction in the subject of English language developed by ONPEC for Pratom-6. 8. To get opinion of the teachers on CAI developed by the investigator for the subject of Thai language. 10. To get opinion of the students on CAI developed by the investigator for the subject of Thai language. Research Design: It is a developmental-cum-experimental study. Pre-test, Post-test design with replication groups was used for conducting the experiment. Two experimental groups along with eight replication groups, each consisting of 30 students were well drawn. In all 150 students of Pratom-3 and 150 students of Pratom-6 belonging to Buriram Province participated in the study. Tools and Techniques: CAI programmes on 5 units for learning each language were used for conducting the experiment. Different tools for the study, namely, criterion tests and opinionnaires have been used. Data Analysis: The data have been suitably analysed through mean, SD and t-tests. Findings of the Study: The CAI

Packages developed by the investigator on Thai language have been found effective at both the levels, that is, Pratom-3 and Pratom-6 .The CAI Packages developed by the investigator on Thai language and by the ONPEC on English language received favourable opinions both by the teachers and students.

(Barot, 2005) conducted a study entitled, “To study the effectiveness of CAI in Sanskrit for std. VIII students”. The objective of the study was: (1) To develop Computer Assisted Instruction (CAI) in Sanskrit for standard VIII students. (2) To study the effectiveness of CAI package in terms of mean achievement of students in Sanskrit. (3) To study the reaction of the students regarding the effectiveness of the developed CAI package. 86 students of Std. VIII of Shree Ambe Vidyalaya, Waghodia Road, Baroda constituted the sample for the study. A single group pre-test and post-test design was employed for the study .Achievement test and reaction scales were constructed by the investigator. Flash MX, Corel Draw 11 and Front Page were used for the development of software. ‘t’ value, frequencies and % responses were used for data analysis . Researcher has prepared CAI using Flash software. Findings of the study had proved that CAI can be used very well for remediation purpose. Prepared CAI in Sanskrit was found effective. The reactions of the students towards the developed CAI in Sanskrit were found positive.

(Pardeshi, 2005) conducted a study on “A study of the relative effectiveness of CAI and CAIPI in learning Trigonometry by English medium students of Standard IX of Baroda City” in CASE, MSU, Baroda. The objectives of the study were to develop the CAI and study its effectiveness in mono, diad and triad settings and its relative effectiveness in the three settings and through reactions of the students. The study was conducted in the three sections of Standard IX of Zenith High School, Baroda, dividing each section into two groups- experimental and control. The CAI was developed using Flash-MX, Directors and Corel Draw 11.0 along with the Internet. An achievement test was constructed for administering as pre-test and post-test. The data were analysed through mean, SD, uncorrelated ‘t’ and ANOVA. No significant difference has been found in the mean achievement scores of the groups in mono, diad and triad. No significant difference has been found in the mean achievement scores of the experimental group in mono, diad, triad and control groups, respectively. Significant difference has been found in the mean achievement scores of the experimental group in triad and control group. The students were found to have positive reactions towards the developed CAI.

(Parikh, 2006) conducted a study entitled “Developing and implementing Computer Assisted Learning Material for 11th standard commerce students on subject Introduction to

book-keeping and Accountancy prescribed by GSEB”. Objectives of this study were: (1) To develop CALM for “Rectification of Error” chapter selected from the 11th standard Introduction to Book Keeping and Accountancy text book of GSEB (2) To study the effectiveness of CALM package in Accounts in terms of Achievement of 11th standard commerce students (3) To study the reaction of 11th standard commerce students regarding the effectiveness of the developed CALM. In findings CALM was effective for 2nd objective. Students had positive reactions towards the CALM and given favourable statements related to the interest, mode of presentation, content, clarity in graphics with content and the questions asked in it.

(Thakkar, 2006) conducted a study entitled, “To develop and implement CAI for ‘Organization of commerce and management’ subject in standard XI as prescribed by GSEB” with pre-test, post-test experimental and control group research design. The objectives of the study were: (1) To develop a CAI for the chapter of Foreign Trade selected from the subject ‘Organization of Commerce and Management’ textbook of standard XI (2) To study the effectiveness of the developed CAI. The findings of the study revealed that CAI was found effective in teaching foreign trade leading to significant gain achievement in the scores of the post-test from the pre-test of experimental group. CAI was found effective in teaching foreign trade leading to increase in the mean of gain achievement scores of the experimental group than the control group. The overall reaction of the students towards the prepared CAI in commerce was found positive. CAI was perceived by majority of students to be quite interesting and motivating in learning.

(Rathwa, 2007) conducted a study entitled, “Development and Implementation of Multimedia Package for teaching Gujarati subject”. Objectives of this study were: (1) To develop a multimedia package in Gujarati subject for std. VII students. (2) To study the effectiveness of the multimedia package in terms of achievement of students on whom it was implemented. (3) To study the effectiveness of multimedia package in terms of reflection of students (of experimental group) collected through opinionnaire. (4) To compare the achievement of VII grade students in the unit test conducted for experimental and control groups. Study revealed that developed multimedia package was found to be an effective and had great impact to gain better achievement of experimental group in comparison to that of control group. It was observed through opinionnaire that multimedia package was effective and students enjoyed learning.

(Patel, 2008) conducted a study on Computer Assisted Instruction in Physics for the students of standard XI. Objectives of the study were (i) To develop Computer Assisted

Instruction package on two units of physics for XI Science student studying GSTB syllabus. (ii) To study the effectiveness of the CAI package in terms of achievement of students of experimental group. (iii) To study the relative effectiveness of teaching Physics in terms of two methods of teaching Physics i.e. conventional method of instruction and CAI package for students of traditional group and experimental group. (iv) To study the relative effectiveness of CAI with reference to the sex of the students of the experimental group. (v) To know the opinions of the students of the experimental group regarding the effectiveness of used CAI in Physics. (vi) To know the opinions of the teachers of the experimental group regarding the effectiveness of used CAI in physics. Method: Multistage sampling technique was used by the researcher in the study. The pre-test post-test control group design was employed. Two schools, one in rural and another in urban area was selected to conduct the experiment. The sample for the experiment consisted of 30 students each in traditional and experimental groups. Time duration was 28 days for both groups with two chapters of class XI Physics text book for the experiment of the study. The tool used was an opinionnaire for students of both groups. Opinions of the expert and subject teacher were invited by an evaluation sheet. For the analysis and interpretation of the data the statistical technique such as mean, S.D., t -test and chi square test was employed. Findings: (i) The study has resulted in the development of a CAI program on 'motion in one dimension and two dimensions' and 'Laws of Motion' for teaching Physics to the students of Class XI. (ii) The package was found significantly effective for the students of class XI of both the groups. (iii) Comparative effectiveness of the CAI method and the traditional method was measured by the experiment and CAI method was found more effective in terms of achievement scores. (iv) In relative effectiveness of the package was equally effective in teaching boys and girls. (v) Students and teachers both revealed a favourable opinion towards CAI program.

(Patel, 2009) conducted a study on Development and Implementation of CAI to teach English grammar to standard VIII student in different modes Objectives: (i) To develop the CAI to teach English Grammar to Standard VIII Gujarat Secondary and Higher Secondary Board (GS&HSEB) students in different modes (only CAI, CAI with repetition, CAI with discussion) (ii) To study the effectiveness of the developed CAI in different modes in terms of students' achievement in English Grammar. (iii) To study the effectiveness of the developed CAI in terms of the reactions of students. (iv) To study the relative effectiveness of the developed CAI in different modes of presentation (only CAI, CAI with repetition, CAI with discussion) in terms of differences in the adjusted post-test mean achievement of the student in English Grammar. Method: The sample of the present study was selected

purposively. For it two schools of Vadodara namely, Bright day school and Kelvani school during the academic year 2008-09 were selected. From the selected schools 26 standards VIII students of only one division VIII-A of Kelvani School were taken as the Control group and 62 standard VIII students of Bright day school were treated as the experiment group. The required data were collected with the help of pre-test, post-test and reaction scale which were constructed by the researcher. In between pre-test and post-test the researcher implemented the intervention program in the form of CAI package for ten days for two hours per day on the experiment groups and control group was taught the same topics by their teacher. After the implementation of that the researcher administered the post-test after the span of fifteen days and the reactions of the students, based on teaching with CAI and the developed CAI itself were taken. The data were collected in three phase. ANOVA was used for data analysis. Findings: (i) The achievement of the students in English Grammar taught through CAI was found significantly higher than that of the students taught through traditional method. (ii) The achievement of the students taught through only CAI was found significantly higher in English Grammar than that of the students taught through traditional method. (iii) The achievement of the students taught through CAI with repetition and CAI with Discussion was found significantly higher than the achievement of the students who were taught through traditional method. (iv) From the three modes of the presentation of this CAI, the mode i.e. teaching through CAI with discussion was found significantly superior in comparison to other two modes. (v) CAI was also found to be effective in terms of the students.

(Vansia, 2011) conducted a study entitled Effectiveness of Computer with Peer Interaction for Math's learning in urban area. Objectives of the study were 1. To develop Computer Assisted Instruction Programme in math's subject for standard IX students. 2. To compare the achievement scores of students learning through Computer Assisted Instruction with Peer Interaction (CAIPI) for boys and girls on posttest. 3. To compare the achievement score of students learning through Computer Assisted Instruction with Peer Interaction (CAIPI) for students of high IQ and low IQ on posttest. 4. To compare the achievement scores of boys and girls group on posttest. 5. To compare the achievement scores of experimental and traditional group on posttest. 6. To compare the achievement scores for students of high IQ and low IQ group on posttest. 7. To study the interaction between sex and method of teaching on posttest. 8. To study the interaction between sex and IQ on posttest. 9. To study the interaction between method of teaching and IQ on posttest. 10. To study the interaction between sex, method of teaching and IQ on posttest. Multi-staged sampling technique was used by the researcher in this study. The experimental and traditional both

groups consisted of 52 students and both groups are equal on pretest scores. The true experimental design 'posttest control group' was employed. Conventional Lecture Method was adopted for the control group, while CAIPI were introduced as experimental group. The total sample for the experiment consist 104 students. Students in both groups learn same content topic of 'Solid Matter' through the respective instructional strategy. Experiment time duration was 30 periods in both groups. Data were analysed through the statistical techniques such as t-value and ANOVA. Findings of the study were 1. Math's learning through Computer Assisted Instruction with Peer Interaction (CAIPI) was equal effective for boys and girls.2. Math's learning through Computer Assisted Instruction with Peer Interaction (CAIPI) was more effective for high IQ student's then low IQ students.3. Effectiveness of sex was shown on mean achievement score of posttest.4. Effectiveness of teaching method was shown on mean achievement score of posttest.5. Effectiveness of IQ was shown on mean achievement score of posttest.6. Interaction effects of sex and teaching method was not shown on mean achievement score of posttest.7. Interaction effects of sex and IQ was not shown on mean achievement score of posttest.8. Interaction effects of teaching method and IQ was not shown on mean achievement score of posttest.9. Interaction effects of sex, teaching method and IQ was not shown on mean achievement score of posttest.

2.07 The related literature in the field of Computer Assisted Instruction conducted Abroad

(Suwanma, 1991) conducted a study entitle, "Construction of Computer Assisted Instruction in science on topic "Earth and Changing" for Mathoyom Suska 2". Subjects were 20 Mathayom Suska 2 students of the 1999 academic year from Spng-Kwae Witthayakom School, King-Amphur Doi-Loi, and Chiang Mai Province. The subjects took a pre-test and then they were given the post-test. Data were treated using item by objectives analysis. The result showed the efficiency of the CAI. The students mastered at 84.75 per cent criterion of objectives of the study. They were satisfied and appreciated with this CAI program.

(Hsu, 1994) conducted a study entitled "Computer assisted language learning (CALL) to see the effect of elementary language students (ELS) use of interactional modification on listening comprehension". Objectives of the study were (1) Is second language student request modification of the input they hear while working on Computer based listening exercise, and (2) If this international computerized modifies help second language students listening comprehension and language acquisition. Data were collected from 15 elementary second language students by using a single group pre-test research design. The findings revealed that second language students use the tools made available by the computer

technology to make input comprehensible and computerized modification and language acquisition.

(Nimtrakul, 1999) conducted a study entitled “Effects of computer-assisted instruction Atomic Structure in chemistry if Mathayom Suska 4 students”. The purpose of the research was: (1) To construct CAI on atomic structure in chemistry of Mathoyom Suska 4 students (2) To investigate the achievements in chemistry on atomic structure of Mathoyom Suska 4 students who were taught through the CAI program and (3) To explore the learning attitude towards the chemistry of the students who were taught through the CAI program. The subjects of this study were of Mathoyom Suska 4 students of Chiang Mai University Demonstration School Maung District Chiang Mai Province during the first semester of academic year 1999. A class of students was chosen as the experimental group by clusters random sampling. The research instruments were the CAI on atomic structure in chemistry of Mathoyom Suska 4 students, the chemistry achievement test on atomic structure with reliability of 0.8210 and chemistry learning test with reliability of 0.8276. The statistics used for the construction of CAI on atomic structure in chemistry of Mathoyom Suska 4 students, were divided into two parts. One was to find the efficiency of the program by using the mean and percentage if the test between and after being taught through it and the other was to compare chemistry learning achievement on atomic structure in chemistry of Mathoyom Suska 4 students, by using t-test in form of paired-test analysed with SPSS for windows program. The statistics used for the study of learning attitude towards the CAI on atomic structure in chemistry if Mathoyom Suska 4 students were mean, standard deviation (SD) and mean population estimation (m) also analysed with SPSS for windows program. Research Finding were (1) The efficiency of the CAI on atomic structure in Chemistry of Mathoyom Suska 4 students was 93.26/92.06, which was higher than the standard criterion 85/85. (2) The learning achievement in chemistry on atomic structure of Mathoyom Suska 4 students, after being taught through the CAI on atomic structure in Chemistry was higher than that before being taught through the CAI on atomic structure in Chemistry at the .01 level of significance. (3) The learning attitude in Chemistry with CAI on atomic structure of Mathoyom Suska 4 students was at the moderate to satisfactory.

(Robkob, 1999) conducted a study entitle, “Achievement and Retention in Science of Prathom Saksa 5 Students Learned Through Computer-Assisted Instruction.” Objective of the study was (1) To determine achievement of the computer-assisted instruction, created a life science unit on animals for the three subunits of the students at the fifth grade. (2) To study the stability of learning Computer-assisted instruction in a science unit on living animals for

the three subunits of the students at the fifth grade. The purpose of this study was to compare achievement and retention of Prathom Suska 5 students from at Anubaab Chiang Main School, Muang District, and Chiang Mai Province, first semester in academic year 1999. They were divided into two groups; the experimental and the control. Each group had 20 students. Both group took the pre-test after experimental group studied through CAI program themselves while the control group learned by the conventional method. At the end of studies, they were given the post-test. The retention test was applied to both groups of the students, two weeks after the post-test. Data was analysed using item by objective analysis. The results showed that learning achievement and retention of students, which studied through CAI and studied by conventional method, were differing.

(Vaisopha, 1999) conducted a study entitled “Construction of Computer Assisted Instruction in the Mathematics on topic ‘Adding fraction’ for Prahom Suska 5 students”. The design for the study was pre-test-CAI program-post-test. Data were analysed using item-by-objective analysis. The result indicated that the subjects were able to master learning objectives of the study were off the study were with their percentage of 94.5 average. The students were satisfied and appreciated this CAI program. The finding of the study revealed that significant gain in terms of mean achievement through CAI. CAI has evoked positive perceptions amongst teachers and students.

(Salsbury, 2002) conducted “A study on comparing teacher-directed and computer-assisted instruction of elementary geographic place vocabulary”. The purpose of this study was to compare computer-assisted instruction to teacher-directed instruction for teaching elementary geographic place name vocabulary. The quasi-experimental research design of pre-test, treatment and post-test was employed in this study since the students were in pre-assigned classrooms. Two classrooms received instruction for learning to identify and label 50 world places, and third class was the control group. Overall data analysis revealed significant difference between two methods of instruction when compared to each other, and to the control group. Gains in pre-test to post-tests scores were greater from computer assisted instruction. This study has reported the highly significant academic success of fourth grade students learning geographic place name vocabulary through drill, whether a teacher or a computer provides the instruction.

(Crews, 2003) conducted a case study that investigates the effectiveness of a CAI reading tutorial in helping poor readers improve their ability to read. The study was undertaken with three objectives (1) To scientifically investigate if poor readers using the CAI significantly improved their reading abilities, and assuming the CAI was effective (2) To

identify the instructional methods and strategies implemented in the CAI design (3) To theoretically explain the effectiveness of the CAI and thereby provided information of effective methods of designing effective CAI for poor readers. The study was conducted at a Title 1 elementary school in a large city in the southwest. Title 2 schools serve a high concentration of students living in poverty and as a result, receive funds to provide special educational services for low achieving and at-risk students. The 13 participating students were fourth and fifth grade students with poor reading abilities as determined by the independent assessments and observations of their homeroom teachers. The multimedia CAI program investigated supports the active cognitive participation of the learner, delivers multi-sensory instruction, and provides timely, directed feedback, teacher's phonics skills, and implements 100 per cent mastery learning. The instruction is individualized and self-paced. Results of pre-post reading comprehensive tests and interviews indicate that poor readers completing the CAI tutorial significantly improved their reading skills and the students and their teachers felt that using the CAI tutorial helped the students become better reader.

(Casanova , 2004) conducted a study entitled 'an analysis of computer-mediated communication technologies as tools to enhance learning.' The integration of computer-mediated communication (CMC) technologies into the higher educational settings have requires faculty to change their roles from the direct instructional model to a model based on constructivists' ideas. CMS instructional tools (Its) have provided a change by shifting a traditional teacher centred setting into a teacher facilitator environment. Teacher's professional development has become an important task to effectively integrate technology into their courses. Questions concerning the implementation and value of CMS technologies and their impact in higher education are not yet clear. The purpose of this research study was to determine the extent to which CMS technologies promoted the achievement of stated goals and objectives for course taught in higher education. This study was directed by three research questions (1) in what ways are higher education faculties using CMS technologies to deliver their courses? (2) What is the faculty's primary instructional intent for the CMS technologies they selected for integration into the teaching process? (3) In what ways does the integration of selected CMS technologies promote achievement of stated goals and objectives in their courses? The research study population consisted of 17 higher education faculties from the trek 21 projects at West Virginia University during the year 2001. These participants received technical training, enhanced web-designed courses, worked collaboratively and prepared instructional resources during a 7 day week period during summer 2001. The data collection was done by survey, course analysis and interview.

Findings indicated that faculty was mainly using CMC technologies to support teaching practices and to improve teacher's productivity. It's were basically targeted to increase interactivity, open avenues for feedback and provide resources but less used for inquiry based and active learning. Faculty's primary intent to integrate CMC technologies was to create different avenues to communicate with students and to offer them a learning environment that would support students outside the classroom. CMC promoted the achievement of goals and objectives with different degree of success mainly in two different areas: content delivery and course management and less regarding tele collaborative activity structures.

(McLaughlin, 2004) conducted a study entitled "Towards a new paradigm for teaching and learning: A case study of the process of integrating instructional design and technology at Florida Community College at Jacksonville." The study examined the process by which administrators, faculty and instructional design staff at Florida Community College converted four traditionally formatted courses to online courses in order to integrate innovative instructional design and learning strategies with instructional technology. The study also examined the design and development of an electronic instructional design assistant that would enable the user to systematically design curriculum that incorporated learning and motivational theory. The investigator used case study design to describe the model and processes the college administration used to implement the project. The purpose of this study was to explore how one institution of higher education addressed the gap that exists between systematic and collaborative instructional design and the use of instructional technology in online course development. Data for the study was collected through semi-structure interview and a review of project related records, reports, guidelines and artefacts. Data was also obtained through field observations and investigator participation in training and professional development sessions with faculty and staff.

(Eteokleous, 2004) conducted a study on 'Computer technology integration in Cyprus elementary schools.' The purpose of this study is to evaluate the current situation in Cyprus elementary classrooms regarding computer technology integration. The study examined how Cypriot elementary teachers use computers and the factors that influence computer integration in their classroom practices. To address the research questions that guided the study, an evaluative case study design was applied. It employed mixed method approach through the usage do structures questionnaires and semi-structured, open-ended interviews as the major methods of data collection. The value of the proposed study lies in its potential to help policymakers, educators and stakeholders that have the power to take decisions and design policies, in gaining understanding on how computers are used in the classroom and the

factors that influence their use. The results of the qualitative analysis summarize the factors that influence teachers in applying computers in their classroom practices. A general uniformity across the three categories of teachers revealed, in terms of the factors that function as barriers in applying computer in the classrooms. The factors can be summarized as follow: lack of resources; tyranny of the curriculum; incomplete and inadequate professional development training.

(Hung, 2005) conducted a study on “The evaluation of a technology-aided lecture accompanied by a set of macroeconomics computer interactive exercises in macroeconomics for the undergraduate business major in Taiwan”. The study examined the effects of a technology aided lecture accompanied by a set of macroeconomics computer interactive exercises and a traditional instruction supported by using transparencies on students’ learning achievement. Since a significant difference in knowledge of macroeconomics existed between the experimental group and the control group, analysis of covariance (ANCOVA) of the post-tests, using pre-test as the covariate, was used to analyse the research data. As comparing the effectiveness of the two different instructional methods, it is concluded offering the courses for the unit on unemployment and inflation through the Technology-Aided Lecture (TAL), accompanied by a set of macroeconomics computer interactive exercises, or the standard instruction produced a non-significant difference, to the extent measured by the researcher developed test.

(Rosales, 2005) conducted a study entitled “The effect of computer-assisted instruction on the mathematics achievement of ninth-grade high school students in the lower Rio Grande Valley”. This study was conducted to describe the effect a computer-assisted instruction program had on the mathematics achievement of ninth grade high school students in the lower Rio Grande Valley as measured by the state assessment. A quasi-experimental pre-test post-test control group design with matching was used. The subjects were first time, non-exempted ninth grade students from two schools paired by ethnicity and percentage of socio-economically disadvantaged. ANCOVA procedures were used to determine the statistical significance. The study tested the following research hypothesis: There was statistically significant difference between the mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who participated in computer-assisted instruction and the mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who did not participate in computer-assisted instruction. The resultant analysis indicated that there were no statistically significant differences between the mathematics achievements of the two groups.

(Gilbert, 2006) conducted a study entitled “Effectiveness of computer-assisted instruction blended with class-room teaching methods to acquire automotive psychomotor skills”. Here two blended learning methodologies of web-based CAI and face-to-face classroom instruction were investigated in the Automotive Technology Department at Southern Illinois University Carbondale. Results were determined by a psychomotor electrical diagnostic skill evaluation of two matched groups exposed to different blending methods of teaching basic electrical concepts. Analysis revealed that the blended teaching methods experienced by the experimental group demonstrated a comparatively higher level of psychomotor electrical diagnostic skill capability.

(Beaird, 2007) conducted a study entitled “The effects of computer-assisted language learning on English language learners with and without disabilities in an elementary school setting”. The purpose of the study was to investigate the effects of the English Language Learners Instructional System (ELLIS) on oral language, written language and reading achievement among students who are English language learners with and without disabilities. Additionally, levels of teacher satisfaction with computer-assisted language learning (CALL) and the use of ELLIS were assessed. Participant were 78 third, fourth and fifth grade students with and without disabilities enrolled in a public elementary school. They were randomly assigned to one of three groups. Treatment Group A included students with and without disabilities and received individual instruction on the ELLIS (English Language Learning Instructional System) program. Treatment Group B included students with and without disabilities and received ELLIS instruction in student pairs. The third group of students was a control group and did not receive instruction using the ELLIS program. Data were collected to answer eight research questions related to the effectiveness of the ELLIS program. Data were analysed quantitatively as well as qualitatively with ANOVA/ANCOVA and open-ended interview techniques respectively. In findings of the study, the ANOVA and ANCOVA analyses revealed that students with disabilities who received instruction using the ELLIS program performed similarly to students with disabilities who did not receive instruction using ELLIS program in oral language, written language and reading achievement. The students without disabilities who received instruction using the ELLIS program performed similarly to students without disabilities who did not receive instruction using the ELLIS program in oral language, written language and reading achievement. Paired instruction using the ELLIS software program had similar effects on student performance as individual instruction using the ELLIS software program. Results from the open-ended interview revealed high levels of teacher satisfaction with the ELLIS software program.

(Ford, 2007) conducted a study entitled “Effect of computer-aided instruction versus traditional modes on student PT’s learning musculoskeletal special tests” with 3 group single-blind pre-test, immediate post-test, final post-test repeated measures with qualitative survey for the CAI group design. Subjects were randomly assigned to CAI, live demonstration or textbook learning groups. Three novel special tests were instructed. Analysis of performance on written and practical examinations was conducted across the 3 repeated measures. A qualitative survey was completed by the CAI group post intervention. Finding of the study revealed that CAI was equally as effective as live demonstration and textbook learning of musculoskeletal special tests in the cognitive domain, however, CAI was superior to live demonstration and textbook instruction at final post-testing.

(Galvis , 2007) conducted a study entitled “Computer Assisted Instruction (CAI) as a teaching tool for occupational therapy education: A guide to understand CAI design and effectiveness”. The primary purpose of the study was to compare the effects of CAI versus traditional teaching methods with occupational therapy students. To explore the topic, three consecutive and inter-related studies were conducted. The result of this research can assist occupational therapy and other allied health educators to understand the advantages CAI materials can provide if they are properly designed and implemented in their classes. In its analysis researcher had founded that the CAI was an effective alternative to traditional classroom lecture to teach practical skills and theoretical knowledge. It was also found that CAI provides faster instruction while providing learner-centred training.

(Karnati, 2008) conducted a study entitled “Computer aided instruction for out-of-school children in India: An impact study in Andhra Pradesh”. India has the largest number of out-of-school children, the majority of whom are girls. Against this backdrop, the Bridges to the Future Initiative (BFI), a computer-aided instruction (CAI) intervention was launched in Andhra Pradesh to bring children back to school. The BFI used multimedia software to teach basic literacy and numeric skills through interactive stories and activities, in the local language Telugu. The methodology employed in the study was a quasi-experimental design on a sample of around 140 children (age range 7-19 years). The research study included the Bridges to the Future Initiative (BFI) sites which offered two hours of CAI a day and comparison sites which provided five hours of teacher-based instruction (TBI) a day. This research was one of the first to explore the context of out-of-school children in poor communities and the use of CAI in Telugu (local language) to bring these learners back to school. The results support the use of ICT with marginalized sections of society in developing countries in order to improve literacy skills.

(Pilli, 2008) conducted a study on The Effects Of Computer-Assisted Instruction on The Achievement, Attitudes And Retention of Fourth Grade Mathematics Course. A PhD thesis submitted to Middle East technical University. The purpose of this study was to examine the impact of computer assisted instruction with the software *Frizbi Mathematics 4* on fourth grade students' achievement, attitudes and retention in mathematics lessons. In this study quasi-experimental research design was used in order to investigate the impacts of the *Frizbi Mathematics 4* educational software on the 4th grade student's mathematics achievement, mathematics attitude, and computer assisted learning attitude, and retention. Research Questions were 1: Is there a significant difference between the achievement post-tests scores of the students exposed to Computer Assisted Instruction with the *Frizbi Mathematics 4* and those who were exposed to traditional instruction with textbook? 2: Is there a significant difference between the mathematics attitude scale post scores of the students exposed to computer assisted instruction with *Frizbi Mathematics 4* and those who were exposed to traditional instruction with textbook? 3: Is there a significant difference between the computer attitude scale post scores of the students exposed to computer with *Frizbi Mathematics 4* and those who were exposed to traditional instruction with textbook? 4: Is there a significant difference between the retention test scores of the students exposed to computer assisted instruction with the *Frizbi Mathematics 4* and those who were exposed to traditional instruction with textbook? The sample consisted of 26 students in control group and 29 students in Experimental Group. Findings of the study 1. The results of pre-test and post-tests for unit 1: "Multiplication of Natural Numbers" revealed that the CAI with *Frizbi Mathematics 4* applied to the experimental group was demonstrated to be effective in increasing the 15 achievement scores of the students. 2. The results of pre-test and post-tests for unit 2: "Division of Natural Numbers" were significant differences between achievement tests' mean scores of students in the experimental and control group. 3. The results of pre-test and post-tests for unit 3: "Fractions" revealed there were significant differences between achievement tests' mean scores of students in the experimental and control group. 4. In unit 1 (Multiplication of Natural Numbers) retention test were lower than the post-test mean scores in both groups and the "rate of retention decay" was not significantly different between the experimental and the control group, the results of independent *t*-test indicated that the experimental group's retention test mean score was significantly higher than the control group.

(Jackson & Dave , 2011) conducted a study on "The Effect of Computer-Assisted Instruction on Student's Attitudes and Achievement in Matrices and Transformations in

Secondary Schools in Uasin Gishu District, Kenya, Moi University, Kenya.” The purpose of the study was to investigate the effects of CAI on students’ attitude and achievement in matrices and transformations between form four students who received instruction using CAI module or conventional instruction methods. The study addressed the following questions: 1. What are the effects of the CAI module on students’ achievement in matrices and transformations? 2. Is there any significant difference in the achievement on matrices and transformations between subjects exposed to CAI module and those not? 3. What are the effects of the CAI module on students’ attitudes towards Mathematics course? 4. Is there any significant difference in attitudes towards lessons on matrices and transformations between subjects exposed to CAI module and those not? The pre-test – post-test control group experimental research design was used. Six classes selected at random with 205 students participated in the study. Results of this study indicated higher achievement and positive attitudes with CAI treatment groups. Making connections between the goals of Mathematics education and CAI offers a valuable means for improving mathematical knowledge and skills and hence performance in Mathematics.

(Bayturan & Kesan, 2012) conducted an study on “The Effect of Computer Assisted Instruction on the Achievement and Attitudes Towards Mathematics of Students in Mathematics Education” The objective of this study was to investigate the impact of Computer Assisted Instruction method on students achievement and attitudes towards mathematics in secondary mathematics education. The research was designed based on an experimental pre-test post-test model. The research was conducted in 60 ninth grade students from a Anatolian high-school during 2009-2010 academic year. The experiment group consists of 30 students and the control group consists of 30 students. The research is implemented by using Computer Assisted teaching material that is developed by Flash MX program related with the unit of “Relation, Function and Operation” of the area of learning algebra and took 10 weeks. Computer Assisted Instruction and traditional instruction methods were used in the experiment group and the control group respectively. The data were collected by using the Mathematics Test, Mathematics Attitudes Scale. Data analysis was done using t test. The results demonstrated that teaching mathematics with a computer assisted instruction method increased student success significantly in mathematics lesson. However, the experimental and control groups did not differ between students’ attitudes towards mathematics.

2.08 Related literature in Education act

Investigator has reviewed the following authentic sources to conform the inclusion of class VIII in primary level. The (Gujarat Government Gazette, 2012) in the Right of Children to Free and Compulsory Education Rules, 2012 has stated that the Elementary Education Schools in the State of Gujarat shall be either from class I-V or VI-VIII or I-VIII and State Government shall modify the existing schools to conform to this structure. (Gujarat Government Gazette, 2012)The Gujarat Elementary Education Rules, 2010 Opening of new Elementary Schools or take over a private school. Areas or limits: The areas or limits of neighbourhood within which a school has to be established by the State Government shall be as under (a) In respect of children in classes I - VIII, a school shall be established within a walking distance of one km of the neighbourhood.

2.09 Analytical Review of Related Literature

Table 2.1 Analytical Review of Studies Related to Programmed Learning Material Conducted in India

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
1	Kulkarni and Yadav -1966	Comparative study of teaching by different methods of programming of different levels of pupils	Math	The study attempted to know which method of programming could have better impact on instruction for the development of an ability for a given group of students, i.e Branching, linear and simple programmes. Different types of programmes on the development of knowledge, comprehension and application objectives for “solving simple equations”.	Three matched groups on the basis of marks were formed. ANOVA F Values	VI students of an English Medium school in Delhi	Solving Simple Equations	Findings showed that the treatment effects did not seem to be significantly different; to arrive at certain conclusions replications with better control were needed.
2	Sharma -1966 PhD Thesis	A comparative study of outcomes of teaching of Algebra by	Math	To find the effectiveness of the developed programmed instruction	The sample consists of 80 students of class IX. Besides usual pre-test and post-test a delayed	IX 80 students	Algebra	The findings of the study showed that the mean achievement of the experimental group taught

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		conventional classroom and method of programmed instruction			posttest was also administered to study the effectiveness of the two methods in terms of retention.			through PLM was 2.5 point higher than that of the control group taught by the teacher through the lecture method. Also the delayed posttest showed better retention by the experimental group
3	Shah -1969 PhD Thesis	Auto instructional programmes in Algebra for standard VIII and to find out their effectiveness in relation to different variables	Math	The purpose of the study was To examine the potentialities of the auto instructional programmes as a practical solution.	-	VIII	Algebra	Findings (i) the total mean score achieved by the experimental group was higher than the total mean score achieved by the control group (ii) the average time taken by the experimental group was less than the average time allotted to the control group.
4	Patel -1975 PhD Thesis	Development of Auto Instructional Programmes in	Math	To developed Auto Instructional Programmes in Geometry for Std. IX	The tools used in the study were (i) The Desai's Intelligence Test	IX Fourteen	Geometry	The findings of the study were: (i) the PLM proved to be more effective than

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		Geometry for Std. IX and to find out their Effectiveness in relation to different variables		and to find out their Effectiveness in relation to different variables	etc.,	class of Rural and Fourteen class of Urban high Schools		conventional method (ii) high and low IQ groups of students performed better with PLM than with conventional teaching (iii) the average time taken by the group learning through PLM was less than that of the group taught by the traditional method (iv) students from different strata of the society performed better with PLM than with conventional teaching.
5	Patel -1977 PhD Thesis	Development and try out Auto Instructional Programmes in Some Units of Geometry for Class VIII and to study its	Math	(i) to develop PLM in some units of Geometry for class VIII (ii) to compare the achievement in mathematics of students having different reading abilities, and learning through PLM	The sample consisted of 810 students of class VIII studying in fourteen schools of Kaira District. The sample was selected in view the following criteria, strength of the	VIII 810 students	Geometry	It was found that the auto instructional material does not work well with pupils having low n Ach.; (ii) in case of highly motivated students the material was found to be working well; (iii) learning through PLM

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		Effectiveness in the Context of different Variables		and traditional way of teaching.	school etc.			in case of students having poor reading ability was not more effective than the conventional method but it was superior in case of students who had good reading ability: (iv) more anxious students could learn better through PLM than their counterparts.
6	Seshadri -1980 PhD Thesis MSU Baroda	An Experiment in the Use of Programmed Instruction in Secondary Schools	Math	(i) to identify different components of the instructional strategy. (ii) to develop software material to be utilized under different components, (iii) to study the effectiveness of each component in terms of students and parents reactions and teachers observation. (iv) to study the effectiveness of	The tools of data collection were the criterion tests, Headmasters' Association examinations, semester and comprehensive examinations, questionnaire to know learners', parents' and school authorities' reaction. Other tools used were the Raven's	IX	Whole syllabus	She found that the strategy having PLM as its major component worked better.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				instructional strategy as a whole.	Standard Progressive Matrices, Junior of Motivation (JIM Scale) and Palsane's Study Habit Inventory. The statistical techniques used were t-test, product moment coefficient of correlation and partial correlation.			
7	Pandey -1980 PhD Thesis Pat. University	Use of programmed Instruction on Teaching Mathematics at Primary Level	Math	The aim of the study was to see the relative effectiveness of the traditional method without home assignment and grading, a programmed text and the traditional method with regular home assignment and grading in teaching mathematics at primary level.	Not available	IV 60 students	Whole syllabus	He found that the PLM was superior to other methods and that the high and the low-income group students following the PLM were distinctively superior to those who had traditional teaching with home assignment and grading.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
8	Trivedi-1980 PhD Thesis	Developed branching style PLM in mathematics for class V, VI and VII	Math	(i) to develop Programmed Learning Material of the branching type in mathematics for classes V, VI and VII (ii) to compare the achievement of the students by the traditional methods of teaching with that of the students studying through programmed materials (iii) to diagnose students weakness in mathematics and (iv) to use programmed materials as remedial measures.	Two way analysis of variance	V, VI and VII	-	For class VI the PLM was more effective than the corrective teaching and for class V and VII both the methods were equally effective. The class VI girls learnt better than the boys whereas in the other two class there was no difference between the sexes.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
9	Inamdar -1981 PhD Thesis SPU	Effectiveness of the Programmed Learning Strategy in the Subject of Mathematics for standard VII in relation to some Psychological Correlates	Math	(i) To develop PLM (ii) To study the effectiveness of the developed PLM	The performance of the group was studied in relation to some psychological correlates such as general ability reasoning ability and motivation towards school. Analysis interpretation of the data were done to find out the relation between general ability and performance in achievement test in the PLM.	VII 108 boys and 100 girls	Simple Interest	He found that the programme fares better than the conventional method.
10	Shah -1981 PhD Thesis Gujarat Univ	To Develop and try Programmed Material in Mathematics for students of Class V	Math	(i) to develop programmed materials on various units of the mathematics syllabus of class V and (ii) to try the same on children of class V from a few selected schools.	For every unit criteria test was used. Questionnaire was used for students and teachers to know their reactions towards the programmed materials	V Seven Primary Schools 250 students for PLM and 200 for control Group	All	Findings (i) the total mean score achieved by the experimental group was higher than the total mean score achieved by the control group (ii) the average time taken by the experimental group was less than the average time allotted to the control group. The reactions of the students and the teachers were favourable.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
11	Suthar -1981 PhD Thesis SPU	Developed algebra programme for class VIII covering	Math	The major objectives of the study were (i) to develop PLM in algebra of students with different study habits, learning through PLM and traditional way of learning.(iii) to compare the achievement of algebra of students with different reasoning abilities. (iv) to compare the achievement of students having positive and negative attitudes.	Study habits, attitude towards mathematics, learning abilities, motivation towards school, learning and entering behaviour were also analysed	VIII	set theory, rational numbers, real numbers powers and indices, equations and problems, and graphs	The PLM emerged superior irrespective of different variables.
12	Davies -1982 PhD Thesis Madras Univ	Effects of Different Modes of paring in programmed Learning of Mathematics on the Performance of Underachievers	Math	To test the differential effects of the three pairing modes in PLM, on the achievement of underachievers in mathematics	Ten randomly selected schools The statistics used were t test, F- ratio, chi square test, ANOVA, multiple regression and factor analysis were used for data analysis.	IX 1092 students	Statistics	The main findings of the study were, the underachievers had 78% individual gains, underachievers in teachers choice and mixed pairs gained significantly in the post test and had significant residual gains

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								over the predicted level of performance in mathematics.
13	Rao -1983 PhD Thesis Osmania University	A comparative study of PLM and conventional learning methods in the instruction of mathematics, a psychological approach	Math	Objective of the study (i) to find out the efficiency of the PLM over the conventional learning method in the instruction of mathematics in school education. (ii) to determine the variation in learning gains in the pupils in the rural urban dimension.	The design was an experimental cum field investigation. Two matched groups of students were exposed to PLM and conventional classroom teaching.	Grade V and Grade X 300 students from grade V and 296 students from grade X	General	The findings of the study were (1) the mean performance scores of all the PLM groups were higher than those of the corresponding conventional learning groups. (2) The performance of urban subjects was superior to the performance of the rural subjects under the PLM, irrespective of grade.
14	Bhatia-1992 PhD Thesis	remedy of difficulties in learning fractions with Programmed instructional material	Math	Objectives (1) to develop programmed instructional material on fractions for students of class V. (2) to use programmed instructional material a remedial tool. (3) to test	A sample of 50 students was selected from two M.C.D primary schools of Karol Bagh New Delhi twenty five students from each school; four criterion	V	Fractions	Major findings : (1) Teaching and learning through PLM could definitely help both students and teachers. (2) Students receiving the PLM did better in post test

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				the effectiveness of programmed instructional material in class room teaching for students of class V and (4) to test the significance of difference between the traditional method of teaching and teaching through PLM.	tests were administered as tools to collect data. The collected data were treated by using mean, SD and t-test.			as compared to the other group. (3)The PLM worked effectively as a remedial tool. (4) PLM not only helped the students to learn better but also helped the teacher to know how the students learn better.
15	Thatte-1998	An Experimental Study of the Relative Effectiveness of Programmed Learning and Learning Through Audio Visual Aids with reference to certain selected topics from the syllabus of Science for Std. V to VII in Greater Bombay	Science	1. To compare the mean achievement scores of the students of Std. V, VI, and VII studying through AV Aids method, Programmed Learning Method and Traditional method.2. To study the effect of treatment, sex, and their interaction on achievement.	Tools of the study were the question papers set by the investigator based on the topic were used as tools for data collection. Data were Analysed using Central tendencies, percentile and percentile ranks, SD, ANCOVA and t test.	Std. V to VII Sample of the study was eight Schools of Greater Mumbai were selected in all. Twenty four different classes were considered and the total	-	Findings of the study were 1. AV aids method was found to be significantly more effective than the Programmed Learning Method and the Traditional method in terms of achievement at Std. V, VI, and VII. 2. Programmed Instruction Method was found to be significantly more effective than the Traditional Method in terms of achievement at Std. V, VI, and VII.3.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
						number of students was 1381.		Programmed Learning Method and Audio Visual Method are more successful when the classes are small, at the same time they are more effective for average students. 4. Male students and female students, both, equally benefited through the AV method as well as Programmed Learning Method. No significant effect of interaction between treatment and sex was found on the achievement of student.
16	Tare -2001 Rani Durgavati Univ, Jabalpure	A Study of the Effectiveness of Branching Variety of Programmed Instructional Material as	Chemistry	1. To compare the achievements of the students of urban and rural areas of Jabalpur Division by the traditional method of	Research Design used Experimental and Control Group Design was used for the purpose of this study. Tools and Techniques: A branching	Secondary Classes Sample 280 students were selected	-	Findings 1.The achievement of the experimental group was found significantly greater than the achievement of the control group. 2. The

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		Diagnostic and Remedial Tool in Chemistry for Secondary Classes in Jabalpur Division		teaching with that of studying through branching frames of programmed learning in Chemistry Subject.2. To diagnose the weakness of the students of urban and rural areas with the help of PLM.	programme was developed on Atomic Structure and Chemical Bonding and pre-test and post-test were constructed by the investigator. Data Analysis: ANOVA and t-test were used for data analysis.	from different Government Higher Secondary Schools of urban and rural areas of Jabalpur Division		achievement of the urban girls through PLM was found significantly higher than that of the urban boys. 3. No significant difference was found in the achievement of boys and girls of rural areas in the post-test on atomic structure and chemical bonding. 4. 135 boys out of 180 and 64 girls out of 99 wanted to continue the study with the PLM on both the topics. 5. The weakness of individual students were diagnosed and removed when branched frames on both the topics were administered.
17	Ramani and Patadia-2012 Journal of	Development and Try-out of the Programmed	Math	1. To develop programmed learning material in mathematics	Post test only control group design was used.Tools of the study	XI 14 Students	Probability	PLM was found to be effective in teaching PROBABILITY to XI

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	Teacher Education in Developing Nations.	Learning Material in Mathematics for class XI students studying in schools affiliated to Gujarat Secondary and Higher Secondary Education Board (GSHSEB)		for XI standard students. 2. To implement the developed programmed learning material in mathematics to the XI Std. students studying in one of the English Medium Schools following the syllabus of GSHSEB. 3. To study the effectiveness of the developed programmed learning material.	were teacher made achievement tests. Data were analysed using correlated t test.			standard science stream s students as the achievement test score of experimental group students was found significantly higher than the achievement test score of the control group students.

Table 2.2 Analytical Review of Studies Related to Computer Assisted Instruction conducted in India

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
1	Nagar-1988 M.Phil., Education University of Delhi Fifth Survey	Effectiveness of computers in teaching mathematics in school	Math	(1) to examine the usefulness of the computer in teaching mathematics. (2) to examine areas/aspects of mathematics which can be more effectively taught with the help of computers and (3) to examine the trends regarding the use of computer-aided teaching of mathematics.	This study is based on survey of studies, which include; mainly, three projects and ten research studies conducted independently.	survey	General	The major findings are (1) Computer Assisted teaching (CAT) of mathematics benefited both the teacher and the learner. (2) CAT encouraged individualisation and practice without burdening the teacher with repetitive and monotonous activity. (3) CAT helped the learners to use their creativity by exploring new areas not covered by the syllabus. (4) computer

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								awareness was not sufficient in schools for CAT. level of education.
2	Jeyamani -1991 M Phil Thesis Avinashilingam Institute of Home Science, Coimbatore Fifth Survey	Development of Computer Aided Instruction in Physics for class IX	Physics	1.To develop CAI using BASICA. 2. To find the effectiveness of the developed software in terms of sex. 3. To find the effectiveness of the developed software in terms of medium of instruction.	Pre-test Post-test Control Group Design SD, mean and t test	XI	-	The experimental group received CAI and after the experiment it was found that experimental group performed better on the post- test. The difference was significant in terms of sex and medium of instruction. Significant: Yes
3	Singh, Ahluwalia, and Verma -1991	Effectiveness of Computer Assisted Instruction (CAI) and Conventional method of instruction	Math	Objectives: (i) To study the difference in mathematics achievement which occurs as a result of the	Stratified Random Sampling Pre- testpost-test control Group Design	The sample of the study consisted of 220 students from four selected higher secondary schools, covering the good, average	-	(i) The students who used the computer scored significantly higher than those taught mathematics

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				difference in instructional strategy among boys and girls separately and as a group. (ii) To study the direction of change in attitudes of male and female students separately and as a group towards mathematics as a result of two different instructional strategies.		and poor schools		through the conventional method. (ii) The students who used the computer showed significantly highly favorable attitude towards mathematics than those who did not use the computer (iii) Achievement in mathematics and change in attitude towards mathematics were found to be independent of the sex factor.
4	Rose Antony Stella V -1992 PhD Education Bharathidasan University	Effectiveness of Computer Assisted Instruction with special reference	Math	(1) To develop CAI software. (2) To find out the effectiveness of CAI with TSS and	The randomised block design was followed in the selection of the samples, with IQ	IX	Language of Sets	Major findings (1) Both the CAI strategies were superior to the traditional method

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	PhD Thesis	to underachievers.		CAI without TSS with references to the learners variables viz sex, IQ and achievement level and (3) To find out the interaction of the learner variables and the treatment on the achievement score.	as the blocking variables. t-test, Chi-square, one-way and two-way ANOVA. The tools used included CAI software on the language of sets, achievement test, and cultural fair, intelligent test by Cattell and cattell, study habitsinventory by patel, and Mathematics study attitude scale by Sundarrajan, Mean, S.D, t-test, Chi-square, one-way and two-way ANOVA were used to treat the collected data			of instruction, and CAI with TSS was more effective than CAI without TSS for underachiever (UA) (2) Except achievement level, all the other learner variables combined with the treatment had no interaction effect on the achievement score. (3) There was no relationship between the post-treatment scores and the variables 'sex', 'locali' and 'achievement level 'of the experimental group. In the case

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
					The samples consisted of three groups of size 32. composed of students of standard IX selected from Tamil Nadu State Board schools covering one rural and two Urban.			of the variables IQ, 'Study habits' and 'maths study attitude', the positive relationship between those variable and achievement at the pre-treatment level was found to be cancelled at the post-test. Similar results were obtained for UA. Significant: Yes
5	Singh -1992 PhD Education Guru Ghasidas University	Effectiveness of teaching mathematics through computer assisted instruction and conventional method of instruction on	Math	(1) To compare the results of the two groups in mathematical achievement. (2) To compare the results of the two groups in mathematical	The tools used in the study include rating scale by the researcher, general intelligent test of Mohsin, the attitude scale towards mathematics of	IX	simultaneous equations in algebra, statistical representation in statistics, and triangles and their congruency in geometry	(1) The groups taught through CAI in all the schools showed a substantial progress. (2) The gains in achievement of the pupils of good

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		cognitive and non-cognitive variables		achievement sex wise and (3) To compare the attitudes towards mathematics of the two groups as whole and also sex wise.	Suydam, and the educational software prepared by the practising teachers. The statistical techniques used include mean, S.D and t-test. mean, S.D and t-test. Attitude Scale			schools are higher than those of pupils of average and poor schools. (3) the CAI method of teaching mathematics had proved to be more effective (4) both boys and girls gained more from the computer treatment.(5) a significant favourable change in the attitude of the pupils of the experimental groups over the control groups was observed.(6) The change in attitude towards mathematics was independent of

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								gender. Significant: Yes
6	Adhikari -1992 Journal Educational Media in India	Development of computer aided instructional material on cell and cell reproduction for class 9	Biology	(1) To develop computer aided instructional material on cell reproduction and study its effectiveness in terms of (a) achievement of students, (b) reaction of students studying through computer aided instructional material. (2) To compare mean achievement scores of the students towards the computer aided instructional material and traditional method by taking	Pre-testpost-test control Group Design t test	IX 40 Students	-	The findings of study were (1) the computer aided instructional material was found to be effective in terms of achievement of students. (2) students showed positive reaction towards computer aided instructional material (3) computer aided instructional material is effective in achievement when both the groups were matched on intelligence. Significant: Yes

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				intelligence as the co-variate.				
7	Das -1998 PhD work The M.S. University Baroda	Exploring effectiveness of computer assisted learning materials on rhymes in different modes	English	1. to develop computer software on rhymes in text, graphics-text, text-music, graphics text music, and graphics-text-music- recital modes. 2. to study the effectiveness of CALM prepared in different modes for learning the Rhymes in terms of Word meaning (lexicon), Analytical understanding, Comprehensive understanding, Writing ability, Recitation ability	Systematic RANDOM Sampling was used. The treatment tool was the Computer Assisted Learning Material (CALM) on rhymes developed by the researcher in different modes. Testing tool was an achievement test developed by the investigator. The design of the study was developmental cum experimental in nature. ANCOVA was used for data analysis	Class II 169 students	-	The findings of the study revealed that computer as a potential medium significantly contributed the realization of the objectives of the study and CAIM ensure higher learning in all area of language development. Significant: Yes

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				and LSRW ability.				
8	Khirwadkar -1998 PhD work The M.S University Baroda	Development of Computer Software for learning Chemistry at standard XI	Chemistry	(1) To develop CAL package in subject of chemistry for standard XI science students, studying GSTB syllabus. (2) To study effectiveness of the software package in terms of instructional time and achievement of students. (3) To study the effectiveness of software package of students' achievement in relation to students' intelligence level, motivational level	Randomization method ,t test, interview, Researcher had collected data of achievement through structured post-test and pre- test and data about attitude towards package through structured and unstructured interview schedule. Time duration one month for both the groups Data analysis was done by ANOVA, ANCOVA and Content Analysis	XI GSHSEB 60 students	-	The findings of the study revealed that the CAI package was effective in terms of academic achievement of students and instructional time, the teacher and students have positive attitude about developed CAI. IQ, academic motivation and attitude affected achievement of students. Significant: Yes

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				and attitude towards the package. (4) To study attitude of the students and teacher regarding the effectiveness of CAL.				
9	Zyoud -1999 PhD Work The M.S. University Baroda	Development of Computer assisted English language teaching of VIII standard students	English	(1) To develop a Computer assisted English Language Teaching VII standard Gujarati medium students. (2) To study the effectiveness of the Computer assisted English language teaching program on students' achievement in terms of vocabulary, grammar, and comprehension	Raven's progressive matrices. The researcher had randomly taken the sample of students for control and experiment group from the Gujarati Medium School. For the purpose of the study, tools had been constructed and used were achievement test, JIM scale and	VIII Gujarati Medium School GSHSEB Exp Gp 66 students and Control group 46 students	-	The finding of the study revealed that developed package helped the students in vocabulary and grammar; no effect in comprehension. Also, IQ had an impact on students' achievement, while motivation had not found impact on student's achievement.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				with respect to their intelligence motivation and attitude. (3) To study the attitude of the students towards the usefulness of the Computer assisted English language teaching program.	Raven's progressive matrices. ANCOVA was used for Data Analysis			Students were found to have positive attitude towards the packages. Significant: Yes
10	Yadav -2000 M.Ed Dissertation The M.S. University Baroda	A study of the effectiveness of the Computer Software for students of standard I	English		Researcher had selected the purposive sampling method for school and taken the Baroda High School, Bagikhana, as sample ,t test. For the purpose of study tool have been constructed and used were pre-test, semi-structure interview	I	-	The findings of the study revealed that developed package helped the students in vocabulary and grammar. Whereas, no effect in comprehension. Also, IQ had an impact on students' achievement, while motivation had not found

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
					for teacher and informal interview and observation for students.			impact on it. Students were found to have positive attitude towards the package. There was a significant gain in terms of mean achievement through CAL. Also CAL has evoked positive perceptions amongst teachers and students regarding computers. Significant: Yes
11	Dalwadi -2001 M.Ed The M.S. University of Baroda	Development of computer assisted instruction in science for the students of standard IX	Science	(1) To develop Computer Assisted Instruction (CAI) in science for standard IX. (2) To study the	T test	IX	-	The researcher had found the significant gain in terms of the achievement of students through CAI on "Light".

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				<p>effectiveness of CAI in terms of achievement of standard IX students and (3)</p> <p>To study opinion of the science teachers and students regarding the effectiveness of the developed CAI.</p>				<p>CAI had evoked positive perception among the students. Though there were the students who did not take interest in CAI due to coloured graphics, but they like the more of presentation of text with graphics. Majority of students had enjoyed learning with CAI and suggested to prepare CAI on other topics too. The students were of opinion that coloured animated graphics, sound effect in CAI would enhance</p>

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								learning. The teacher has also suggested to develop CAI in other area of science. Both the teacher and student encouraged the computerized self-learning instead of stereotype classroom session. Significant: Yes
12	Patel-2001 M.Ed The M.S. University of Baroda	Learning through Computer Assisted Learning Material in relation to selected production variables and contiguity	Science	(i) To analyse CALM in relation to production variables and contiguity. (ii) To study the effectiveness of CALM in terms of mean achievement of students. (ii) To study the learning through various	The research is an experimental type. In order to study the effectiveness of the developed CALM pre-testpost-test single group design was used. Correlated t test was used for Data Analysis	VIII 30 students single group	-	There has been found significant gain through interaction with the Computer Assisted Learning Material on Solar system and Magnet –Standard VIII through the computed correlated t

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				message items in relation to production variable and contiguity.				values. The status of the CALM in terms of production variable and contiguity vis-à-vis achievement has been found quite higher, except on a few teaching points where there was need to improve upon graphics, mode of presentation, spatial contiguity of text and animation and temporal contiguity of animation and narration. Significant: Yes
13	Sharma -2003 M.Ed Dissertation	A study of the effectiveness of	Chemistry	(1) To develop CAL in chemistry	T test	XI	-	The researcher had found that

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	The M.S. University Baroda	Computer Assisted Learning (CAL) in chemistry for the students of standard XI		in terms of achievement of standard XI students. (2) To study the effectiveness of the CAL in chemistry in terms of achievement of standard XI students. (3) To study the opinion of the chemistry students regarding the effectiveness of the developed CAL				CAL developed was effective for teaching Chemistry at standard XI. It helped the students to learn the topic of organic compound and clarified the concepts. Students were found to have a positive reaction towards the CAL. It was found to be favourable as far as the statements related to the interest, mode of presentation, content clarity and the question asked in the CAL. A chemistry teacher was found to have

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								positive reaction towards developed CAL. Also, the data analysed were revealed that teacher has given favorable statements regarding content, language clarity, mode of presentation, and clarity in graphics and evaluation procedure in developed CAL. Significant: Yes
14	Vasanthi and Hema -2003	Effectiveness of teaching Chemistry for 1 year B.E. students through Computer Assisted Instruction	Chemistry	. Objectives: (i) To study the effectiveness of teaching chemistry through Computer Assisted Instruction over the traditional	A pre-test and post-test parallel group experimental design was used. The experimental group was given the CAI software. Statistical	B.E. 60 students	-	Findings: (i) There is significant difference between the mean gain score of the control group taught through TTM and the

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				teaching Method. (ii) To study the effectiveness of the Computer Assisted Instruction over the traditional teaching	technique like Mean, S.D and t-test computed to analyse the data collected.			experimental group administrated by the CAI in all units put together. (ii) There is no significant difference between the mean scores of pre test of control group taught through TTM and experimental group administrated by CAI in all units together (Electrochemical and bonding). (iii) There is no significant difference between the mean scores of post test of control group

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								taught through TTM and experimental group administrated by CAI in all units put together. Significant : Yes
15	Helaiya -2004 M.Ed Dissertation The M.S. University Baroda	Developing and implementation of CAI package for teaching statistics to B.Ed. students	Statistics	(1) To develop a CAI package for teaching statistics to B.Ed. students. (2) To study the effectiveness of CAI package in statistics in terms of B.Ed. students. (3) To study the reaction of the B.Ed. students regarding the effectiveness of the developed CAI package.	Pre-test treatment post-test was used. t test	B.Ed 16 students	-	Investigator had observed that CAI was effective in teaching statistics to B.Ed. students than traditional method. Students had enjoyed learning with CAI & suggested to prepare CAI in other topics too. Significant: Yes
16	Ruttanathummatee	Effectiveness of	Thai Language	1. To know the	Pre-test, Post-test	Prathom-3 and	-	The CAI Packages

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	-2004 South Gujarat Univ, Surat	Computer Assisted Instruction for Primary School Students: An Experimental Study	and English Language	effectiveness of Computer Assisted Instruction in the subject of Thai language developed by investigator for the students of Pratom-3. 2. To know the effectiveness of Computer Assisted Instruction in the subject of Thai language developed by investigator for the students of Pratom-6.	design with replication groups was used for conducting the experiment. SD and t test were used for data analysis	Prathom-6 150 students in Prathom-3 and 150 students in Prathom-6		developed by the investigator on Thai language have been found effective at both the levels, that is, Pratom-3 and Pratom-6 .The CAI Packages developed by the investigator on Thai language and by the ONPEC on English language received favourable opinions both by the teachers and students.
17	Barot -2005 M.Ed Dissertation The M.S. University Baroda	To study the effectiveness of CAI in Sanskrit for std. VIII students	Sanskrit	(1) To develop Computer Assisted Instruction (CAI) in Sanskrit for	single group pre-test and post-test design Researcher has prepared CAI	VIII 86 students	-	Findings of the study had proved that CAI can be used very well for remediation

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				standard VII students. (2) To study the effectiveness of CAI package in terms of mean achievement of students in Sanskrit. (3) To study the reaction of the students regarding the effectiveness of the developed CAI package.	using Flash software. t test			purpose. Prepared CAI in Sanskrit was found effective. The reaction of students towards the prepared CAI was also found effective. Significant: Yes
18	Pardeshi -2005 Phd Study MSU Baroda	A study of the relative effectiveness of CAI and CAIPI in learning Trigonometry by English medium students of Standard IX of Baroda City	Math	To develop the CAI and study its effectiveness in mono, diad and triad settings and its relative effectiveness in the three settings and through reactions of the students.	An achievement test was constructed for administering as pre-test and post-test. The data were analysed through mean, SD, uncorrelated 't' and ANOVA.	IX three section of students	Trigonometry	No significant difference has been found in the mean achievement scores of the experimental group in mono, diad, triad and control groups, respectively. Significant

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								difference has been found in the mean achievement scores of the experimental group in triad and control group. The students were found to have positive reactions towards the developed CAI. Significant: No
19	Parikh -2006 M.Ed Dissertation The M.S. University Baroda	Developing and implementing Computer Assisted Learning Material for 11 th std commerce students on subject Introduction to book-keeping and Accountancy prescribed by GSEB	Commerce	(1) To develop CALM for “Rectification of Error” chapter selected from the 11 th standard Introduction to Book Keeping and Accountancy text book of GSEB (2) To study the effectiveness of CALM package in	Pre-testpost-test control group design t test	XI	-	In findings CALM was effective for 2 nd objective. Students had positive reactions towards the CALM and given favorable statements related to the interest, mode of presentation, content, clarity in

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				Accounts in terms of Achievement of 11 th standard commerce students (3) To study the reaction of 11 th standard commerce students regarding the effectiveness of the developed CALM.				graphics with content and the questions asked in it. Significant: Yes
20	Thakkar -2006 M.Ed Dissertation The M.S. University Baroda	To develop and implement CAI for 'Organization of commerce and management' subject in standard XI as prescribed by GSEB	Commerce	(1) To develop a CAI for the chapter of Foreign Trade selected from the subject 'Organization of Commerce and Management' textbook of standard XI (2) To study the effectiveness of the developed CAI.	pre-test, post-test experimental and control group research design T test	XI	-	The findings of the study revealed that CAI was found effective in teaching foreign trade leading to significant gain achievement in the scores of the post test from the pre test of experimental group. CAI was found effective in

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								teaching foreign trade leading to increase in the mean of gain achievement scores of the experimental group than the control group. The overall reaction of the students towards the prepared CAI in commerce was found positive. CAI was perceived by majority of students to be quite interesting and motivating in learning. Significant: Yes
21	Rathwa -2007 M.Ed Dissertation	Development and Implementation of	Gujarati	(1) To develop a multimedia	T test	VII	-	Study revealed that developed

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	The M.S. University Baroda	Multimedia Package for teaching Gujarati subject		package in Gujarati subject for std. VII students. (2) To study the effectiveness of the multimedia package in terms of achievement of students on whom it was implemented. (3) To study the effectiveness of multimedia package in terms of reflection of students (of experimental group) collected through opinionnaire. (4) To compare the achievement of VIII grade students in the				multimedia package was found to be an effective and had great impact to gain better achievement of experimental group in comparison to that of control group. It was observed through opinionnaire that multimedia package was effective and students enjoyed learning. Significant: Yes

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				unit test conducted for experimental and control groups.				
22	Patel -2008	Computer Assisted Instruction in Physics for the students of standard XI	Physics	(i) To develop Computer Assisted Instruction package on two units of physics for XI Science student studying GSTB syllabus. (ii) To study the effectiveness of the CAI package in terms of achievement of students of experimental group. (iii) To study the relative effectiveness of teaching Physics in terms of two methods of	Multistage sampling technique was used by the researcher in the study. The pre-test post-test control group design was employed. The tool used was an opinionnaire for students of both groups. Statistical technique such as mean, S.D., t -test and chi square test was employed.	XI 60 Students	-	(i) The study has resulted in the development of a CAI program on 'motion in one dimension and two dimensions' and 'Laws of Motion' for teaching Physics to the students of Class XI. (ii) The package was found significantly effective for the students of class XI of both the groups. (iii) Comparative effectiveness of the CAI method

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				<p>teaching Physics i.e. conventional method of instruction and CAI package for students of traditional group and experimental group. (iv) To study the relative effectiveness of CAI with reference to the sex of the students of the experimental group. (v) To know the opinions of the students of the experimental group regarding the effectiveness of used CAI in Physics. (vi) To know the opinions of the teachers of</p>				<p>and the traditional method was measured by the experiment and CAI method was found more effective in terms of achievement scores. (iv) In relative effectiveness of the package was equally effective in teaching boys and girls. (v) Students and teachers both revealed a favourable opinion towards CAI program.</p>

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				the experimental group regarding the effectiveness of used CAI in physics.				
23	Patel- 2009	Development and Implementation of CAI to teach English grammar to standard VIII student in different modes	English	(i) To develop the CAI to teach English Grammar to Standard VIII Gujarat Secondary and Higher Secondary Board (GS&HSEB) students in different modes (only CAI, CAI with repetition, CAI with discussion) (ii) To study the effectiveness of the developed CAI in different modes in terms of students' achievement in	Pre-test post control group design Data was analysed through ANOVA	VIII 48 students	-	Findings: (i) The achievement of the students in English Grammar taught through CAI was found significantly higher than that of the students taught through traditional method. (ii) The achievement of the students taught through only CAI was found significantly higher in English Grammar than that of the students taught through traditional

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				<p>English Grammar.</p> <p>(iii) To study the effectiveness of the developed CAI in terms of the reactions of students. (iv) To study the relative effectiveness of the developed CAI in different modes of presentation (only CAI, CAI with repetition, CAI with discussion) in terms of differences in the adjusted post-test mean achievement of the student in English Grammar.</p>				<p>method. (iii) The achievement of the students taught through CAI with repetition and CAI with Discussion was found significantly higher than the achievement of the students who were taught through traditional method. (iv) From the three modes of the presentation of this CAI, the mode i.e. teaching through CAI with discussion was found significantly superior in comparison to other two modes. (v) CAI was also</p>

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								found to be effective in terms of the students.
24	Vansia -2011 Journal International Referred Research Journal, September, 2011	Effectiveness of Computer with Peer Interaction for Math's learning in urban area	Math	1. To develop Computer Assisted Instruction Programme in math's subject for standard IX students. 2. To compare the achievement scores of students learning through Computer Assisted Instruction with Peer Interaction (CAIPI) for boys and girls on post- test. 3. To compare the achievement score of students learning through Computer Assisted Instruction with Peer Interaction (CAIPI) for students of high IQ and low IQ on post-test. 4. To compare the	Data were analysed through the statistical techniques such as t-value and ANOVA. Multistage Sampling technique	IX Total sampling consisted of 104 students	Solid Matter	1. Math's learning through Computer Assisted Instruction with Peer Interaction (CAIPI) was equal effective for boys and girls.2. Math's learning through Computer Assisted Instruction with Peer Interaction (CAIPI) was more effective for high IQ student's then low IQ students.3. Effectiveness of sex was shown on mean achievement score of posttest.4. Effectiveness of

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				<p>achievement scores of boys and girls group on post-test. 5. To compare the achievement scores of experimental and traditional group on post-test. 6. To compare the achievement scores for students of high IQ and low IQ group on post-test. 7. To study the interaction between sex and method of teaching on post-test. 8. To study the interaction between sex and IQ on post-test. 9. To study the interaction between method of teaching and IQ on post-test. 10. To study the interaction between sex, method of teaching and IQ on post-test.</p>				<p>teaching method was shown on mean achievement score of post-test. 5. Effectiveness of IQ was shown on mean achievement score of post-test. 6. Interaction effects of sex and teaching method was not shown on mean achievement score of post-test. 7. Interaction effects of sex and IQ was not shown on mean achievement score of posttest. 8. Interaction effects of teaching method and IQ was not shown on mean achievement score of posttest.</p>

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								9. Interaction effects of sex, teaching method and IQ was not shown on mean achievement score of posttest. Significant Difference: Yes

Table 2.3 Analytical Review of Studies Related to Computer Assisted Instruction Conducted in Abroad

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
1	Suwanma -1991 PhD	Construction of Computer Assisted Instruction in science on topic "Earth and Changing"	Science	1. To develop computer Assisted instruction on topic "Earth and Changing". 2. To find its effectiveness.	The subjects took a pre-test and then they were given the post-test. Data were treated using item by objectives analysis .t test	II 20 Mathayom Suska 2 students	-	The result showed the efficiency of the CAI. The students mastered at 84.75 percent criterion of objectives of the study. They were satisfied and appreciated with this CAI program. Significant: Yes
2	Hsu – 1994 Dissertation Abstracts International	Computer assisted language learning (CALL) to see the effect of elementary language students (ELS) use of interactional modification on listening comprehension	Language	(1) Is second language student request modification of the input they hear while working on Computer based listening exercise, and (2) If this international computerized modifies help second language students listening comprehension and language acquisition.	Data were collected from 15 elementary second language students by using a single group pre-test research design.	Elementary Level 15 students	-	The findings revealed that second language students use the tools made available by the computer technology to make input comprehensible and computerized modification and language acquisition. Significant: Yes
3	Nimtrakul -1999 Chiang Mai University	Effects of computer-assisted instruction Atomic Structure in chemistry if Mathayom Suska 4	Chemistry	(1) To construct CAI on atomic structure in chemistry of Mathayom Suska 4 students (2) To investigate the	Cluster Random sampling, paired t test	Mathayom Suska 4 students	-	Research Finding were (1) The efficiency of the CAI on atomic structure in Chemistry of Mathayom Suska 4 students was 93.26/92.06, which was higher

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		students		achievements in chemistry on atomic structure of Mathoyom Suska 4 students who were taught through the CAI program and (3) To explore the learning attitude towards the chemistry of the students who were taught through the CAI program.				than the standard criterion 85/85. (2) The learning achievement in chemistry on atomic structure of Mathoyom Suska 4 students, after being taught through the CAI on atomic structure in Chemistry was higher than that before being taught through the CAI on atomic structure in Chemistry at the .01 level of significance. (3) The learning attitude in Chemistry with CAI on atomic structure of Mathoyom Suska 4 students was at the moderate to satisfactory. Significant: Yes
4	Robkob -1999	Achievement and Retention in science of Prathom Suska 5 students in science studying through CAI	Science	The purpose of this study was to compare achievement and retention of Prathom Suska 5 students from at Anubaab Chiang Main School, Muang District, and Chiang Mai Province, first semester in academic year 1999.	Data were analysed using item by objective analysis. The retention test was applied to both groups of the students, two weeks after the post test.	XI	-	The results showed that learning achievement and retention of students, which studied through CAI and studied by conventional method, were differing. Significant: Yes

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
5	Vaisopha -1999	Construction of Computer Assisted Instruction in the Mathematics on topic 'Adding fraction' for Prahom Suska 5 students	Math	1. To develop CAI. 2 .To find its effectiveness.	Data were analysed using item-by-objective analysis.	IV	fractions	The finding of the study revealed that significant gain in terms of mean achievement through CAI. CAI has evoked positive perceptions amongst teachers and students. Significant: Yes
6	Salsbury-2002 PhD Thesis Kansas State University	A study on comparing teacher-directed and computer-assisted instruction of elementary geographic place vocabulary	Geography	The purpose of this study was to compare computer-assisted instruction to teacher-directed instruction for teaching elementary geographic place name vocabulary.	The quasi-experimental research design of pre-test, treatment and post-test was employed in this study since the students were in pre-assigned classrooms. Two classrooms received instruction for learning to identify and label 50 world places, and third class was the control group.	Grade IV	-	Overall data analysis revealed significant difference between two methods of instruction when compared to each other, and to the control group. Gains in pretest to posttest scores were greater from computer-assisted instruction. This study has reported the highly significant academic success of fourth grade students learning geographic place name vocabulary through drill, whether a teacher or a computer provides the instruction.
7	Crews -2003	A case study that investigates the	Language	(1) To scientifically investigate if poor	The study was conducted at a Title 1 elementary school in a	Grade IV and V	-	Results of pre-post reading comprehensive tests and

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
		effectiveness of a CAI reading tutorial in helping poor readers improve their ability to read		readers using the CAI significantly improved their reading abilities, and assuming the CAI was effective (2) To identify the instructional methods and strategies implemented in the CAI design (3) To theoretically explain the effectiveness of the CAI and thereby provided information of effective methods of designing effective CAI for poor readers	large city in the southwest. Title 2 schools serve a high concentration of students living in poverty and as a result, receive funds to provide special educational services for low achieving and at-risk students. The 13 participating students were fourth and fifth grade students with poor reading abilities as determined by the independent assessments and observations of their homeroom teachers. The multimedia CAI program investigated supports the active cognitive participation of the learner, delivers multi-sensory instruction, and provides timely, directed feedback, teacher's phonics skills, and implements 100 per cent mastery learning. The instruction is individualized and self-paced.	13 students		interviews indicate that poor readers completing the CAI tutorial significantly improved their reading skills and the students and their teachers felt that using the CAI tutorial helped the students become better reader.
8	Casanova -2004	An analysis of	CMS	to determine the extent to	The data collection was done by	Higher	-	Findings indicated that faculty

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	West Virginia University Dissertation Abstract	computer-mediated communication technologies as tools to enhance learning	Computer Mediated communication	which CMS technologies promoted the achievement of stated goals and objectives for course taught in higher education. This study was directed by three research questions (1) in what ways are higher education faculties using CMS technologies to deliver their courses? (2) What is the faculty's primary instructional intent for the CMS technologies they selected for integration into the teaching process? (3) In what ways does the integration of selected CMS technologies promote achievement of stated goals and objectives in their courses?	survey, course analysis and interview. Interview, survey	education		was mainly using CMC technologies to support teaching practices and to improve teacher's productivity. It's were basically targeted to increase interactivity, open avenues for feedback and provide resources but less used for inquiry based and active learning. Faculty's primary intent to integrate CMC technologies was to create different avenues to communicate with students and to offer them a learning environment that would support students outside the classroom. CMC promoted the achievement of goals and objectives with different degree of success mainly in two different areas: content delivery and course management and less regarding tele collaborative activity structures. Significant: Yes
9	McLaughlin Daniel -	Towards a new	IT	The purpose of this	The investigator used case	College	-	Data for the study was collected

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	2004 Florida Community College	paradigm for teaching and learning: A case study of the process of integrating instructional design and technology at Florida Community College at Jacksonville		study was to explore how one institution of higher education addressed the gap that exists between systematic and collaborative instructional design and the use of instructional technology in online course development.	study design to describe the model and processes the college administration used to implement the project.	students		through semi-structure interview and a review of project related records, reports, guidelines and artifacts. Data was also obtained through field observations and investigator participation in training and professional development sessions with faculty and staff. Significant: Yes
10	Eteokleous, Nikelia -2004 Dissertation Abstract International	Computer technology integration in Cyprus elementary schools	Computer technology integration in elementary classrooms	1.To evaluate the current situation in Cyprus elementary classrooms regarding computer technology integration. 2. To study how Cypriot elementary teachers use computers and the factors that influence computer integration in their classroom practices. 3. To address the research questions that guided the study, an evaluative case study	Qualitative analysis, semi structured interview	Elementary school	-	The results of the qualitative analysis summarize the factors that influence teachers in applying computers in their classroom practices. A general uniformity across the three categories of teachers revealed, in terms of the factors that function as barriers in applying computer in the classrooms. The factors can be summarized as follow: lack of resources; tyranny of the curriculum; incomplete and inadequate professional development

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				design was applied.				training. Significant: Yes
11	Hung -2005 Idaho State University Dissertation Abstract International	The evaluation of a technology-aided lecture accompanied by a set of macroeconomics computer interactive exercises in macroeconomics for the undergraduate business major in Taiwan	Micro Economics	The study examined the effects of a technology aided lecture accompanied by a set of macroeconomics computer interactive exercises and a traditional instruction supported by using transparencies on students' learning achievement.	ANCOVA	Under Graduate	-	As comparing the effectiveness of the two different instructional methods, it is concluded offering the courses for the unit on unemployment and inflation through the Technology-Aided Lecture (TAL), accompanied by a set of macroeconomics computer interactive exercises, or the standard instruction produced a non-significant difference, to the extent measured by the researcher developed test.
12	Rosales -2005 the lowere Rio Grande Valley.Ed.University of Houston Dissertation Abstract International	The effect of computer-assisted instruction on the mathematics achievement of ninth-grade high school students in the lower Rio Grande Valley	Mathematics		ANCOVA	IX	-	There was statistically significant difference between the mathematics achievement of ninth grade high school students in the lower Rio Grande Valley who participated in computer-assisted instruction and the mathematics achievement of ninth grade high school students

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								in the lower Rio Grande Valley who did not participate in computer-assisted instruction. The resultant analysis indicated that there were no statistically significant differences between the mathematics achievements of the two groups.
13	Gilbert -2006 Southern Illinois University Carbondale	Effectiveness of computer-assisted instruction blended with class-room teaching methods to acquire automotive psychomotor skills	Automotive Technology	To study the relative effectiveness of two blended learning methodologies of web-based CAI and face-to-face classroom instruction were investigated in the Automotive Technology Department at Southern Illinois University Carbondale	t test	Results were determined by a psychomotor electrical diagnostic skill evaluation of two matched groups exposed to different blending methods of teaching basic electrical concepts.	Higher Education	Analysis revealed that the blended teaching methods experienced by the experimental group demonstrated a comparatively higher level of psychomotor electrical diagnostic skill capability.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
14	Beaird -2007 Ph.D. Thesis., University of Nevada, Las Vegas Dissertation Abstract International	The effects of computer-assisted language learning on English language learners with and without disabilities in an elementary school setting	English	The purpose of the study was to investigate the effects of the English Language Learners Instructional System (ELLIS) on oral language, written language and reading achievement among students who are English language learners with and without disabilities. Additionally, levels of teacher satisfaction with computer-assisted language learning (CALL) and the use of ELLIS were assessed	Data were analysed quantitatively as well as qualitatively with ANOVA/ANCOVA and open- ended interview techniques respectively.	Elementary school(IV and V)	III, IV and V grade	In findings of the study, the ANOVA and ANCOVA analyses revealed that students with disabilities who received instruction using the ELLIS program performed similarly to students with disabilities who did not receive instruction using ELLIS program in oral language, written language and reading achievement. The students without disabilities who received instruction using the ELLIS program performed similarly to students without disabilities who did not receive instruction using the ELLIS program in oral language, written language and reading achievement. Paired instruction using the ELLIS software program had similar effects on student performance as individual instruction using the ELLIS software program. Results from the open-ended interview revealed high levels of

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
								teacher satisfaction with the ELLIS software program.
15	Ford -2007 Dissertation Abstract International	Effect of computer-aided instruction versus traditional modes on student PT's learning musculoskeletal special tests	Biology	To find the relative effectiveness of computer-aided instruction verses traditional modes on student's PT's learning musculoskeletal special tests.	Analysis of performance on written and practical examinations was conducted across the 3 repeated measures. A qualitative survey was completed by the CAI group post intervention.	-	-	Finding of the study revealed that CAI was equally as effective as live demonstration and textbook learning of musculoskeletal special tests in the cognitive domain, however, CAI was superior to live demonstration and textbook instruction at final post-testing.
16	Galvis -2007 Ph.D. Thesis, Texas Women's University Dissertation Abstract International	Computer-assisted instruction (CAI) as a teaching tool for occupational therapy education: A guide to understand CAI design and effectiveness	occupational therapy education	The primary purpose of the study was to compare the effects of CAI versus traditional teaching methods with occupational therapy students. To explore the topic, three consecutive and inter-related studies were conducted.	t test	-	-	In its analysis researcher had founded that the CAI was an effective alternative to traditional classroom lecture to teach practical skills and theoretical knowledge. It was also found that CAI provides faster instruction while providing learner-centered training.
17	Karnati -2008 Ph.D. Thesis., University of	Computer aided instruction for out-of-school children in	Telugu Language	India has the largest number of out-of-school children, the majority of	The methodology employed in the study was a quasi-experimental design on a	Age range 7-19 140 children	-	The results support the use of ICT with marginalized sections of society in developing

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
	Pennsylvania Dissertation Abstract International	India: An impact study in Andhra Pradesh		whom are girls. Against this backdrop, the Bridges to the Future Initiative (BFI), a computer-aided instruction (CAI) intervention was launched in Andhra Pradesh to bring children back to school. The BFI used multimedia software to teach basic literacy and numeric skills through interactive stories and activities, in the local language Telugu.	sample of around 140 children (age range 7-19 years). The research study included the Bridges to the Future Initiative (BFI) sites which offered two hours of CAI a day and comparison sites which provided five hours of teacher- based instruction (TBI) a day. This research was one of the first to explore the context of out-of-school children in poor communities and the use of CAI in Telugu (local language) to bring these learners back to school.			countries in order to improve literacy skills.
18	Pilli -2008 PhD Thesis Middle East Technical University	The Effects Of Computer-Assisted Instruction On The Achievement, Attitudes And Retention Of Fourth Grade Mathematics Course	Math	Research Questions were 1: Is there a significant difference between the achievement posttest scores of the students exposed to Computer Assisted Instruction with the <i>Frizbi Mathematics 4</i> and those who were	In this study quasi-experimental research design was used in order to investigate the impacts of the <i>Frizbi Mathematics 4</i> educational software on the 4th grade students' mathematics achievement, mathematics attitude, computer assisted learning attitude, and retention.	Grade IV The sample consisted of 26 students in control group and 29 students in Experimental Group.	Multiplication, Division of Natural Numbers and Fractions	Findings of the study 1. The results of pretest and posttest for unit 1: "Multiplication of Natural Numbers" revealed that the CAI with <i>Frizbi Mathematics 4</i> applied to the experimental group was demonstrated to be effective in increasing the 115 achievement scores of the

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				<p>exposed to traditional instruction with textbook? 2: Is there a significant difference between the mathematics attitude scale post scores of the students exposed to computer assisted instruction with <i>Frizbi Mathematics 4</i> and those who were exposed to traditional instruction with textbook? 3: Is there a significant difference between the computer assisted learning attitude scale post scores of the students exposed to computer assisted instruction with <i>Frizbi Mathematics 4</i> and those who were exposed to traditional instruction with textbook? 4: Is there a significant difference between the retention test</p>				<p>students. 2. The results of pretest and posttest for unit 2: “Division of Natural Numbers” were significant differences between achievement tests’ mean scores of students in the experimental and control group. 3. The results of pretest and posttest for unit 3: “Fractions” revealed there were significant differences between achievement tests’ mean scores of students in the experimental and control group. 4. In unit 1 (Multiplication of Natural Numbers) retention test mean scores were lower than the post test mean scores in both groups and the “rate of retention decay” was not significantly different between the experimental and the control group, the results of independent <i>t</i>-test indicated that the experimental group’s retention test mean score was significantly higher than the control group.</p>

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				scores of the students exposed to computer assisted instruction with the <i>Frizbi Mathematics 4</i> and those who were exposed to traditional instruction with textbook?				
19	Jackson and Dave - 2011 International Journal of Curriculum and Instruction	The Effect of Computer-Assisted Instruction on Student's Attitudes and Achievement in Matrices and Transformations in Secondary Schools in Uasin Gishu District, Kenya, Moi University, Kenya	Math	The purpose of the study was to investigate the effects of CAI on students' attitude and achievement in matrices and transformations between form four students who received instruction using CAI module or conventional instruction methods. The study addressed the following questions: 1. What are the effects of the CAI module on students' achievement in matrices and transformations? 2. Is	The pretest – posttest control group experimental research design was used. Six classes selected at random with 205 students participated in the study.	Secondary Schools 205 students	Matrices and transformation	Results of this study indicated higher achievement and positive attitudes with CAI treatment groups. Making connections between the goals of Mathematics education and CAI offers a valuable means for improving mathematical knowledge and skills and hence performance in Mathematics.

S.No	Investigator	Title of the Study	Subject	Major Objectives	Design & Tools of the Study	Level & Size of the Sample	Unit (Maths)	Major Findings
				<p>there any significant difference in the achievement on matrices and transformations between subjects exposed to CAI module and those not? 3. What are the effects of the CAI module on students' attitudes towards Mathematics course? 4. Is there any significant difference in attitudes towards lessons on matrices and transformations between subjects exposed to CAI module and those not?</p>				
20	Bayturan and Kesan(2012)	The Effect of Computer-Assisted Instruction on the Achievement and Attitudes Towards Mathematics of Students in Mathematics Education	Math	The objective of this study was to investigate the impact of computer-assisted instruction method on students achievement and attitudes towards mathematics in secondary mathematics education.	The research was designed based on an experimental pre-test post-test model. The research was conducted in 60 ninth grade students from a Anatolian high-school during 2009-2010 academic year. t test was used for Date analysis	IX 60 ninth grade students	Relation, Function and Operation	The results demonstrated that teaching mathematics with a computer assisted instruction method increased student success significantly in mathematics lesson. However, the experimental and control groups did not differ between students' attitudes towards mathematics.

2.10 Flow Chart of the Reviewed Studies

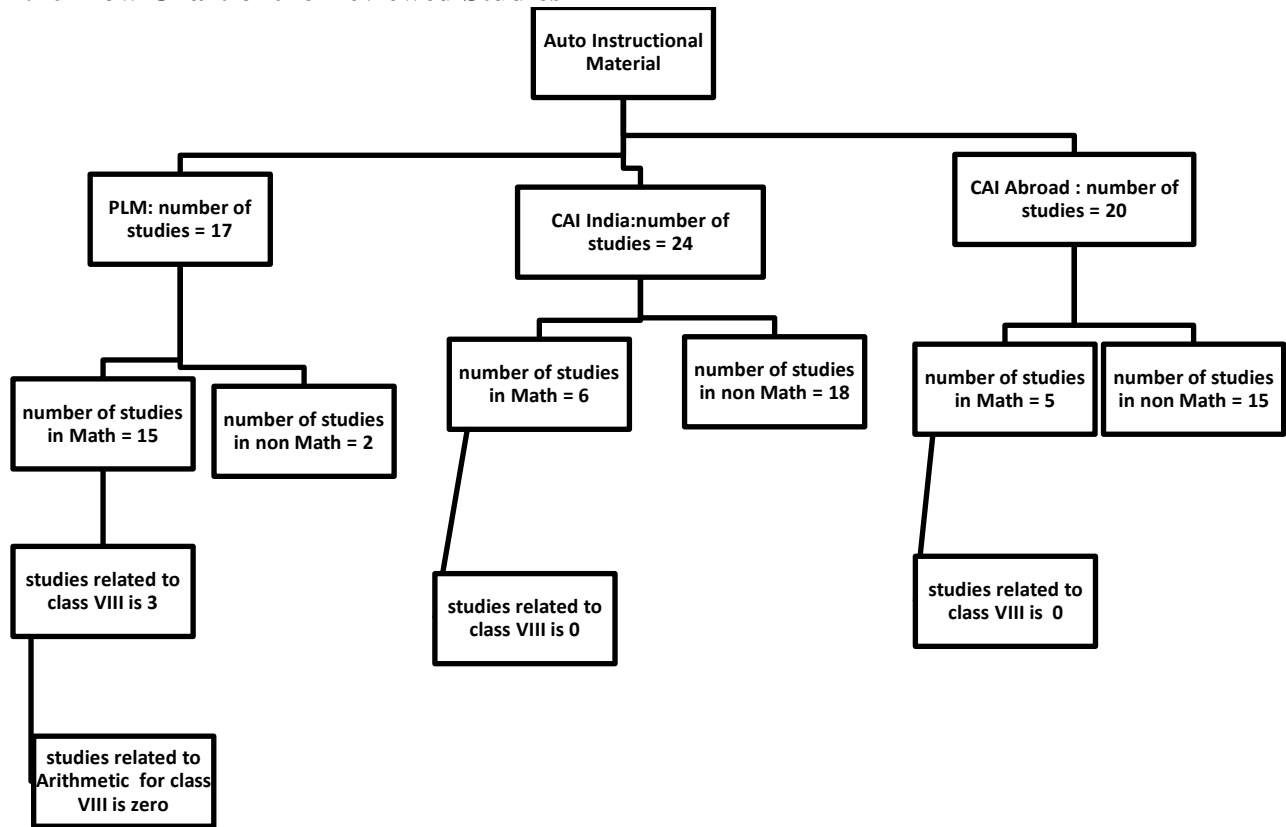


Figure 2.1 Flow Chart of the Reviewed Studies

2.11 Analysis of Reviewed Literature

2.11.1 Classification of Reviewed Studies Related to Mathematics

Table 2.4 Studies Conducted in India Related to PLM in Mathematics

S.No	Investigator	Class/ Level	Topic
1	Kulkarni and Yadav -1966	VI	Solving Simple Equations
2	Sharma- 1966	IX	Algebra
3	Shah-1969	VIII	Algebra
4	Patel-1975	IX	Geometry
5	Patel-1977	VIII	Geometry
6	Seshadri-1980	IX	Whole Syllabus
7	Pandey-1980	IV	Whole syllabus
8	Trivedi-1980	V, VI, VII	-
9	Inamadar-1981	VII	Simple Interest
10	Shah-1981	V	All
11	Suthar-1981	VIII	Set theory, Rational numbers, real numbers, powers and Indices, equations and problems and graph
12	Davies-1982	IX	Statistics
13	Rao-1983	V and X	-
14	Bhatia-1992	V	Fractions
15	Ramani and Patadia-2012	XI	Probability

Investigator has reviewed a total of seventeen studies (ref table 2.1) related to PLM. Out of seventeen studies fifteen (ref table 2.4) related to Mathematics. Out of fifteen there were three studies conducted for class VIII. Two studies were related to the topic Algebra and one was related to the topic geometry. There were no studies related to profit and loss, simple interest and compound interest ie arithmetic part of mathematics for class VIII mathematics.

Table 2.5 Studies Conducted in India Related to CAI in Mathematics

S.No	Investigator	Class/ Level	Topic
1	Nagar-1988	Survey	General
2	Singh, Ahluwalia, and Verma-1991	Higher Secondary	-
3	Rose Antony Stella V-1992	IX	Language of sets
4	Singh-1992	IX	Simultaneous equations in algebra, statistical representation in statistics, and triangles and their congruency in geometry
5	Pardeshi-2005	IX	Trigonometry
6	Vansia-2011	IX	Solid Matter

Investigator has reviewed a total of twenty four studies conducted in India related to CAI (ref table 2.2). Out of twenty four studies six were related to Mathematics (ref table 2.5). Five studies were conducted for class IX and one for Higher Secondary. There were no studies related to class VIII and especially for profit and loss, simple interest and compound interest i.e. arithmetic part of mathematics.

Table 2.6 Studies Conducted in Abroad Related to CAI in Mathematics

S.No	Investigator	Class/ Level	Topic
1	Vaisopha-1999	IV	Fraction
2	Rosales-2005	IX	Not available
3	Pilli-2008	IV	Multiplication, Division of Natural Numbers and Fractions
4	Jackson and Dave-2011	XI	Matrices and Transformation
5	Bayturan and Kesan (2012)	IX	Relation, function and Operation

Investigator has reviewed a total of twenty studies conducted Abroad related to CAI (ref table 2.3). Out of twenty studies five were related to Mathematics (ref table 2.6). Out of five studies two were related to class IV mathematics, and two for class IX and one for class IX. There were no studies related to class VIII and especially for profit and loss, simple interest and compound interest ie arithmetic part of mathematics.

2.11.2 Year Wise Classification of Reviewed Studies

Table 2.7 Year Wise Classification of Indian Studies in PLM Conducted During 1966-2012

S.No	Year	Number of Studies Conducted	Percentage
1	1966	3	17.65%
2	1975	1	5.88%
3	1977	1	5.88%
4	1980	3	17.65%
5	1981	3	17.65%
6	1982	1	5.88%
7	1983	1	5.88%
8	1992	1	5.88%
9	1998	1	5.88%
10	2001	1	5.88%
11	2012	1	5.88%

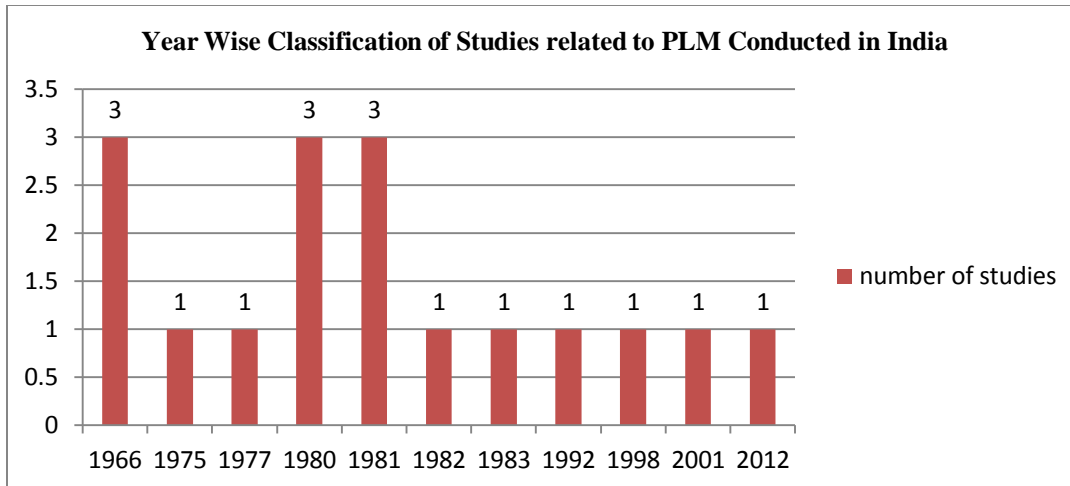


Figure 2.2 Year Wise Classification of Studies Related to PLM Conducted in India

In the year wise classification of the studies related to PLM conducted (ref table 2.7) in India. Three studies were conducted in the year 1966, 1980 and 1981. In the rest there was only one study each in the respective year 1975, 1977, 1982, 1983, 1992, 1998, 2001 and 2012. It can be clearly seen that there was a decreasing trend in the studies related to PLM.

Table 2.8 Year Wise Classification of Indian Studies in CAI Conducted During 1988-2011

S.No	Year	Number of Studies Conducted	Percentage
1	1988	1	4.17%
2	1991	2	8.33%
3	1992	3	12.5%
4	1998	2	8.33%
5	1999	1	4.17%
6	2000	1	4.17%
7	2001	2	8.33%
8	2003	2	8.33%
9	2004	2	8.33%
10	2005	2	8.33%
11	2006	2	8.33%
12	2007	1	4.17%
13	2008	1	4.17%
14	2009	1	4.17%
15	2011	1	4.17%

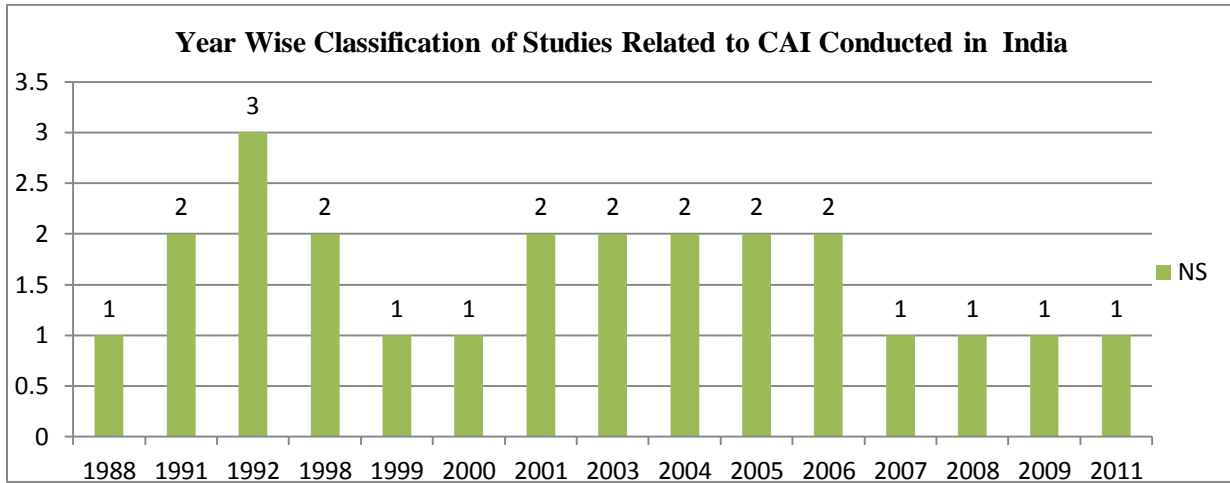


Figure 2.3 Year Wise Classification of Studies Related to CAI Conducted in India

NS=number of studies

In the year wise classification of the studies related to CAI conducted (ref table 2.8) in India one study was conducted during the year 1992, two were conducted in the year 1991, 1998, 2001, 2003, 2004, 2005 and 2006. There was one study each in the year 1988, 1990, 2000, 2007, 2008, 2009 and 2011 respectively.

Table 2.9 Five Year Interval Wise Classification of Indian Studies in CAI Conducted During 1988-2011

S.No	Year	Number of Studies Conducted	Percentage
1	1988-1992	6	25%
2	1993-1997	0	0%
3	1998-2002	6	25%
4	2003-2007	9	37.5%
5	2008-2012	3	12.5%

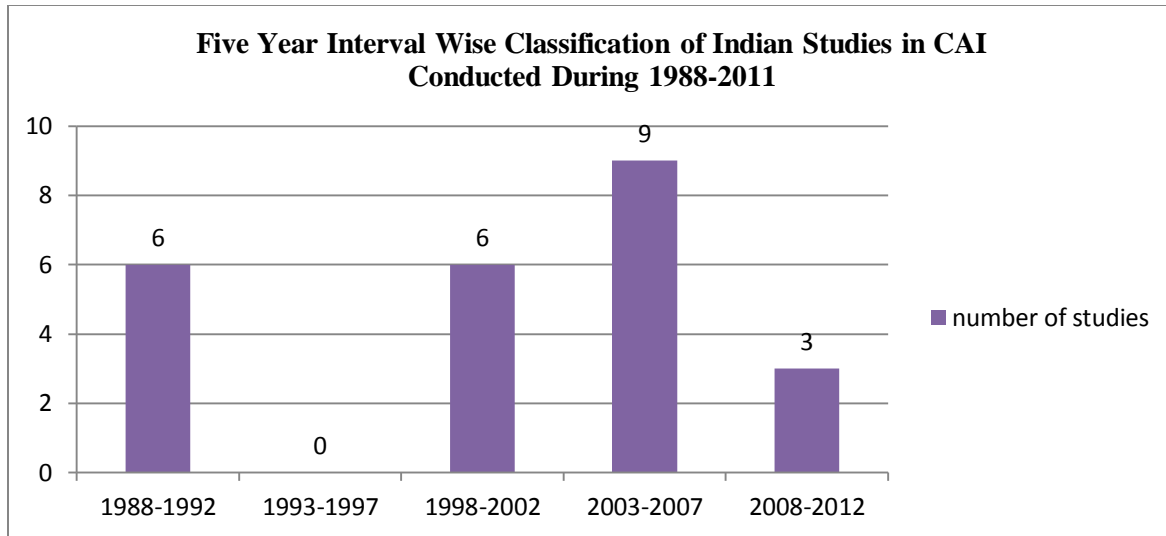


Figure 2.4 Five-year Interval wise classification of Studies Related to CAI conducted in India

In the five year classification of the studies(ref table 2.9) it can be seen that six studies were conducted during the period 1988-1992 and 1998-2002, nine studies during 2003-2007 and three studies during 2008-2012 and there were no studies during 1993-1997.

Table 2.10 Year Wise Classification of Studies Related to CAI Conducted abroad during 1991-2011

S.No	Year	Number of Studies Conducted	Percentage
1	1991	1	5%
2	1994	1	5%
3	1999	3	15%
4	2002	1	5%
5	2003	1	5%
6	2004	3	15%
7	2005	2	10%
8	2006	1	5%
9	2007	3	15%
10	2008	2	10%
11	2011	1	5%
12	2012	1	5%

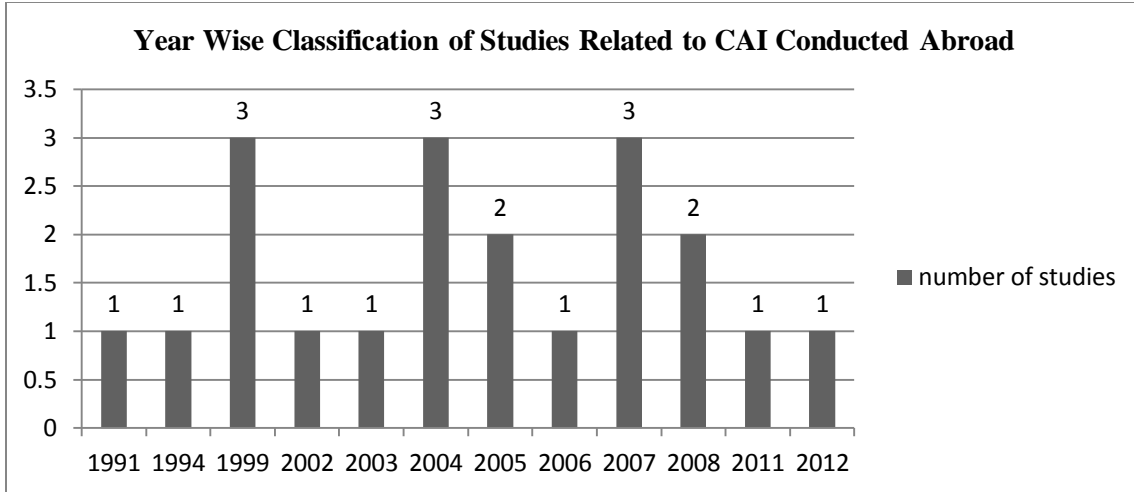


Figure 2.5 Year Wise Classification of the Studies Related to CAI Conducted Abroad

In the year wise classification of the studies conducted abroad (ref table 2.10) it can be seen that there were three studies conducted respectively in the year 1999, 2004 and 2007. Two studies were conducted respectively during the year 2005 and 2008. There was one study conducted respectively during the year 1991, 1994, 2002, 2003, 2006, 2011 and 2012.

2.11.3 Research Study Wise Classification of Reviewed Studies Related to PLM

Table 2.11 Research Study Wise Classification of the Indian Studies Related to PLM

S.No	Research study	Number of studies	Percentage
1	Experimental	17	100%
2	Survey	0	0%
3	CASE	0	0%

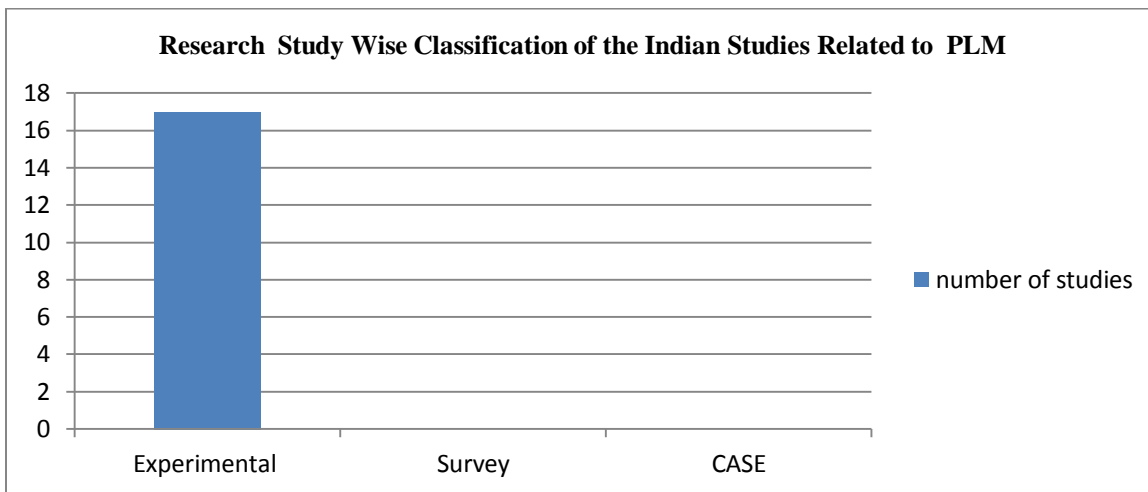


Figure 2.6 Research Study Wise Classification of Indian Studies Related to PLM

In research study wise classification of the reviewed studies conducted in PLM(ref table 2.11) it was found that all the seventeen studies were of Experimental study.

Table 2.12 Research Design Wise Classification of the Indian Studies Related to PLM

S.No	Research Design of the study	Number of studies	Percentage
1	Pretest-Posttest Control Group	5	29.41%
2	Post-test only Control Group	2	11.76%
3	Not known	10	58.82%

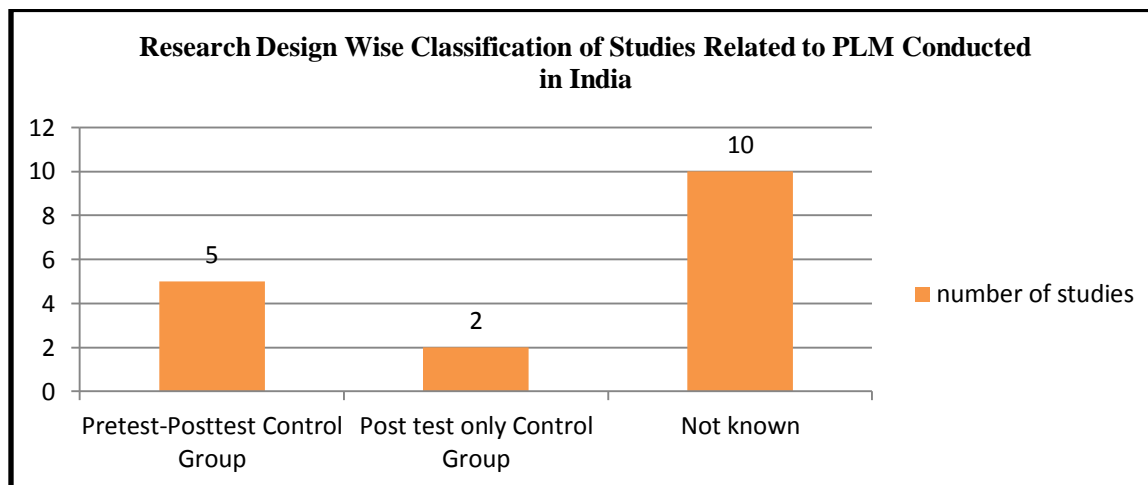


Figure 2.7 Research Design Wise Classification of the Indian Studies Related to PLM

In research design wise classification of the studies conducted in PLM(ref table 2.12) it was found that there were five studies related to Pretest-Posttest Control Group design, two studies related to Post-test Only Control Group design and in ten studies research design was not known.

Table 2.13 Data Analysis Wise Classification of the Indian Studies Related to PLM

S.No	Data Analysis wise classification	Number of studies	Percentage
1	t test	7	41.18%
2	Correlated t test	2	11.76%
3	ANOVA	1	5.88%
4	ANCOVA	1	5.88%
5	Not Known	6	35.29%

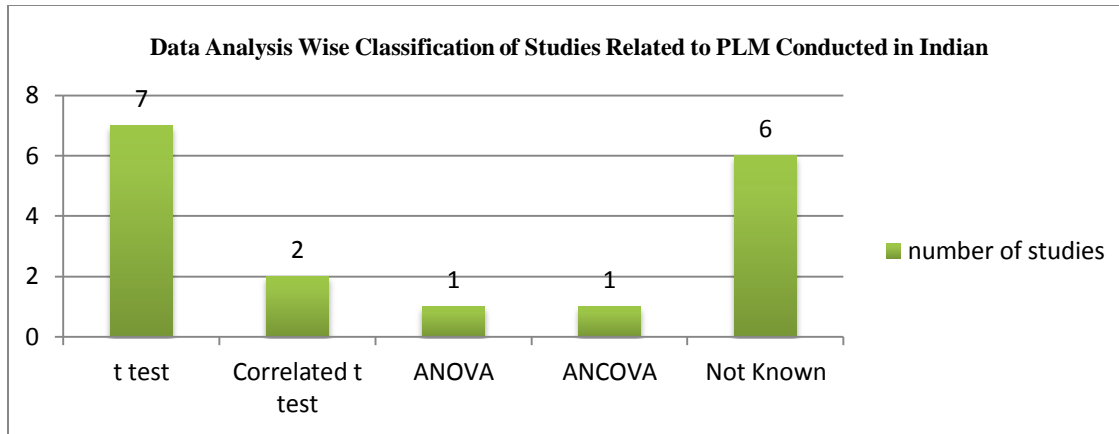


Figure 2.8 Data Analysis Wise Classification of the Indian Studies Related to PLM

In data analysis wise classification of the studies conducted in PLM (ref table 2.13) it was found that there were seven studies related to t test, two studies related to correlated t test, one study related to ANOVA, one study related to ANCOVA and six were unknown.

2.11.4 Research Study Wise Classification of Reviewed Studies Related to CAI Conducted in India

Table 2.14 Research Study Wise Classification of Studies Related to CAI Conducted in Indian

S.No	Research study	Number of studies	Percentage
1	Experimental	23	95.83%
2	Survey	1	4.17%
3	CASE	0	0%

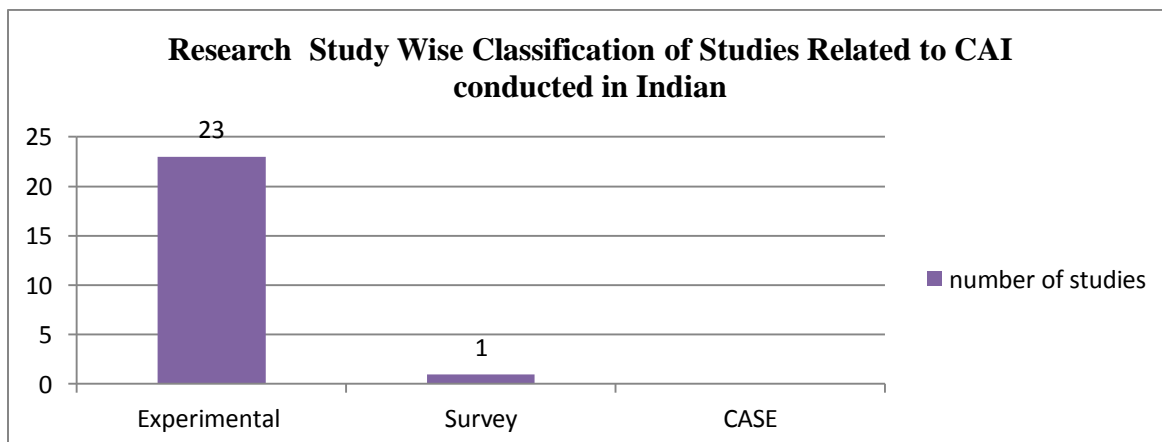


Figure 2.9 Research Study Wise Classification of the Indian Studies Related to CAI

In research study wise classification of the reviewed studies of CAI conducted in India (ref table 2.14) it was found that twenty-three were of Experimental study and one was of Survey Study and there was no study related to CASE study.

Table 2.15 Sampling Method Wise Classification of the Indian Studies Related to CAI

S.No	Sampling Method	Number of Studies	Percentage
1	Simple Random Sampling	4	16.67%
2	Stratified Sampling	4	16.67%
3	Randomised Block Sampling	3	12.5%
4	Multistage Sampling	2	8.33%
5	Purposive Sampling	5	20.83%
6	Not known	6	25%

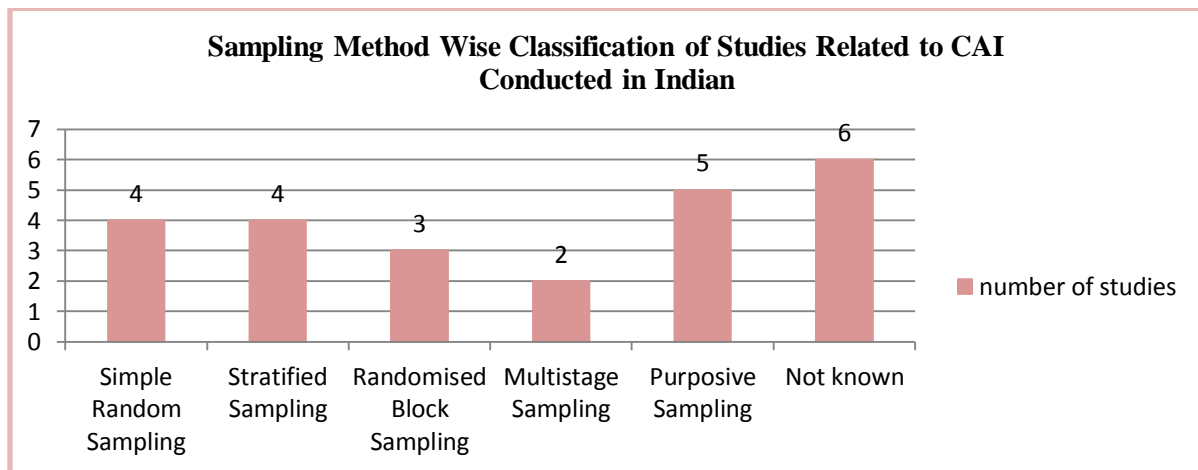


Figure 2.10 Sampling Method Wise Classification of the Indian Studies Related to CAI

In the Sampling Method Wise classification of CAI conducted in the India (ref table 2.15) it was found that there were four studies using Simple Random Sampling, four using Stratified Sampling, three using Randomised Block Sampling, two using multistage Sampling, five using Purposive Sampling and in six studies sampling method was not known.

Table 2.16 Research Design Wise Classification of the Indian Studies Related to CAI

S.No	Research Design of the study	Number of studies	Percentage
1	Pretest-Posttest Control Group	10	41.67%
2	Post-test only Control Group	4	16.67%
3	One group Pretest-Posttest Design	2	8.33%
4	Not known	8	33.33%

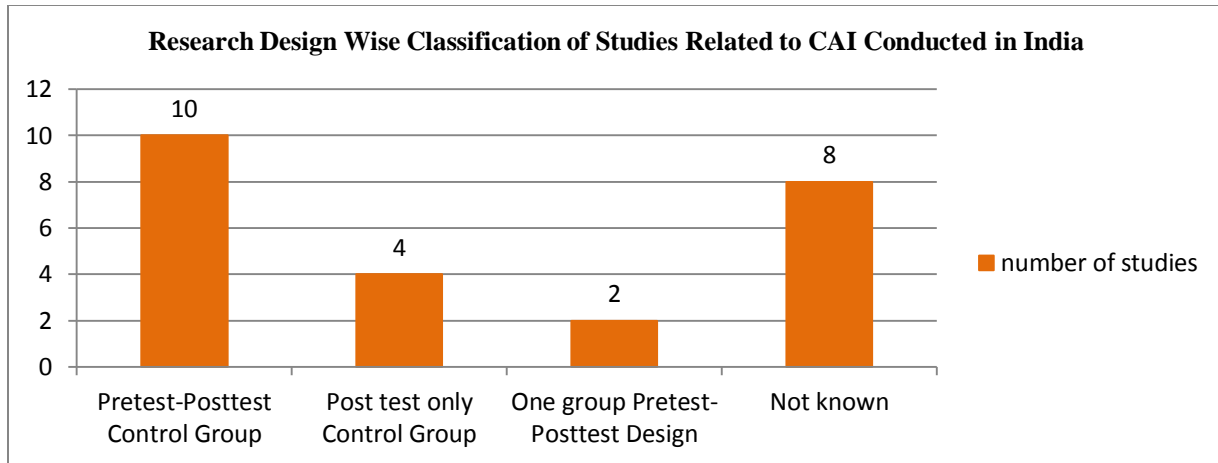


Figure 2.11 Research Design Wise Classification of the Indian Studies Related to CAI

In research design wise classification of the studies related to CAI conducted in India (ref 2.16) it was found that there were ten studies related to Pretest-Posttest Control Group design, four related to Post-test only Control group design, two related to one group Pretest-Posttest design and eight studies were not known.

Table 2.17 Data Analysis Wise Classification of the Indian Studies Related to CAI

S.No	Data Analysis wise classification	Number of studies	Percentage
1	t test	13	52%
2	Correlated t test	6	24%
3	ANOVA	4	16%
4	ANCOVA	2	8%

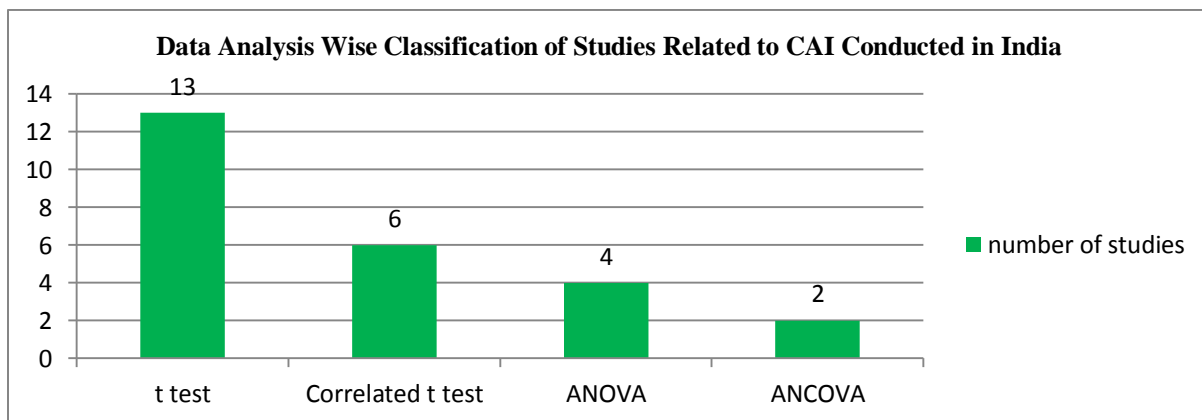


Figure 2.12 Data Analysis Wise Classification of the Indian Studies Related to CAI

In data analysis wise classification of the studies related to CAI conducted in India (ref table 2.17) it was found that there were thirteen studies related to t test, six studies related to correlated t test, four studies related to ANOVA and two studies were related to ANCOVA.

2.11.5 Research Study Wise Classification of Reviewed Studies Related to CAI Conducted Abroad

Table 2.18 Research Study Wise Classification of the Abroad Studies Related to CAI

S.No	Research study	Number of studies	Percentage
1	True Experimental	15	75%
2	Quasi Experimental	2	10%
2	Survey	2	10%
3	CASE	1	5%

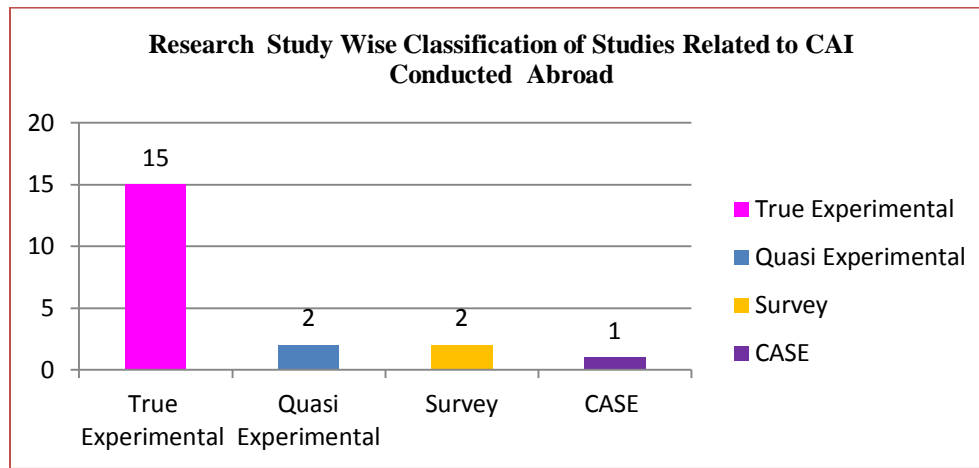


Figure 2.13 Research Study Wise Classification of the Abroad Studies Related to CAI

In research study wise classification of the studies related to CAI conducted Abroad (ref table 2.18) it was found that there were fifteen studies related to True Experimental, two studies related to Quasi Experimental, two studies related to Survey and one study related to CASE study.

Table 2.19 Sampling Method Wise Classification of the Studies Conducted Abroad Related to CAI

S.No	Sampling Method	Number of Studies	Percentage
1	Simple Random Sampling	3	12.5
2	Stratified Sampling	1	4.17
3	Cluster Sampling	0	0
4	Quota Sampling	1	4.17
5	Purposive Sampling	8	33.33
6	Not known	7	29.17

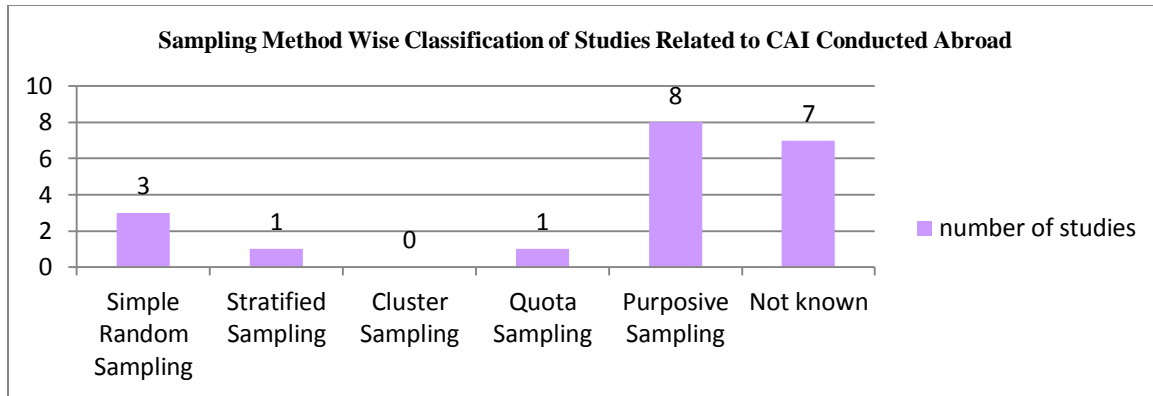


Figure 2.14 Sampling Method Wise Classification of the Abroad Studies Related to CAI

In the research method wise classification of the CAI studies conducted Abroad (ref table 2.19) it can be found that there were three studies related to simple random sampling, one related to stratified sampling, one relate to quota sampling, eight related to purposive sampling and seven were unknown.

Table 2.20 Research Design Wise Classification of the Abroad Studies Related to CAI

S.No	Research Design of the study	Number of studies	Percentage
1	Pretest-Posttest Control Group	8	33.33%
2	Post-test only Control Group	6	25%
3	One group Pretest-Posttest Design	1	4.17%
4	Qualitative	1	4.17%
5	Not known	4	16.67%

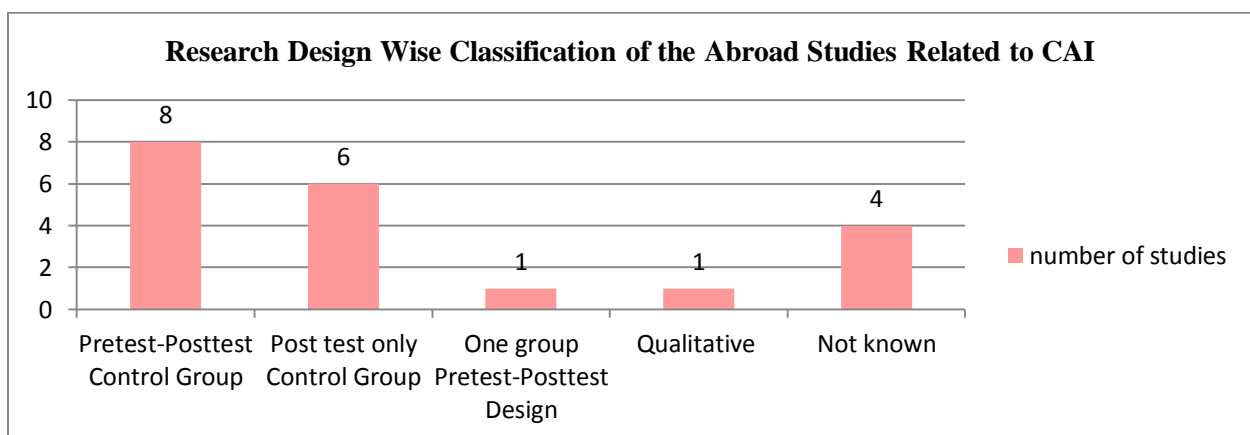
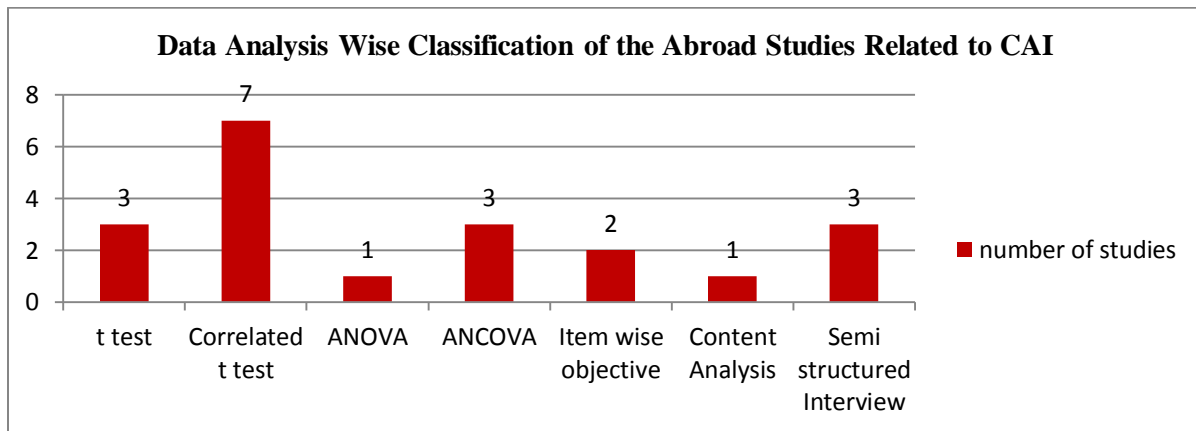


Figure 2.15 Research Design Wise Classification of the Abroad Studies Related to CAI

In research design wise classification of CAI conducted Abroad (ref table 2.20) it was found that there were seven studies related to Pretest-Posttest Control Group design, six studies related to Post-test Only Control Group design one related to qualitative and four were not known.

Table 2.21 Data Analysis Wise Classification of the Abroad Studies Related to CAI

S.No	Data Analysis wise classification	Number of studies	Percentage
1	t test	3	13.04%
2	Correlated t test	7	30.43%
3	ANOVA	1	4.35%
4	ANCOVA	3	13.04%
5	Item wise objective	2	8.70%
6	Content Analysis	1	4.35%
7	Semi structured Interview	3	13.04%
8	Not Known	3	13.04%

**Figure 2.16 Data Analysis Wise Classification of the Abroad Studies Related to CAI**

In data analysis wise classification of the CAI studies conducted abroad (ref table 2.21) it was found that there were three studies related to t test, seven studies related to correlated t test, one study related to ANOVA, three studies related to ANCOVA, two related to Item wise objective one related to content analysis, and three related to semi structured interview.

2.11.6 Research Level Wise Classification of Reviewed Studies

Table 2.22 Research Level Wise Classification of the Indian Studies Related to PLM

S.No	Level of the Study	Number of Studies Conducted	Percentage
1	Lower Primary	2	11.76%
2	Upper Primary	10	58.82%
3	Secondary	4	23.53%
4	Higher Secondary	1	5.88%
5	Higher Education	0	0%

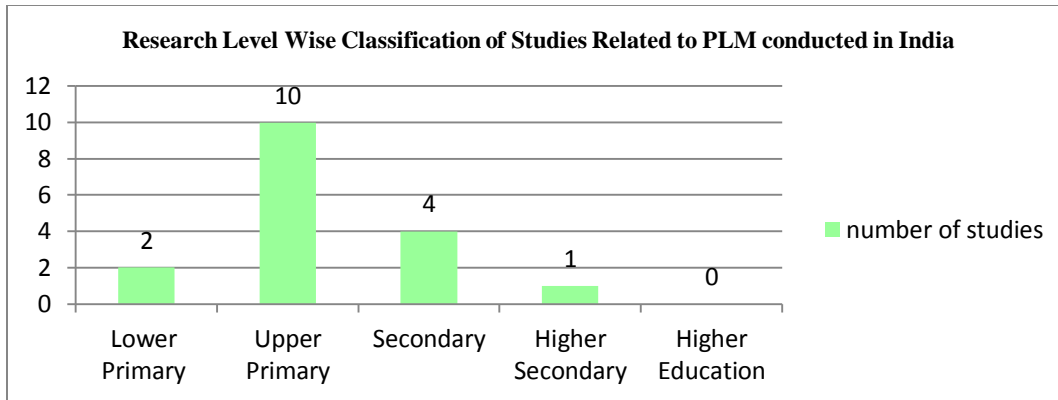


Figure 2.17 Research Level Wise Classification of Studies Related to PLM Conducted in India

In the research level wise classification of the studies conducted in the field of PLM (ref table 2.22) it can be seen that there were two studies related to lower primary level and ten related to upper primary level, four related to secondary level and one related to higher secondary. More studies were conducted in the upper primary level.

Table 2.23 Research Level Wise Classification of the Indian Studies Related to CAI

S.No	Level of the Study	Number of Studies Conducted	Percentage
1	Lower Primary	3	13.04%
2	Upper Primary	5	21.74%
3	Secondary	7	30.43%
4	Higher Secondary	6	26.09%
5	Higher Education	2	8.70%

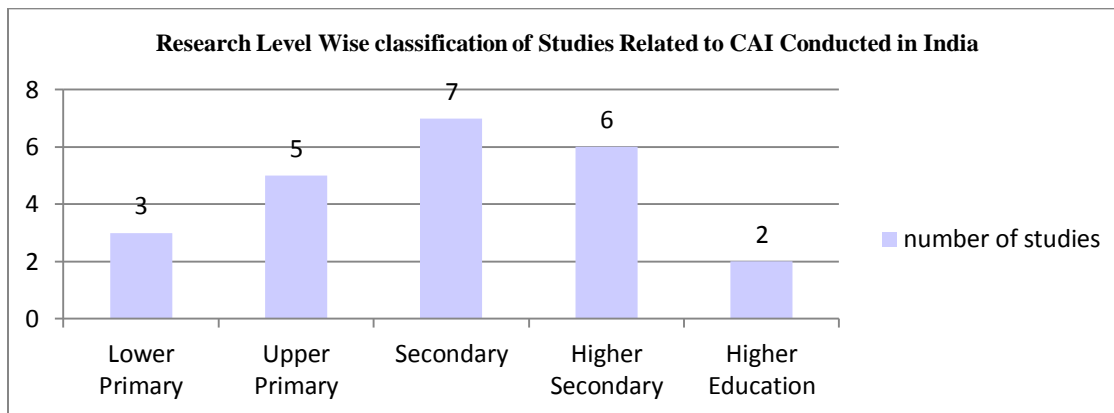


Figure 2.18 Research Level Wise Classification of India Studies Related to CAI

In the research level wise classification of the studies conducted in India in the field of CAI (ref table 2.23) it can be seen that there were three studies related to lower primary level, five related

upper primary level, seven related to secondary, six related to higher secondary and two related to higher education. It can be seen that more studies were conducted in secondary level.

Table 2.24 Research Level Wise Classification of the Abroad Studies Related to CAI

S.No	Level of the Study	Number of Studies Conducted	Percentage
1	Lower Primary	9	50%
2	Upper Primary	1	5.55%
3	Secondary	3	16.67%
4	Higher Secondary	1	5.55%
5	Higher Education	3	16.67%
6	Out of School-Age 7 to 19 years	1	5.55%

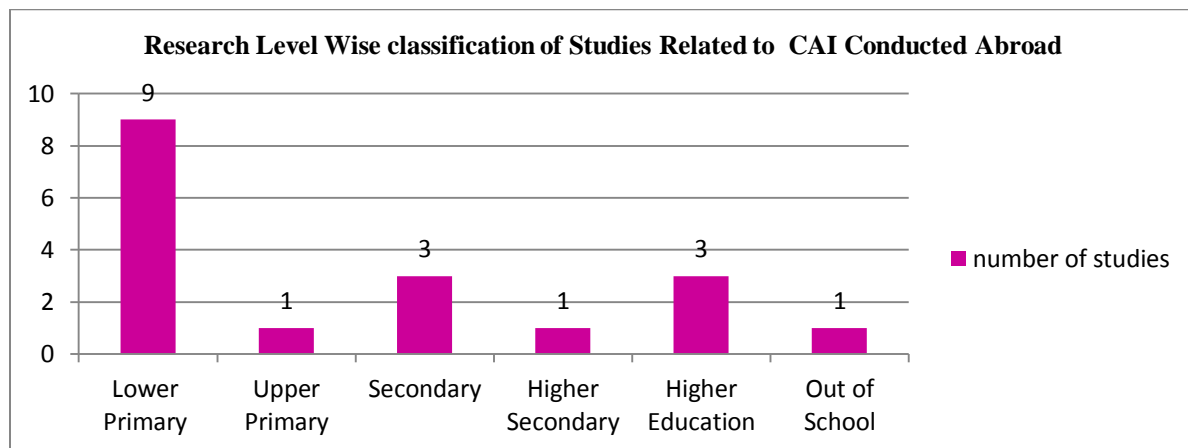


Figure 2.19 Research Level Wise Classification of Abroad Studies Related to CAI

In the research level wise classification of the studies conducted abroad in the field of CAI (ref table 2.24) it can be seen that there were nine studies related to lower primary level. One study related to Upper primary level, three related to secondary level, one related to higher secondary level, three related to higher education and one study related to out of school for the age group 7 to 19 years. We can see that more studies were conducted in lower primary level.

2.11.7 Research Finding Wise Classification of Reviewed Studies

Table 2.25 Classification of Indian studies related to PLM according to findings

S.No	Investigator	Class/subject	Findings
1	Kulkarni and Yadav - 1966	VI-Math	No Significant difference was observed
2	Sharma -1966	IX-Math	Significant difference was observed
3	Shah -1969	VIII-Math	Significant difference was observed
4	Patel-1975	IX-Math	Significant difference was observed
5	Patel-1977	VIII-Math	Significant difference was observed
6	Seshadri-1980	IX-Math	Significant difference was observed
7	Pandey-1980	IV-Math	Significant difference was observed
8	Trivedi-1980	V,VI and VII-Math	Significant difference was observed
9	Inamdar -1981	VII-Math	Significant difference was observed
10	Shah -1981	V-Math	Significant difference was observed
11	Suthar-1981	VIII-Math	Significant difference was observed
12	Davies-1982	IX-Math	Significant difference was observed
13	Rao-1983	V and X-Math	Significant difference was observed
14	Bhatia-1992	V-Math	Significant difference was observed
15	Thatte-1998	V and VII-science	Significant difference was observed
16	Tare-2001	Secondary-Chemistry	Significant difference was observed
17	Ramani and Patadia-2012	XI-Math	Significant difference was observed

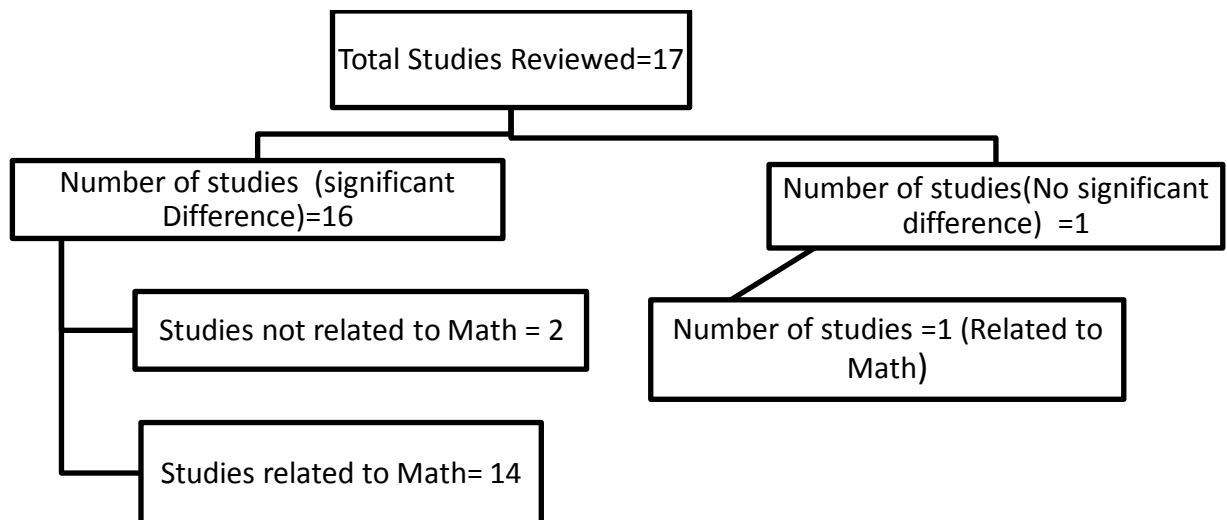


Figure 2.20 Classification of Studies Related to PLM Conducted in India according to Findings

Out of seventeen studies reviewed related to PLM, in sixteen studies there was significant difference between PLM and traditional method. Out of fifteen studies related to mathematics, in fourteen studies there was significant difference between PLM and traditional method. Therefore, it can be concluded that PLM is one of the best method to teach mathematics to students.

Table 2.26 Classification of studies related to CAI conducted in India according to findings

S.No	Investigator	Class/subject	Findings
1	Nagar(1988)	Survey	Significant difference was observed
2	Jeyamani (1991)	XI-Physics	Significant difference was observed
3	Singh, Ahluwalia, and Verma (1991)	IX-Math	Significant difference was observed
4	Rose Antony Stella, V. (1992)	IX-Math	Significant difference was observed
5	Singh (1992)	IX-Math	Significant difference was observed
6	Adhikari (1992)	IX-Biology	Significant difference was observed
7	Das (1998)	II- English	Significant difference was observed
8	Khirwadkar (1998)	XI- Chemistry	Significant difference was observed
9	Zyoud (1999)	VIII-English	Significant difference was observed
10	Yadav (2000)	I-English	Significant difference was observed
11	Dalwadi (2001)	IX-Science	Significant difference was observed
12	Patel (2001)	VIII-Science	Significant difference was observed
13	Sharma (2003)	XI-Chemistry	Significant difference was observed
14	Vasanthi and Hema (2003)	B.E. Chemistry	Significant difference was observed
15	Helaiya (2004)	B.Ed., Statistics	Significant difference was observed
16	Ruttanathummatee (2004)	Prathom-3and 6 Thai and English Language	Significant difference was observed
17	Barot (2005)	VIII- Sanskrit	Significant difference was observed
18	Pardeshi (2005)	IX- Math	No Significant difference was observed
19	Parikh (2006)	XI-Commerce	Significant difference was observed
20	Thakkar (2006)	XI-Commerce	Significant difference was observed
21	Rathwa (2007)	VII-Gujarati	Significant difference was observed
22	Patel (2008)	XI- Physics	Significant difference was observed
23	Patel (2009)	VIII-English	Significant difference was observed
24	Vansia (2011)	IX- Math	Significant difference was observed

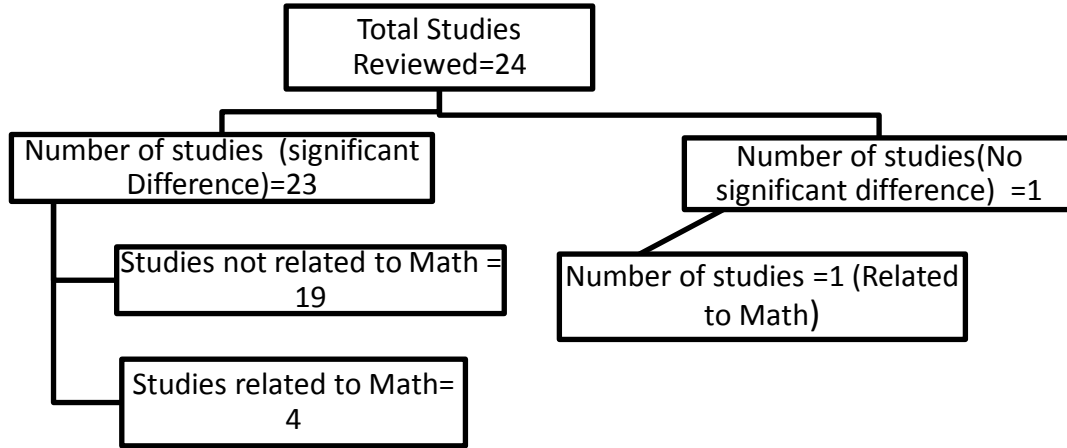


Figure 2.21 Classification of Studies Related to CAI conducted in India according to Findings

Out of twenty-four studies reviewed related to CAI conducted in India(ref table 2.26), in twenty three studies there was significant difference between CAI and traditional method. Out of five studies related to Mathematics in four studies there was significant difference between CAI and traditional method therefore it can be concluded that CAI is one of the best method to teach mathematics to students.

Table 2.27 Classification of studies related to CAI conducted Abroad according to findings

S.No	Investigator	Class/subject	Findings
1	Suwanma (1991)	II-Science	Significant difference was observed
2	Hsu (1994)	Elementary-Language	Significant difference was observed
3	Nimtrakul (1999)	IV- Chemistry	Significant difference was observed
4	Robkob (1999)	XI-Science	Significant difference was observed
5	Vaisopha (1999)	IV-Math	Significant difference was observed
6	Salsbury (2002)	IV- Geography	Significant difference was observed
7	Crews (2003)	IV and V-Language	Significant difference was observed
8	Casanova (2004)	Higher Education-CMS	Significant difference was observed
9	McLaughlin Daniel (2004)	College students-IT	Significant difference was observed
10	Eteokleous, Nikelia (2004)	Elementary	Significant difference was observed
11	Hung (2005)	Undergraduate-Microeconomics	No Significant difference was observed
12	Rosales (2005)	IX- Math	Significant difference was observed
13	Gilbert (2006)	Higher Education-Automatic Technology	Significant difference was observed
14	Beaird (2007)	IV and V- English	No Significant difference was observed

S.No	Investigator	Class/subject	Findings
15	Ford (2007)	Secondary- Biology	Significant difference was observed
16	Galvis (2007)	Higher Education- Biology	Significant difference was observed
17	Karnati (2008)	Out of school children- Basic literacy and Numerical Skills	Significant difference was observed
18	Pilli (2008)	IV- Math	Significant difference was observed
19	Jackson and Dave (2011)	Secondary- Math	Significant difference was observed
20	Bayturan and Kesan(2012)	Higher Education-Math Education	Significant difference was observed

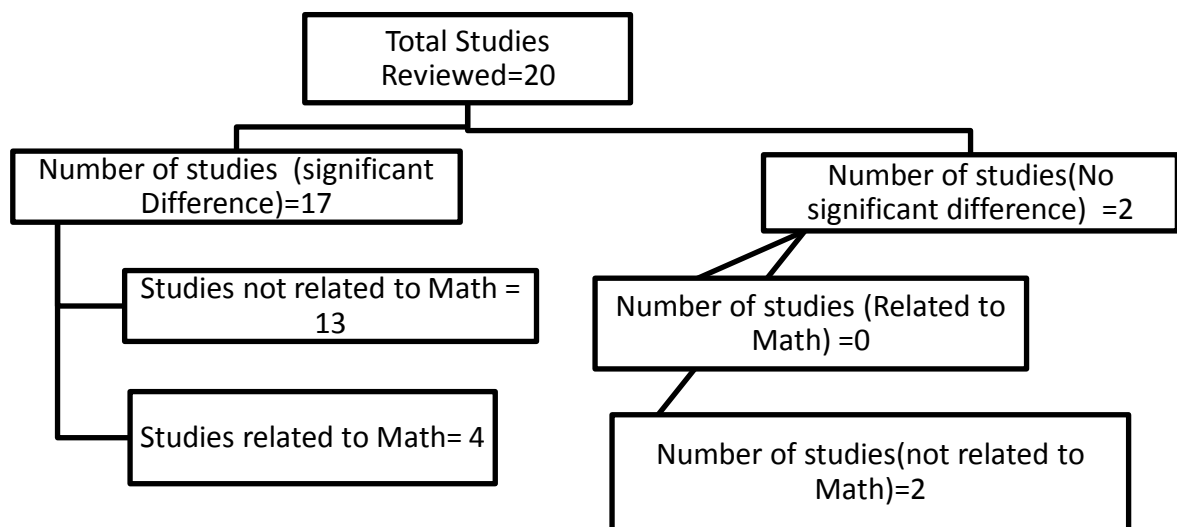


Figure 2.22 Classification of Studies Related to CAI conducted Abroad according to Findings

Out of twenty studies reviewed (ref table 2.27), in seventeen studies significant difference between CAI and traditional method was observed. Out of five studies related to Mathematics, in all studies there was significant difference between CAI and traditional method. Therefore, it can be concluded that CAI is one of the best method to learn mathematics.

2.12 Discussions Based on Reviewed Literature to Locate Research Gaps and its Implications for the Present Study

Class VIII was included in secondary level until academic year 2011 in Gujarat. However, from the academic year 2012, class VIII has been shifted to primary level. Elementary education consists of classes I–VIII, I–IV is primary and V–VIII is upper primary. Irrespective of whether a student continues his/her study after class VIII or dropouts, mathematics as a subject and its application is

very important to him/her in day to day life as well as to face all kinds of challenges in life. According to NCERT 2005, "...We want mathematics education that is affordable to every child, and at the same time, enjoyable. With many children exiting the system after Class VIII, mathematics education at the elementary stage should prepare for the challenges they face further in life." Studies like (Jain & Burad 1988), (Kasat, 1991) found the causes responsible for low results in secondary mathematics and cause of failure in SSC mathematics respectively. They found that non-availability of mathematics teachers due to late appointments and frequent teacher transfers; lack of appropriate classrooms, blackboards and other physical facilities; irregular attendance of students; low standard in the lower classes; non-availability of textbooks; lack of timely correction of homework; overburdened and uninteresting curriculum; lack of child-centered teaching; insufficient periods for teaching mathematics; and lack of suitable teaching aids etc., are cause of low achievements. They have, however, not analysed why these causes affect mathematics learning more than any other subject. They have not suggested steps to enable such students to do better in the examinations. Wagh (1991) conducted a study on multimedia system for remedial purpose and Aguele et al (2012) have conducted a study on use of Educational Technology and effective teaching of mathematics. Yasoda (2009) conducted a study on problems in teaching and learning mathematics. The study reveals that 'commercial mathematics' and 'mensuration' are the most difficult chapters for the students of class VIII and that in addition to these two chapters 'triangles and polygons' and 'circles and concurrent lines of triangles' are most difficult chapters as per the teachers. Students face problems in understanding the mathematical language, symbols and relation between different concepts in mathematics.

Jayasree (1997) and Vasudevan (2003) found certain learning difficulties in mathematics class. Jayasree (1997) found that the level of attainment is poor in the case of classification of open and closed sentences in expanding algebraic expression. The study also revealed that there is no mastery of the rules of signs and many pupils do not seem to have a clear grasp of identities. Vasudevan (2003) found that majority of the students faced difficulty in carrying out the fundamental operations involving negative numbers due to the lack of clarity on rules of fundamental operations. Aguele (2010), Moila (2006) and Anthony and Walshaw (2009) have suggested that enough practice activities should be given to the students for better learning in mathematics. Chel (1990) conducted a study on diagnosis and remediation of underachievement in compulsory mathematics. Researcher diagnosed the learning difficulties in mathematics which are

concept gaps, confusion in understanding mathematical language, *stereotype way of presenting contents* and lack of openness in teaching. The major mistakes found in the performances of students and teacher trainees in the areas include mathematisation of verbal problems, interpretations of mathematical results and *learning new topics in mathematics*. He also found that underachievement was caused due to *lack of understanding* of the mathematical concepts of the *earlier stage*, and the abstract nature of mathematics. Errors are caused due to the versatility and variability of contents and *lack of time*. He also found that student's difficulty to learn mathematics was because of faculty's arrangement of content. The researcher's findings related to remediation's were that the teacher should use reinforces like *readiness, interest, active involvement*, use of *effective materials of instruction* and learning efficiency. This study clearly shows that students find difficult to understand mathematics because of mathematical language and teaching style of teacher. This study clearly shows that teaching is not enough for the students to learn mathematics and there should be some supplement material in addition to traditional teaching. As per Sashidharan (1992) the initial deficiencies of students in mathematics subject have a long-term damaging effect because the content of mathematics is organized in such a manner that learning in each class depends on previous class mathematics content. This study clearly states that higher learning in mathematics depends on students' content mastery in learning previous mathematics classes. If a student is weak in previous class it will be difficult for him to learn mathematics in next class. Therefore, in each class students should learn mathematics thoroughly to understand higher mathematics in the next class because the contents are linked. Class VIII mathematics is bridge between upper primary and secondary mathematics. During this transition from lower level mathematics to higher level mathematics students find it difficult to learn secondary mathematics if they did not learn class VIII mathematics thoroughly. Therefore, learning class VIII mathematics is crucial for students. Based on these studies the investigator found that there are many learning difficulties existing in mathematics class. These difficulties to some extent can be solved by giving enough practice activities to the students as indicated by studies Aguele (2010), Moila (2006) and Anthony and Walshaw (2009). Chel (1990) suggested the use of effective materials in addition to conventional classroom teaching. Learning mathematics should be enjoyable as suggested by NCERT (2005). Investigator has not come across enough studies that provide enough practice activities to the students inside and as well as outside the mathematics classroom. Hence investigator has attempted to develop some practice material to overcome learning difficulties faced by the students in

mathematics. Based on these studies investigator could locate the gap in terms of researches conducted related to material which will give enough practice. This lead the investigator to review sixty-one studies in the field of self-learning material viz. PLM and CAI.

Out of reviewed sixty-one studies fifty-six studies were effective in achieving the respective objectives of the studies for which they were designed. In the remaining five studies there was no significant difference between the experimental group and control group, that is, traditional method of teaching was found to be as effective as teaching through CAI/PLM. Investigator has reviewed a total of seventeen studies related to PLM. Out of seventeen studies fifteen studies related to Mathematics. Out of fifteen there were three studies conducted for class VIII viz one for the topic Algebra, another for the topic geometry and other for the topic set theory. In addition to that there were twelve studies related to classes other than class VIII. Investigator has reviewed a total of twenty-four studies conducted in India related to CAI. Out of twenty-four studies, six of them related to Mathematics and rest seventeen of them are not related to Mathematics. In the said six studies, five studies were conducted for class IX and one for higher secondary. There were no studies related to CAI for class VIII. Investigator has reviewed a total of twenty studies conducted abroad related to CAI. Out of twenty studies, five related to Mathematics. Out of said five studies, two related to class IV mathematics, two for class IX mathematics and one for class XI mathematics. There were no studies related to CAI for class VIII mathematics conducted abroad. In all the reviewed studies viz studies related to PLM, CAI conducted in India and CAI conducted abroad, there was no study related to topics of arithmetic especially at upper primary level, which is very crucial for students learning algebra in higher classes as well as for dropouts.

During 1960's (Kulkarni and Yadav (1966), Shah (1969) and Sharma (1966)) researches concentrated on comparative studies of PLM and conventional learning and found that PLM was effective. During 1970's (Patel (1975) and Patel (1977)) researches started taking different variables such as different learning abilities, rural and urban, high income and low income group. During 1980's (Seshadri (1980), Pandey (1980), Trivedi (1980), Inamdar (1981), Shah (1981), Suthar (1981), Davies (1982) and Rao (1983)) researches were related to Psychological Characteristics, Different modes of Paring, Sex Variation, Study Habits, and Entry Behaviour of the learner and 'comparison between linear and branching style' were studied by researchers. From 1990's most of the studies were related to CAI. Some studies related to PLM (Bhatia (1992), Thatte (1998) and Tare (2001)) were conducted, these studies are related to PLM as a remedial teaching, relative

effectiveness of PLM and Audio Visual Aids, 'Diagnostic and remedial tools' were studied by the researchers. But most of these studies were conducted at M.Ed level. During 2000 (Barot (2005) and Pardeshi (2005)) the researchers used different programming languages like BASICA, Flash MX, and Corel Draw 11 for the construction of CAI.

In the year wise classification of the studies related to PLM conducted in India, reviewed by the investigator, it was found that there were three studies during 1960-1970, five studies during 1971-1980, five studies during 1981-1990, two studies during 1991-2000 and two studies during 2001-2010. Hence a decreasing trend in PLM related studies can be observed over the years. In the year wise classification of the studies related to CAI conducted in India, reviewed by the investigator. It was found that there was one study during 1981-1990, nine studies during 1991-2000, thirteen studies during 2001-2010 and one study during the year 2011. In the year wise classification of the studies related to CAI conducted abroad, reviewed by the investigator, it was found that there were five studies during 1991-2000, there were thirteen studies during 2001-2010 and there were two studies during the year 2011-12.

In the research study wise classification of the reviewed studies related to PLM it was found that all the seventeen studies were of 'Experimental' type. In the research design wise classification of the studies related to PLM it was found that there were five studies related to 'Pre-test Post-test Control Group design', two studies related to 'Post-test Only Control Group design' and in ten studies research design were unknown. In data analysis wise classification of the studies related to PLM it was found that there were seven studies related to 't test', two studies related to 'correlated t test', one study related to ANOVA, one study related to ANCOVA and in six studies data analysis was unknown. In research study wise classification of the reviewed studies of CAI conducted in India it was found that twenty-three were of 'Experimental' type, one was of 'Survey' type and there was no study related to 'CASE' study. In the Sampling Method Wise classification of studies related to CAI conducted in the India it was found that there were four studies using 'Simple Random Sampling', four using 'Stratified Sampling', three using 'Randomised Block Sampling', two using 'multistage Sampling', five using 'Purposive Sampling' and in six studies sampling method was not found. In research design wise classification of the studies related to CAI conducted in India it was found that there were ten studies related to 'Pretest-Posttest Control Group design', four related to 'Post-test only Control group design', two related to 'One group Pretest-Posttest design' and in eight studies research design were not known. In data analysis wise classification of

the studies related to CAI conducted in India it was found that there were thirteen studies related to 't test', six studies related to 'correlated t test', four studies related to ANOVA and two studies were related to ANCOVA. In research study wise classification of the studies related to CAI conducted abroad it was found that there were fifteen studies related to 'True Experimental', two studies related to 'Quasi Experimental', two studies related to 'Survey' and one study was related to 'CASE study'. In the research method wise classification of the CAI studies conducted abroad it was found that there were three studies related to 'simple random sampling', one related to 'stratified sampling', one related to 'quota sampling', eight related to 'purposive sampling' and in seven studies research method were unknown. In data analysis wise classification of the CAI studies conducted abroad it was found that there were three studies related to 't test', seven studies related to 'correlated t test', one study related to 'ANOVA', three studies related to 'ANCOVA', two related to 'Item wise objective', one related to 'content analysis', and three related to 'semi structured interview'. In the research level wise classification of studies it was found that there were only ten studies related to PLM for upper primary level out of seventeen studies reviewed related to PLM, only five studies related to CAI conducted in India for upper primary level out of twenty three studies reviewed related to CAI conducted in India and only one study related to CAI conducted abroad for upper primary level out of eighteen studies reviewed related to CAI conducted abroad. Totally there were only sixteen studies related to upper primary level out of fifty-eight studies reviewed. The above analysis clearly shows that only few studies were conducted for upper primary level in comparison with other levels. There were only six studies related to post-test only control group design in a total of twenty studies reviewed by the investigator, only in three studies ANOVA was used for data analysis in a total of twenty-three studies and in only two studies Chi Square was used for data analysis in a total of twenty-three studies reviewed by the investigator. In t test and correlated t test only two groups were considered viz. experimental group and control group but in ANOVA more than two groups were considered. ANOVA is one of the most powerful statistical techniques for data analysis because it considers variance between the groups and within the groups. **(Eck)** A chi square (X^2) statistic is used to investigate whether distributions of categorical variables differ from one another. In pre-test post-test design it is difficult to eliminate carryover effect which affects internal validity of the experiment this effect is to a great extent is eliminated by using post-test only control group design. The research design used in present study was post-test only control group design, data analysis used was ANOVA and Chi Square.

Of the fifteen studies reviewed related to PLM in Mathematics, fourteen studies found significant difference between PLM and traditional method and in one study there was no significant difference between PLM and traditional method. The two studies reviewed related to PLM other than mathematics found significant difference between PLM and traditional method. Out of twenty-four studies (five related to mathematics) reviewed related to CAI conducted in India, in twenty-three (four related to mathematics) studies there was significant difference between CAI and traditional method and in one study (one related to mathematics) there was no significant difference between CAI and traditional method. Out of twenty studies (five studies related to mathematics) related to CAI conducted abroad in seventeen studies (four studies related to mathematics) there was significant difference between CAI and traditional method and in rest three studies (one study related to mathematics) there was no significant difference between CAI and traditional method. In the reviewed studies investigator found few studies related to upper primary level especially in mathematics as stated above, there was no study related to arithmetic part of mathematics at this level. Investigator found a research gap and there was dire need to conduct a study related to arithmetic part of mathematics at the upper primary level. Therefore investigator is interested in conducting a study related to upper primary level in arithmetic part. Investigator is also interested to know whether there is significant difference between the mean achievement score of experimental group and control group because in three studies it was found that there was no significant difference found between mean achievement score of experimental group and control group.

Investigator felt a need of research related to upper primary level which is the crucial stage of mathematics development and this is the stage we can see more dropouts (Sarva Shiksha Abhiyan, 2012) in India (dropout rate is 1.79 in 2010-primary census abstract 2001) and ultimately leads to the end of learning mathematics. There was no study to compare the achievement of students by CAI, CAI with simultaneous discussion and conventional method. Considering that arithmetic is one of the important topics in mathematics, investigator has proceeded as a step in that direction to study the effectiveness of CAI with different modes.

CHAPTER III - PLAN AND PROCEDURE OF THE STUDY

3.01 Introduction

This chapter is the backbone of this thesis as it gives outline of the research design. (Singh, 1982) The research design is the detailed plan of the investigation. In fact, it is the blueprint of the detailed procedures of testing the hypotheses and analyzing the obtained data. Also it is well known fact that prior to start of any research there should be clarity about the plan and the procedure of the study. This is because the researcher will be mentally prepared about the steps to be adopted while carrying out the actual research, time can be management and to overcome the hurdle during the implementation. Methodology decides the nature, plan and procedure of the study. As such it is regarded as the main body of the research. It is desirable to have a proper methodology to design the research plan prior to data collection. In the present chapter, the aspects of the methodology like population, sample, and procedure for development of CAI, construction of tools, data collection techniques and procedure of data analysis have been discussed along with the objectives and hypothesis of the study.

3.02 Plan of the Study

The study used experimental design and Post-test-only control group design was employed for the present study.

The study was conducted in the following phases.

Phase –I: Selection of Sample for the study

The investigator went through the standard VIII mathematics textbook of English Medium, which is prescribed by GSHSEB and she took arithmetic unit (profit and loss, simple interest and compound interest) from the standard VIII mathematics textbook for preparing CAI. She visited schools and requested the principal for granting the permission to conduct the experiment. Two schools (school 1 and school 2) granted permission and also had computer facility therefore these schools were selected for the present study. Investigator observed different division of VIII standard mathematics class of the selected school 1 to know the mathematical ability, grasping level, potential, level of understanding and other relevant learning behaviour of students in mathematics class.

Phase –II: Development of the CAI

As mentioned in phase I based on the observation of school 1 the investigator had enough data to develop CAI. CAI was developed based on the needs of the students, content, keeping in mind mathematical ability and other relevant learning behaviours by the investigator. Actual development of CAI is explained in the next paragraph. It was shown to the experts in the field of Mathematics Education, Technology, English and Mathematics. The experts were informed about the observation regarding level of the students and their mathematical ability. The investigator incorporated the suggestions given by the experts and finalized the developed CAI.

For developing CAI, investigator had taken the arithmetic unit from VIII standard mathematics textbook of GSHSEB English version published in the year 2004, which was followed during the year 2010. Arithmetic unit has the following topics Profit and Loss, Simple Interest and Compound Interest. Keeping in mind the following instructional objectives the CAI was developed.

Instructional Objectives

Instructional Objectives in Taxonomic Categories

1. Students will be able to compare marks by calculating percentage.
2. Students will be able to calculate profit/loss when cost price and selling price is given.
3. Students will be able to calculate profit%/loss% when cost price and selling price is given.
4. Students will be able to calculate selling price when cost price and profit/loss is given.
5. Students will be able to calculate selling price when cost price and profit/loss% is given.
6. Students will be able to calculate purchase price when selling price and profit/loss% is given.
7. Students will be able to identify important instructions on the picking of medicine.
8. Students will be able to calculate percentage of profit during transaction between manufacturer, wholesale dealer and retailer.
9. Students will be able to calculate percentage of profit in the problems involving commission on printed price.
10. Students will be able to calculate percentage of profit and sales price in problems involving commission.
11. Students will be able to calculate percentage of profit when printed price, discount is given.
12. Students will be able to calculate percentage of profit when discount percentage and decided profit percentage on the purchase price is given.

13. Students will be able to calculate combined profit/loss when more than one thing with different sales are involved.
14. Students will be able to calculate interest and amount when principal, rate and time is given.
15. Students will be able to calculate interest and amount when principal, rate in decimal and number of years in decimal is given.
16. Students will be able to calculate interest and amount when principal, rate and number of months is given.
17. Students will be able to calculate interest and amount when principal, rate in decimal and dates are given.
18. Students will be able to calculate principal, when interest, rate and time is given.
19. Students will be able to calculate rate, when interest, principal and time is given.
20. Students will be able to calculate time, when interest, principal and rate is given.
21. Students will be able to calculate compound interest and amount when principal; rate and time are given without using the formula.
22. Students will be able to calculate compound interest using formula.
23. Students will be able to calculate compounded amount using formula.
24. Students will be able to calculate difference between simple interest and compound interest.
25. Students will be able to calculate compound interest in practical problems.
26. Students will be able to calculate principal if year, rate and compound interest is given.
27. Students will be able to calculate rate if year, principal and compound interest is given.
28. Students will be able to calculate rate of compound interest if amount of maturity, principal and number of years is given.
29. Students will be able to calculate time when amount, rate of compound interest and amount is given.
30. Students will be able to calculate principal when compound interest, number of years, and rate is given.

Phase –III: Development of the Tools

In this phase two tools were need for the study viz. Scholastic Achievement test and Reaction Scale whose description is given below.

1. Scholastic Achievement test (serving the purpose of post-test) was prepared by the investigator on the basis of content analysis (refer appendix). The test was validated by the experts (test paper is attached in the appendix).
2. Reaction Scale was developed by the investigator to study the effectiveness of the developed CAI and given to experts to check for content validity and language used in the reaction scale. They were given objective of the study and clearly stating the purpose of reaction scale. With the help of experts 54 statements were finalized (Reaction Scale is attached in the appendix).

Phase –IV: Implementation of the developed CAI

To study the relative effectiveness of different modes of teaching arithmetic unit comparable three groups viz. group A, group B and group C of standard VIII students were formed from two English medium schools which were selected in phase 1. Group A was the experimental group (only CAI) and group B was another experimental group (CAI with simultaneous discussion) while group C was the control group taught by conventional method by the schoolteacher. Time taken for teaching three groups by different modes was the same.

School 1 was considered for initial try-out while school 2 was considered for final try-out. In both these schools experimental group A learnt the selected arithmetic unit using developed CAI only, while experimental group B learnt with CAI along with simultaneous discussion held with investigator whenever required by the learners. The control group C was taught by schoolteacher in conventional method. In both the try-outs, the time taken by students of experimental group A, experimental group B and control group to learn the arithmetic unit was 30 periods each. The initial try-out in school 1 was conducted during the period from 1st December 2010 to 31st December 2010 whereas the final try-out was conducted during the period from 17th January to 4th February.

Initial Try out

Investigator collected VII standard mathematics scores of the students from school 1 and three matched groups were formed randomly according to comparable mean and standard deviation of their mathematics achievement, during this process different sections (section A, B and C) of the school were not disturbed. Groups A, B and C were randomly selected by using lottery method for experimental purpose. Section C of school 1 was selected as control group, which was taught by conventional method by schoolteacher. Section B of school 1 was selected as experimental group which learnt through only CAI and named as group A for the study purpose. Section A of school 1

was selected as experimental group, which learnt through CAI with simultaneous discussion and named as group B for the purpose of the study. After completion of CAI on profit and loss, simple interest and compound interest, they were tested by scholastic achievement test prepared by the investigator during phase III.

CAI was further modified according to the suggestions given by the students and observation by the investigator. Modified CAI was used for final try-out.

Final Try out

Three matched groups were formed randomly from VIII standard school 2 students according to comparable mean and standard deviation of their mathematics achievement test prepared by the investigator, during this process different sections (section A, B and C) of the school were not disturbed. Groups A, B and C were randomly selected by using lottery method for experimental purpose. Section B of school 2 was selected as control group which was taught by conventional method by schoolteacher. Section A of school 2 was selected as experimental group which learnt through only CAI and named as group A for the study purpose. Section C of school 2 was selected as experimental group which learnt through CAI with simultaneous discussion and named as group B for the purpose of the study. After completion of CAI on profit and loss, simple interest and compound interest, they were tested by scholastic achievement test prepared by the investigator during phase III.

Phase- V: To Study the Effectiveness of the Developed CAI

The investigator administered the achievement test developed in phase III after completion of arithmetic unit on group A, group B and group C students whereas reaction was administered on group A and group B. The scholastic achievement of students of all the three groups were analysed using ANOVA and responses of the students to the reaction scale were analysed using chi-square test to judge the effectiveness of the developed CAI.

3.03 Methodology

True experimental research design was followed in the present study. Details of methodology like, design of the study, population, sample, data collection and data analysis are discussed here as follows.

3.3.1 Design of the Study

True experimental design was followed in this present study. The design was post-test-only control group design.

According to (Tuckman, 1972) the post-test-only control group design is the potentially most useful true design. It can be diagrammed as shown below

R	X	O1
R		O2

This design utilizes two groups, one of which experiences the treatment while the other does not, thus controlling for history and maturation. The appropriate analysis for dealing with data from the post-test-only control group design would be a comparison between the mean for O1 and the mean for O2.

R- The letter R indicates that factor, (for example, selection) have been controlled by using randomization. Etc.,

X-To designate a treatment

O-To designate an observation or measurement

Blank Space- indicates no treatment.

According to (Koul, 2008) two groups, Randomized Subjects, Post-test only control group Design is described as follows

Table 3.1: Post Test Only Control Group Design

Randomly assigned group	Independent variable	Post-test
Experimental	Teaching through CAI	O1
Control	Teaching through conventional method	O2

Advantages

1. The main advantage of this design is randomization, which assures statistical equivalence of the groups prior to the introduction of the experimental treatment.
2. Since no pre-test is used, this design controls for the main effects of history, maturation, and pre-testing. Moreover, there can be no interaction effect of pre-test and independent or experimental variable.

3.3.2 Population of the Study

The population of the study consisted of standard VIII students of English medium schools of Vadodara City following the syllabus of GSHSEB in the year 2010.

3.3.3 Sample of the Study

VIII Standard students of two English medium schools of Vadodara, following GSHSEB Syllabus were selected purposively who formed the sample of the study.

In order to select the schools for sample, the investigator approached different English Medium Schools of Baroda, explaining and requesting the school authorities to grant permission for conducting study. In this case after approaching few schools, the investigator got permission from School 1 and School 2 having the required computer facility. Thus the selection of the schools for this study was done purposively considering the availability of computer facility and willingness of school to conduct the study.

3.3.4 Procedure for Data Collection

The present study has two major aspects, one was the development of CAI and another was to study the effectiveness of the developed CAI. The procedure for the development of CAI has been described earlier. To study the effectiveness of the developed CAI, a scholastic achievement test (developed in phase III) serving the purpose of posttest was administered at the end of the program to all the groups and reaction scale (developed in phase III) was administered to the experimental groups. Investigator corrected the test paper and got the score of individual students.

3.3.5 Data Analysis

Collected data were analyzed through appropriate statistical techniques. To study the effectiveness of the developed CAI, ANOVA was computed. Reaction Scale was analyzed using Chi Square test. A detailed analysis is discussed in the next chapter.

3.04 Details of Developed CAI

CAI has different slides (detailed description is given below). The slides are developed considering the instructional objectives in above-mentioned taxonomic order. Care is taken to arrange the slides in the increasing order of difficulties. Each slide contains a part of the content. This content was followed by a question, students are supposed to answer this question and they can refer to the answer that immediately follows. Sometimes explanation and examples are given before giving actual questions, so students can understand the subject better and they can learn without difficulty. Attempts were made to simplify and enrich the contents wherever possible. It included drilling/

practice exercise wherever necessary. This sequence of content followed by question and answer is called stimulus-response. Investigator discussed with small group (5 to 7) of VIII standard students near her house who belong to different schools about examples that can be included in CAI and got their ideas. After completion of CAI she asked them to see to check whether the language used and explanation is of their level and whether they can follow without any difficulty. Their comments and their suggestions were properly included in CAI. This was only pilot study. She also checked with her son who was in standard IX and his suggestions were also properly taken care of. All his friends (standard VIII students) suggested including video along with the slide so investigator included video also in CAI. In this manner she checked the language used, sequencing, level of understanding matching with standard VIII students. The completely developed CAI is given in CD along with this thesis.

In the similar pattern the entire topic is developed into 56 frames. After each subtopic is completed there is revision exercise, followed by ‘test yourself’ and ‘answer key’. After completion of the entire sub topic criterion test is provided, this includes all the subtopics followed by answer key. This CAI was shown to two subject experts in the field of mathematics for validating in terms of the content of the subject and clarity of the language used in the material. Finally suggestions given by the experts were incorporated.

Power point presentation (ppt) named “All in one ppt” has 5 slides- one can go to all topics from any one of these last four slides by simply double clicking the required topic.

- ✚ Slide 1 with title “ALL IN ONE” and name of the investigator and Guide.
- ✚ From Slide 2 one can choose topics viz. introduction, Chapter 5 or Chapter 6.
 - ❖ Introduction has two subtopics viz. Percentage (Basic Concept) and Application of Percentage.
 - Percentage (Basic Concept) has fifteen slides. This ppt is prepared on basis of previous knowledge of the students which they studied in VII standard. Percentage is useful in learning the three topics selected for the study. Animation used in this slide is taken from Google.
 - Application of Percentage contains six slides. Some examples related to percentage are given. This will develop student’s interest to learn percentage and the related topics. Animation used in this slide is taken from Google.

- ❖ Chapter 5 has two subtopics viz. Basic Concept of Profit and Loss and Profit and Loss.
 - Basic Concept of Profit and loss contains twenty slides. This deals with the concept that they learnt in VII standard. This helps the students to quickly revise the syllabus which they learnt in VII standard. Animation used in this slide is taken from Google.
 - Profit and Loss contains 60 slides this deals with the present topic of VIII standard. Some of the slides are taken from the website http://www.powershow.com/view/1564fa-ZmU3Z/BOMBAY_CAMBRIDG_GURUKUL_powerpoint_ppt_presentation This contains subtopic; explanation of each subtopic followed by questions and immediate answer, student can evaluate their learning by themselves. There are some breaks in between to refresh their mind. From 10th slide on can go to more problems and answers for more practice and as recapitulation. In the end there are MCQ's student can solve and then they can check their answer by clicking the answer they choose. If the answer is correct then slide showing laughing face saying **CORRECT** will appear as reinforcement. If the answer is wrong, then **SORRY** slide will appear with back ground sound. Students can click **solution** to know the correct solution. There are more than 20 questions. From End slide one can go more problems.
- ❖ Chapter 6 had three subtopics viz. Simple Interest, Introduction to Compound Interest and Compound Interest.
 - Simple Interest contains 37 slides, first few slides with introduction of the topic. Some of these slides are taken from the web site www.swtc.edu:8082/.../Ch%208%20Simple%20Interest%20Section%..., mathscienceeducator.weebly.com/uploads/1/2/5/.../simple_interest.pp... highered.mcgraw-hill.com/sites/dl/free/0073377538/.../Chap010.ppt .
 - From slide 24 one can go to 'word documents' for more practice.
 - To the ppt called **more problems in Simple Interest**.

In the end there are MCQ's student can solve and then they can check their answer by clicking the answer they choose. If the answer is correct then slide

showing laughing face saying **CORRECT** will appear as reinforcement. If the answer is wrong, then **SORRY** slide will appear with back ground sound. Students can click **solution** to know the correct solution. There are more than 10 questions. From End slide one can go to reference URLs for more understanding of the topic.

- Introduction to Compound interest contains 17 slides. Some slides are taken from the website www.cod.edu/.../Math%201100%20-%20Chapter%2013-15.ppt. Compound Interest is introduced through some basic examples and with explanations. From this explanation students can understand about the basic concepts of compound interest and difference between simple interest and compound interest.
- Compound Interest contains 72 slides starting with the introduction of the concept, derivation of compound interest formula, comparison with simple interest, calculation of compound interest without formula and introduction to the formula. More than 15 related questions with break in between are given. In the end there are MCQ's. Students can solve these questions and then they can check their answer by clicking the answer they choose. If the answer is correct then slide showing laughing face saying **CORRECT** will appear as reinforcement. If the answer is wrong then **SORRY** slide will appear with back ground sound. Students can click **solution** to know the correct solution. From End slide one can go to reference URLs for in-depth understanding of the topic.

✚ Slide 3 has connection to the topics viz. URL's You can surf the following site's to get more information, Revision before Examination, Watch Video, Take Sample Test and Take Test.

- ❖ There are Video's related to the topics students can watch and understand the topic in depth and this different mode of presentation of the same topic will increase the interest among them and they can learn with very little stress, in fact they can enjoy and learn. These videos are downloaded from internet.
- ❖ There are tests students can take them before actual test, they can get immediate feedback from them, and they can decide whether they need some more preparation or not and how well they are prepared for the topic.

- ✚ Slide 4 has topics viz percentage (basic concepts), Application of percentage, Basic concept of profit and loss, Profit and loss, Simple interest, Introduction to compound interest and Compound interest.
- ✚ Slide 5 has the following topics viz. URL's, You can surf the following site's to get more information, Revision before Examination, Watch Video, Take Sample Test and Take Test.

3.05 Actual Implementation of CAI

For the implementation of the CAI the investigator had taken the necessary permission from the School 1 and School 2 for initial and final try outs from the respective principals to carry out the experiment. Investigator requested the mathematics teachers for not to cover the syllabus before the experiment starts and actual procedure was discussed with them. A brief introduction about CAI was given to the mathematics teachers of the respective schools.

For initial try out two experimental groups and one control group were selected as discussed earlier. They were taught for one month for one period per day. Investigator went to the school in advance before starting the programme to install the CAI in all computers through the server. Investigator personally checked all computers whether they are in proper condition so that no disturbance will be there during the actual experimentation period. She also checked all computers whether CAI is working or not and also inserted password so that nobody can open it other than the investigator.

Investigator explained the students about the experiment and requested their cooperation throughout her study. She also explained the importance of the study and also requested them not to share notes etc with other groups. Investigator discussed with the mathematics teacher about every day program and divided the everyday program (the portion to be covered), so that both the group students learn the same portion every day. In order to assure experimental mortality investigator requested the whole class to be present till the program is completed and explained the importance of their presence and how it would be useful for the study. Attendance was taken every day and reported to the respective teacher.

Investigator discussed with the students, explained them how to use CAI and cleared their doubts. Proper instructions were given to the students to go through the slide in a systematic manner. Students are allowed to skip any slide if they understood or to go back to the same slide so that fast learner can learn fast and slow learner can learn in their own speed. Pace of learning for

different students were different. There were few naughty students who played with the slide and were doing something else when not monitored. They were scolded at some times for their act. Many students liked the way of presentation and they gave their valid suggestion for further improvement and they liked when investigator gave her email id for online discussion. They also suggested that investigator should develop CAI for some difficult topics which they really find it difficult in actual classroom situation. They also told that this mode of presentation they liked and asked investigator to be their teacher. Most of the students are of the opinion that they need teacher along with the presentation for better understanding. They also suggested that some stories, dramas etc should be included to make the presentation livelier. They wrote some dialog to be included in CAI. It was quite interesting experience for the investigator and she really liked it.

Tests were taken after completion of each topic and results were discussed with the students and necessary feedbacks were given to monitor their progress. After completion of profit and loss, simple interest and compound interest, they were tested by scholastic achievement test prepared by the investigator on the basis of content analysis. Again test results were discussed with the students and results were given to the respective teachers. Mathematics teacher liked the presentation and she also needed the presentation to show it to control group students after experiment was completely over. A copy of presentation was given to the students for further reference.

Same procedure was adopted for final Try-out. School had enough computers and all computers were in working condition throughout the study. There were separate computers for each student. Before starting the experiment many students had doubt whether they can learn by themselves using CAI. Even mathematics teacher also had the same doubt. Investigator explained how she prepared the CAI and all the Psychological theories adopted like principle of small steps, with learners pace etc. She also said that it was effective in initial Try-out and how students happily responded to CAI. Every day at 8.00 a.m. investigator started the class for one group of students. Other section students went for prayer. Next class entered in Zero period and previous batch of students had PT during that time, simultaneously control group students had mathematics period. In this manner the whole programme was arranged without any confusion. Students responded positively during the programme. They also found few calculation mistakes, investigator corrected those mistakes immediately. All students enthusiastically participated in the whole study but they liked to discuss in small groups, very few students went through the slide individually. They liked to go through the slides in groups rather than individually. They were discouraged to discuss in groups

and individual learning was encouraged. During those time investigator explained the importance of the study and also explained that she wanted to know whether students can learn individually without others help. She also explained that this is an auto instructional material and students are supposed to learn by themselves. In total they enjoyed the whole programme and cooperated with the investigator. Investigator enjoyed the whole experience because firstly students liked CAI and secondly a sense of self satisfaction and achievement was felt by her because the whole programme was developed by her. All students expressed their feelings about the developed CAI they said that they sometimes don't like the monotonous learning in conventional method and sometimes they are forced to learn when they really don't want to. In this method they can learn whenever they like to learn, whenever their mind is receptive and with their own speed, unlike conventional classroom where teacher teaches in same speed to different kinds of learner. They wanted to interact with the teacher along with the slides whenever they are facing with the difficulty. Investigator felt that there should be video conferencing along with this method so that they can interact on line whenever necessary. CAI can act as a support but cannot replace the presence of teacher whether physical presence or virtual presence of a teacher is essential.

Investigator gave tests after completion of each topic and also discussed the results with the students for feedback purpose, so that students can judge themselves about their learning and also can improve or redo the same topic. They were taught for thirty period for each group. After completion of profit and loss, simple interest and compound interest, they were tested by scholastic achievement test prepared by the investigator. Investigator also discussed with the students about their result and result was submitted to the respective teacher. After completion of the programme CAI was shown to the control group students they also enjoyed CAI. Students said that they wanted soft copy of CAI investigator allowed them to take in their pen drives.

3.06 An Overview

This entire chapter provides a clear direction to the investigator about the plans and procedures followed during the experimentation. It has dealt with details of methodology and lastly for setting the steps for and interpretation of the data. Such an analysis will lead to conclusion, which is the essence of the work. The detailed analysis and interpretation of result is discussed in the following chapter.

CHAPTER IV- DATA ANALYSIS AND INTERPRETATION OF DATA

4.01 Introduction

Data analysis is defined as, “Processing the information or data that has been gathered in order to draw conclusion.” It is the process of systematically applying statistical and logical techniques to describe. Summarize and compare data. Data interpretation is results, trends etc., shown by collected data.

It is very important for a researcher to properly analyze and interpret the data which would lead the investigator to achieve the objectives which were intended to start particular work.

In the previous chapter a complete account of the approach to collect the required data for the present study was presented. The present chapter is devoted to the analysis and interpretation of the collected data according to the objectives and the hypothesis of the present study formulated in the chapter I.

The major objectives of the present study as described in the first chapter are the development of CAI and studying its effectiveness in terms of students test scores in the achievement test and their personal response about the developed CAI in the reaction scale.

To study the effectiveness of CAI, a scholastic achievement test was administered as post-test as the design was post-test only control group design. In the present chapter, collected data has been analysed to test the null hypothesis employing statistical techniques.

4.02 Procedure for Matched Groups for Conducting the Study

Post-test data in initial and final Try-out were analyzed using ANOVA. (Wikipedia, Analysis of variance, 2013) In statistics, **analysis of variance (ANOVA)** is a collection of statistical models, and their associated procedures, in which the observed variance in a particular variable is partitioned into components attributable to different sources of variation. In its simplest form, ANOVA provides a statistical test of whether or not the means of several groups are all equal, and therefore generalizes *t*-test to more than two groups. Doing multiple two-sample *t*-tests would result in an increased chance of committing a type I error. For this reason, ANOVAs are useful in comparing two, three, or more means.

In order to use ANOVA the following conditions or assumptions should be satisfied.

- i. The data are randomly sampled

- ii. The variances of each sample are assumed equal
- iii. The residuals are normally distributed

For condition (i) investigator selected three groups using lottery method (initial and final Try-out). Scores of students are normally distributed for condition (iii). For condition (ii) equivalent groups were formed using mean and standard deviation. Three matched groups were formed (for ANOVA purpose). The groups were matched on the basis of mean and standard deviation.

The following table shows the formation of equivalent groups in initial Try-out, groups were formed using standard seven marks.

Table 4.1 Formation of Equivalent Groups using VII Standard Marks for the purpose of AVONA for Initial Try-out

SEC A: Experimental Group B		SEC B: Experimental Group A		SEC C: Control Group	
1	35	1	35	1	37
2	35	2	35	2	39
3	35	3	35	3	39
4	38	4	35	4	35
5	40	5	40	5	37
6	45	6	40	6	46
7	52	7	52	7	52
8	56	8	59	8	56
9	76	9	77	9	54
10	55	10	51	10	57
11	64	11	69	11	57
12	61	12	78	12	74
13	93	13	79	13	99
Sum	688	Sum	685	Sum	682
Average	52.92	Average	52.69	Average	52.46
SD	18.27321	SD	17.81097	SD	17.96578
Standard Error	5.07	Standard Error	4.94	Standard Error	4.98

The following table shows the formation of equivalent groups in final Try-out, groups were formed using mathematics achievement test prepared by the investigator; obtained marks are converted into equivalent percentage.

Table 4.2: Formation of Equivalent Group using Mathematics Achievement Test Marks for the purpose of AVONA for Final Try-out

SEC A: Experimental Group B		SEC B: Experimental Group A		SEC C: Control Group	
1	60.00	1	60.00	1	60.00
2	66.67	2	66.67	2	66.67
3	66.67	3	66.67	3	66.67
4	66.67	4	66.67	4	66.67
5	66.67	5	66.67	5	66.67
6	73.33	6	80.00	6	73.33
7	80.00	7	80.00	7	80.00
8	86.67	8	86.67	8	80.00
9	86.67	9	86.67	9	86.67
10	86.67	10	86.67	10	86.67
11	86.67	11	86.67	11	86.67
12	86.67	12	86.67	12	86.67
13	93.33	13	93.33	13	93.33
14	93.33	14	93.33	14	93.33
15	93.33	15	93.33	15	93.33
16	93.33	16	93.33	16	93.33
17	93.33	17	93.33	17	93.33
18	93.33	18	93.33	18	93.33
19	100.00	19	100.00	19	100.00
20	100.00	20	100.00	20	100.00
Sum	1673.33	Sum	1680	Sum	1666.67
Average	83.67	Average	84	Average	83.33
SD	12.51432	SD	12.31174	SD	12.52

4.03 Data Collection for the study

Data was collected in the following stages in the initial and final Try-out; the collected data in the form of posttest is below.

The following table shows the Post test score of the students in the initial Try-out in percentage.

Table 4.3: Post-test score of the students (Marks out of 100) in Initial Try-out

Student No.	Control Group	Experimental Group A	Experimental Group B
1	40.00	26.67	93.33
2	46.67	33.33	80.00
3	53.33	33.33	66.67
4	53.33	40.00	73.33
5	60.00	40.00	93.33
6	40.00	40.00	73.33
7	60.00	20.00	60.00
8	33.33	46.67	73.33
9	60.00	20.00	60.00
10	33.33	40.00	46.67
11	40.00	40.00	46.67
12	53.33	46.67	60.00
13	26.67	46.67	80.00

The following table shows the Post test score of the students in the final try out in percentage.

Table 4.4: Post-test score of the students (Marks out of 100) for Final Try-out

Student No.	Control Group	Experimental Group A	Experimental Group B
1	35	40	40
2	86.67	45	53.33
3	66.67	73.33	86.67
4	93.33	80	80
5	66.67	93.33	93.33
6	35	86.67	100
7	45	86.67	100
8	40	86.67	100
9	80	93.33	100
10	33.33	86.67	100
11	86.67	80	100
12	93.33	86.67	86.67
13	45	86.67	100
14	80	50	40
15	86.67	80	73.33
16	93.33	73.33	100
17	40	50	80
18	80	66.67	86.67
19	93.33	66.67	93.33
20	86.67	86.67	100

4.04 Analysis of Data using ANOVA for Initial Try-out

ANOVA was calculated using the online calculator (Kirkman, 1996). The following table shows the Mean, Variance, Standard Deviation and Standard Error of the post test score of the initial try-out.

Table 4.5: Data Summary for Initial Try-out

Samples	Control	Exp A	Exp B	Total
N	13	13	13	39
$\sum X$	599.99	473.34	906.66	1979.99
Mean	46.1531	36.4108	69.7431	50.769
$\sum X^2$	29243.4223	18267.3334	65953.9112	113464.6669
Variance	129.3365	86.055	226.7211	340.5949
SD	11.3726	9.2766	15.0573	18.4552
Standard Error	3.1542	2.5729	4.1761	2.9552

The following table shows the calculation of ANOVA for initial try-out.

Table 4.6: ANOVA Summary for Initial Try-out

Source	SS	df	MS	F	P
Treatment [between groups]	7637.2547	2	3818.6274	23.22	<.0001
Error	3947.1602	24	164.465		
Subjects	1358.1904	12			
Total	12942.6054	38			

From the above table it clear that there is significant difference between the groups at .05 level of significance. But between which groups there is significant difference is not known using the table. In order to know this, investigator further analysed the data using post hoc test, she used Tukey HSD Test for further analysis.

(Abdi & Williams, 2010) When an analysis of variance (ANOVA) gives a significant result, this indicates that at least one group differs from the other groups. Yet, the omnibus test does not inform on the pattern of differences between the means. In order to analyse the pattern of difference between means, the ANOVA is often followed by specific comparisons, and the most commonly used involves comparing two means (the so called “pairwise comparisons”). An easy and frequently used pairwise comparison technique was developed by Tukey under the name of the honestly significant difference (HSD) test.

The following is the graphical representation of the differences between the means from the result of ANOVA for initial try-out.

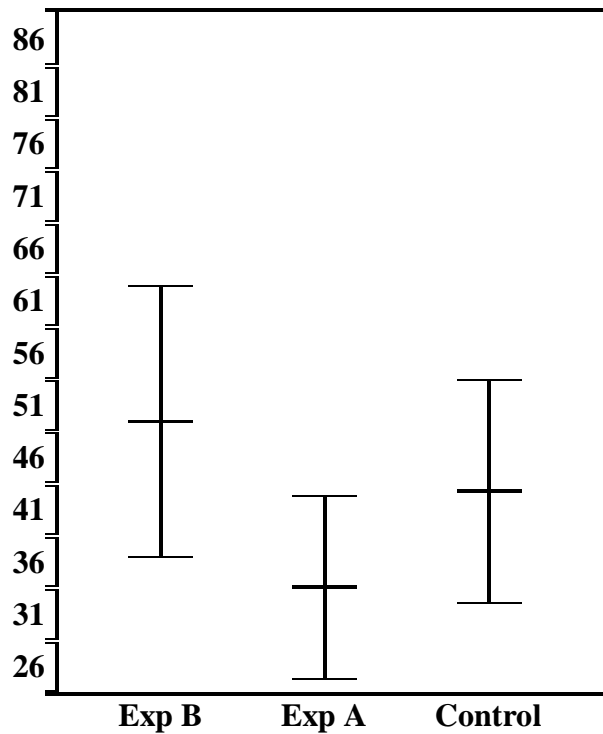


Figure 4.1 Graphical Representation of ANOVA Result of Final Try-out

Control Group:

Mean =46.15

Standard Deviation = 11.4

High = 60.00 and Low = 26.67, Median = 46.67

Average Absolute Deviation from Median = 9.74

Experimental Group A:

Mean = 36.41

Standard Deviation = 9.28

High = 46.67 and Low = 20.00, Median = 40.00

Average Absolute Deviation from Median = 6.67

Experimental Group B:

Mean = 69.74

Standard Deviation = 15.1

High = 93.33 and Low = 46.67, Median = 73.33

Average Absolute Deviation from Median = 11.8.

The following table gives the result of Tukey HSD test for initial try-out.

Table 4.7 Result of Tukey HSD Test for Initial Try-out

<p>HSD[.05]=12.57; HSD[.01]=16.19 M1 vs M2 P<.01 M1 vs M3 P<.01 M2 vs M3 non-significant</p>	<p>M1 = mean of Exp B M2 = mean of Exp A M3= mean of Control Group</p>
	<p>HSD = the absolute [unsigned] difference between any two sample means required for significance at the designated level. HSD[.05] for the .05 level; HSD[.01] for the .01 level.</p>

4.05 Findings of the ANOVA Result for Initial Try-out

Initial try out using inferential statistics ANOVA at .05 level of significance it was found that there was significant difference between the mean achievement score of Experimental Group A, Experimental Group B and the Control Group. Further using Tukey HSD Test it was found that

- i. There was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Control Group (Conventional Method).
- ii. There was significant difference between the mean achievement score of Experimental Group B (CAI with simultaneous discussion) and the Control Group (Conventional Method)
- iii. There was significant difference between the mean achievement score of Experimental Group A (only CAI) and the Experimental Group B (CAI with simultaneous discussion)

4.06 Analysis of Data using ANOVA for Final Try-out

ANOVA was calculated using the online calculator (Kirkman, 1996). The following table shows the Mean, Variance, Standard Deviation and Standard Error of the post test score of the final try-out.

Table 4.8 Data Summary for Final Try-out

Samples	Control	Exp A	Exp B	Total
N	20	20	20	60
ΣX	1366.67	1498.35	1713.33	4578.35
Mean	68.3335	74.9175	85.6665	76.3058
ΣX^2	103789.3779	117472.1557	154177.4223	375438.9559
Variance	547.3702	274.7116	389.602	442.1041
SD	23.3959	16.5744	19.7383	21.0263
Standard Error	5.2315	3.7062	4.4136	2.7145

The following table shows the calculation of ANOVA for final try-out.

Table 4.9 ANOVA Summary for Final Try-out

Source	SS	df	MS	F	P
Treatment [between groups]	3062.153	2	1531.0765	4.73	0.014644
Error	12303.0214	38	323.7637		
Subjects	10718.9695	19			
Total	26084.1439	59			

From the above table it clear that there is significant difference between the groups at .05 level of significance. But between which groups there is significant difference is not known using the above table. In order to know this, investigator further analysed the data using post hoc test, she used Tukey HSD Test for further analysis.

The following is the graphical representation of the differences between the means from the result of ANOVA for final try-out.

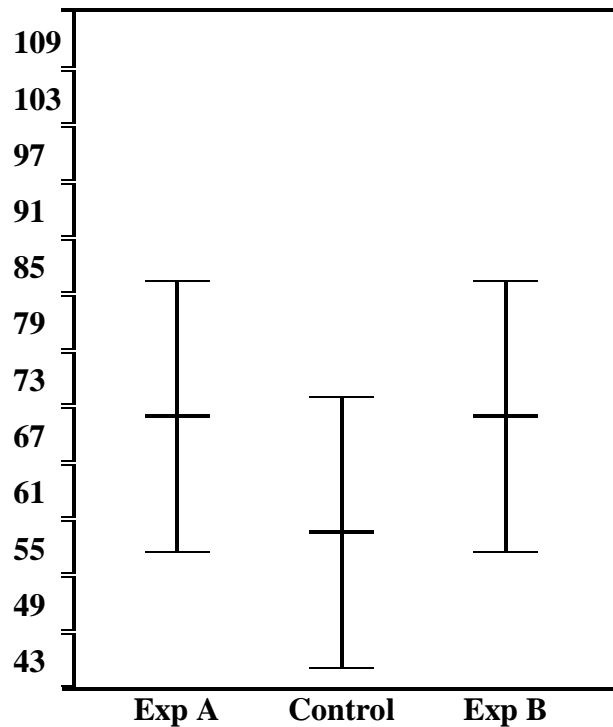


Figure 4.2 Graphical Representation of ANOVA Result of Final Try-out

Control Group:

Mean = 68.33

Standard Deviation = 23.4

High = 93.33 and Low = 33.33, Median = 80.00

Average Absolute Deviation from Median = 19.7

Experimental Group A:

Mean = 74.92

Standard Deviation = 16.6

High = 93.33 and Low = 40.00, Median = 80.00

Average Absolute Deviation from Median = 12.4

Experimental Group B:

Mean = 85.67

Standard Deviation = 19.7

High = 100 and Low = 40.00, Median = 93.33

Average Absolute Deviation from Median = 13.7

The following table gives the result of Tukey HSD test for final try-out.

Table 4.10: Result of Tukey HSD Test for Final Try-out

HSD[.05]=13.88; HSD[.01]=17.65 M1 vs M2 non-significant M1 vs M3 non-significant M2 vs M3 P<.05	M1 = mean of Exp A M2 = mean of Control Group M3= Mean of Exp B
	HSD = the absolute [unsigned] difference between any two sample means required for significance at the designated level. HSD[.05] for the .05 level; HSD[.01] for the .01 level.

4.07 Findings of the ANOVA Result for Final Try-out

Final try out using inferential statistics ANOVA at .05 level of significance it was found that there was significant difference between the mean achievement score of Experimental Group A, Experimental Group B and the Control Group. Further using Tukey HSD Test it was found that

- i. There was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Control Group (Conventional Method).
- ii. There was significant difference between the mean achievement score of Experimental Group B (CAI with simultaneous discussion) and the Control Group (Conventional Method)
- iii. There was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Experimental Group B (CAI with simultaneous discussion).

4.08 Statement wise Analysis of Reaction Scale for Initial Try-out

Positive polarity statements are given points as follows

Table 4.11 Points for Positive polarity statements

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

Negative polarity statements are given points as follows

Table 4.12 Points for Negative polarity statements

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

Level of Significance is .05 for analysis using Chi Square for all statements. Chi Square was calculated using online calculator (Tools for science).

(Tools for science)The Chi Square statistic compares the tallies or counts of categorical responses between two (or more) independent groups. 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 :

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

Data were analysed through the statistical technique χ^2 .

Note: Exp Gp denote Experimental Group

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.13 Responses of Exp Gp A students in percentage for statement 1 for Initial Try-out

Points	Exp Gp A
5	25.93
4	40.74
3	11.11
2	22.22
1	0.00

25.93% of the students strongly agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

40.74% of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

11.11% of the students not decided with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

22.22% of the students disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

0.00% of the students strongly disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

Experimental Group B : Responses of the students in percentage

Table 4.14 Responses of Exp Gp B students in percentage for statement 1 for Initial Try-out

Points	Exp Gp B
5	41.67
4	37.50
3	4.17
2	16.67
1	0.00

41.67% of the students strongly agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

37.50% of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

4.17% of the students not decided with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

16.67% of the students disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

0.00% of the students strongly disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

Graphical Representation of analysis of statement 1 in Percentage

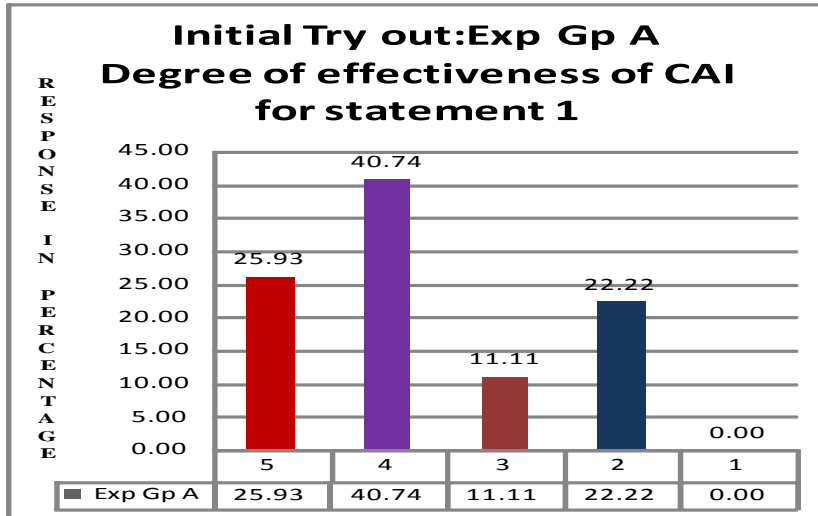


Figure 4.3 Graphical Representation of analysis of statement 1 in Percentage for Exp Gp A for Initial Try-out

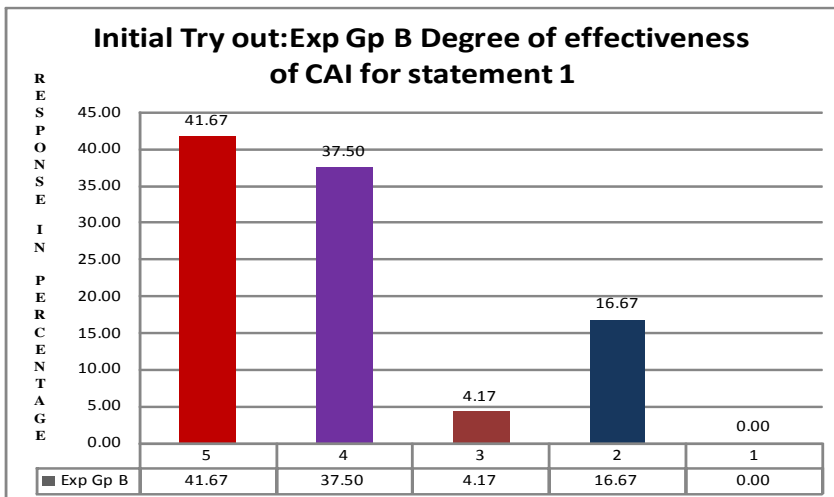


Figure 4.4 Graphical Representation of analysis of statement 1 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.15 Chi Square Table for Exp Gp A for Statement 1 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	5.4
4	11	5.4
3	3	5.4
2	6	5.4
1	0	5.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 12.8

degrees of freedom = 4

probability = 0.012

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures”.

Experimental Group B

Table 4.16 Chi Square Table for Exp Gp B for Statement 1 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	10	4.8
4	9	4.8
3	1	4.8
2	4	4.8
1	0	4.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 17.2

degrees of freedom = 4

probability = 0.002

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures”.

Statement 2: I like illustrations given in the slides, which actually made me learn the lesson.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.17 Responses of Exp Gp A students in percentage for statement 2 for Initial Try-out

Points	Exp Gp A
5	23.08
4	73.08
3	0.00
2	3.85
1	0.00

23.08% of the students strongly agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

73.08% of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

0.00% of the students not decided with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

3.85% of the students disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

0.00% of the students strongly disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

Experimental Group B: Responses of the students in percentage

Table 4.18 Responses of Exp Gp B students in percentage for statement 2 for Initial Try-out

Points	Exp Gp B
5	54.17
4	20.83
3	8.33
2	12.50
1	4.17

54.17% of the students strongly agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

20.83% of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

8.33% of the students not decided with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

12.50% of the students disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

4.17% of the students strongly disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

Graphical Representation of analysis of statement 2 in Percentage

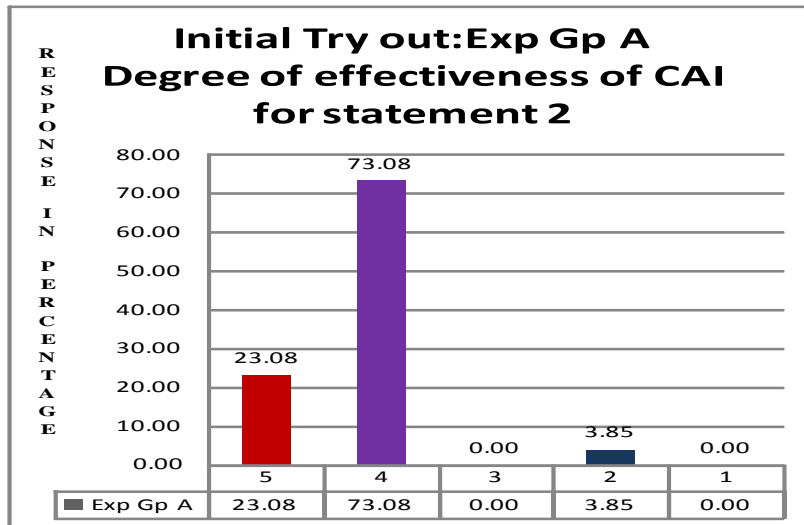


Figure 4.5 Graphical Representation of analysis of statement 2 in Percentage for Exp Gp A for Initial Try-out

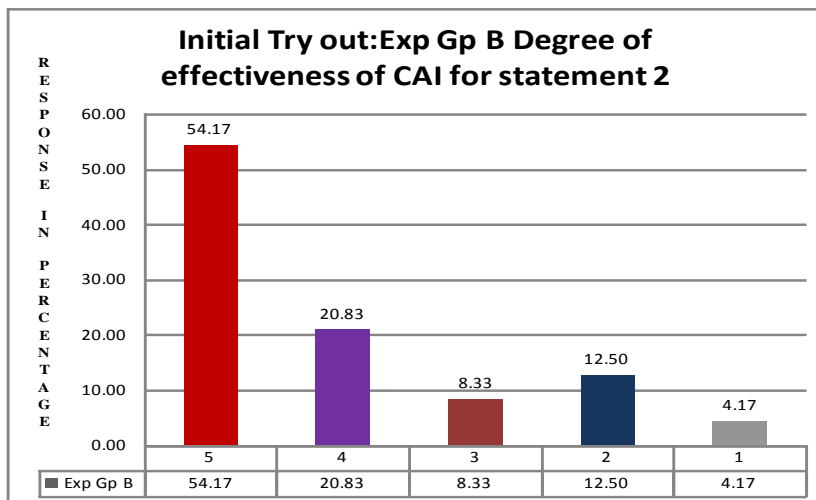


Figure 4.6 Graphical Representation of analysis of statement 2 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.19 Chi Square Table for Exp Gp A for Statement 2 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.2
4	19	5.2
3	0	5.2
2	1	5.2
1	0	5.2

chi-square = 50.5

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson.”

Experimental Group B

Table 4.20 Chi Square Table for Exp Gp B for Statement 2 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	13	4.8
4	5	4.8
3	2	4.8
2	3	4.8
1	1	4.8

chi-square = 19.3

degrees of freedom = 4

probability = 0.001

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson.”

Statement 3: Illustrations didn't help me to relate what we learned in mathematics to real life situation.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.21 Responses of Exp Gp A students in percentage for statement 3 for Initial Try-out

Points	Exp Gp A
5	7.14
4	57.14
3	25.00
2	3.57
1	7.14

7.14% of the students strongly disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

57.14% of the students disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

25.00% of the students not decided with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

3.57% of the students agree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

7.14% of the students strongly agree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

Experimental Group B: Responses of the students in percentage

Table 4.22 Responses of Exp Gp B students in percentage for statement 3 for Initial Try-out

Points	Exp Gp B
5	16.67
4	12.50
3	50.00
2	12.50
1	8.33

16.67% of the students strongly disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

12.50% of the students disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

50.00% of the students not decided with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

12.50% of the students agree with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

8.33% of the students strongly agree with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

Graphical Representation of analysis of statement 3 in Percentage

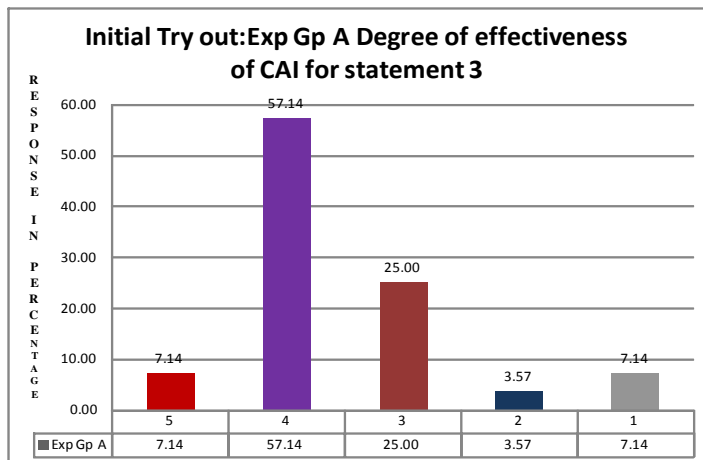


Figure 4.7 Graphical Representation of analysis of statement 3 in Percentage for Exp Gp A for Initial Try-out

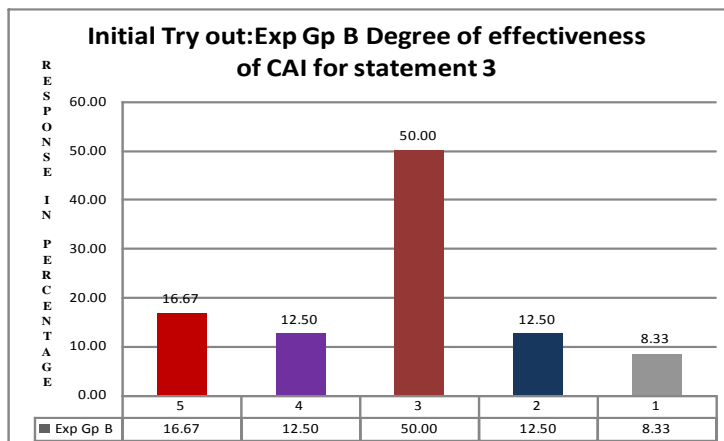


Figure 4.8 Graphical Representation of analysis of statement 3 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.23 Chi Square Table for Exp Gp A for Statement 3 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	5.6
4	16	5.6
3	7	5.6
2	1	5.6
1	2	5.6

chi-square = 28.1

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

Experimental Group B

Table 4.24 Chi Square Table for Exp Gp B for Statement 3 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	4.8
4	3	4.8
3	12	4.8
2	3	4.8
1	2	4.8

chi-square = 13.9

degrees of freedom = 4

probability = 0.008

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

Statement 4: CAI is effective way of presentation because there is little stress in learning situation.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.25 Responses of Exp Gp A students in percentage for statement 4 for Initial Try-out

Points	Exp Gp A
5	11.11
4	22.22
3	44.44
2	18.52
1	3.70

11.11% of the students strongly agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

22.22% of the students agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

44.44% of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

18.52% of the students disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

3.70% of the students strongly disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

Experimental Group B : Responses of the students in percentage

Table 4.26 Responses of Exp Gp B students in percentage for statement 4 for Initial Try-out

Points	Exp Gp B
5	16.67
4	8.33
3	58.33
2	12.50
1	4.17

16.67% of the students strongly agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

8.33% of the students agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

58.33% of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

12.50% of the students disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

4.17% of the students strongly disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

Graphical Representation of analysis of statement 4 in Percentage

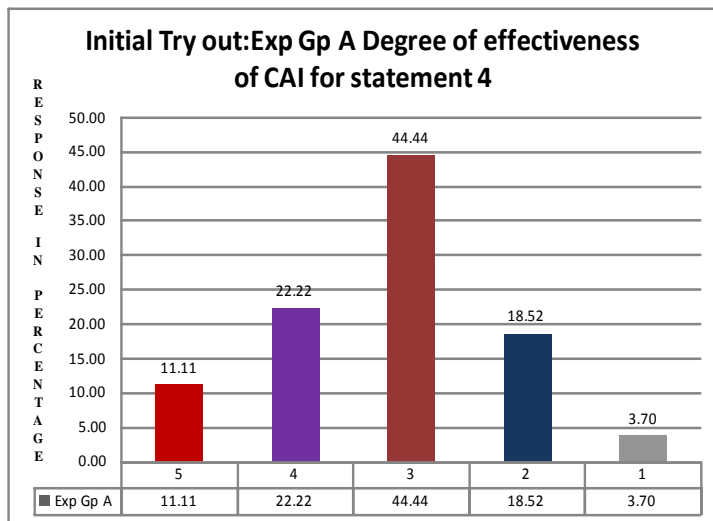


Figure 4.9 Graphical Representation of analysis of statement 4 in Percentage for Exp Gp A for Initial Try-out

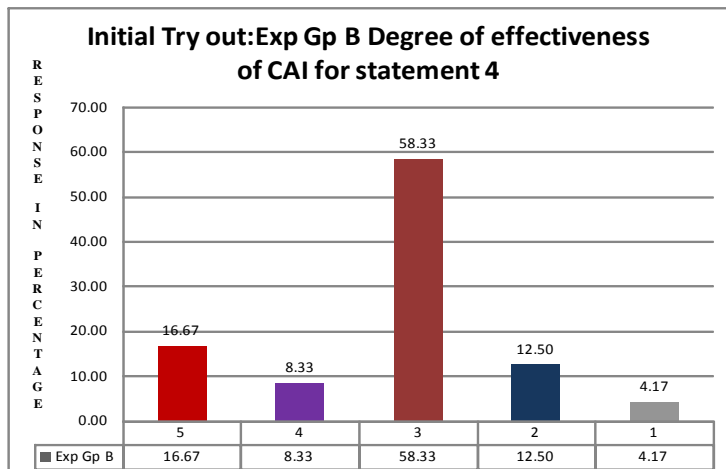


Figure 4.10 Graphical Representation of analysis of statement 4 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.27 Chi Square Table for Exp Gp A for Statement 4 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.4
4	6	5.4
3	12	5.4
2	5	5.4
1	1	5.4

chi-square = 12.8

degrees of freedom = 4

probability = 0.012

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

Experimental Group B

Table 4.28 Chi Square Table for Exp Gp B for Statement 4 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	4.8
4	2	4.8
3	14	4.8
2	3	4.8
1	1	4.8

chi-square = 23.1

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation”.

Statement 5: I can learn with my own speed.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.29 Responses of Exp Gp A students in percentage for statement 5 for Initial Try-out

Points	Exp Gp A
5	46.15
4	34.62
3	7.69
2	7.69
1	3.85

46.15% of the students strongly agree with the statement “I can learn with my own speed.”

34.62% of the students agree with the statement “I can learn with my own speed.”

7.69% of the students not decided with the statement “I can learn with my own speed.”

7.69% of the students disagree with the statement “I can learn with my own speed.”

3.85% of the students strongly disagree with the statement “I can learn with my own speed.”

Experimental Group B : Responses of the students in percentage

Table 4.30 Responses of Exp Gp B students in percentage for statement 5 for Initial Try-out

Points	Exp Gp B
5	58.33
4	29.17
3	8.33
2	0.00
1	4.17

58.33% of the students strongly agree with the statement “I can learn with my own speed.”

29.17% of the students agree with the statement “I can learn with my own speed.”

8.33% of the students not decided with the statement “I can learn with my own speed.”

0.00% of the students disagree with the statement “I can learn with my own speed.”

4.17% of the students strongly disagree with the statement “I can learn with my own speed.”

Graphical Representation of analysis of statement 5 in Percentage

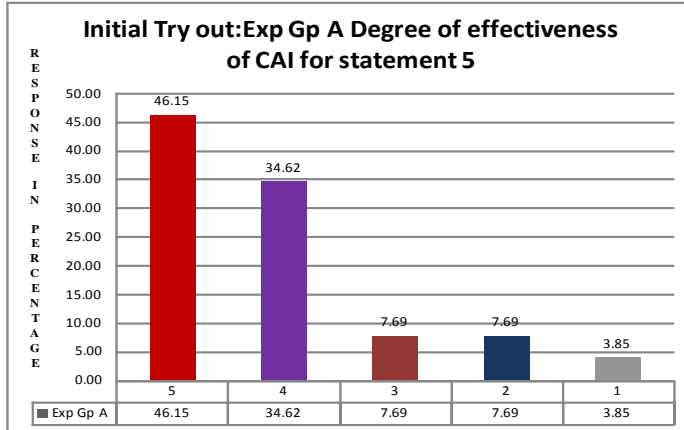


Figure 4.11 Graphical Representation of analysis of statement 5 in Percentage for Exp Gp A for Initial Try-out

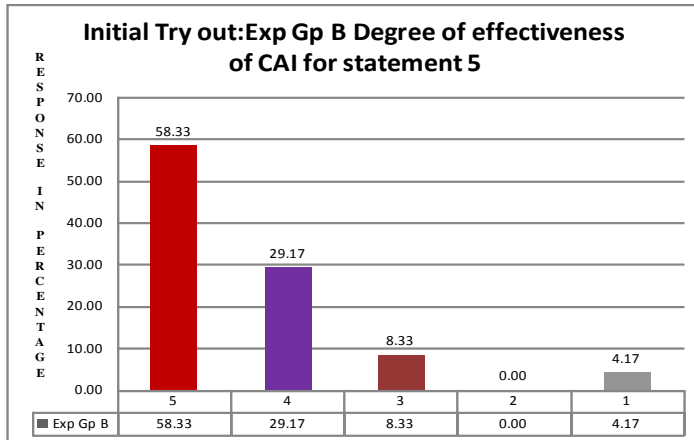


Figure 4.12 Graphical Representation of analysis of statement 5 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.31 Chi Square Table for Exp Gp A for Statement 5 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	12	5.2
4	9	5.2
3	2	5.2
2	2	5.2
1	1	5.2

chi-square = 19.0

degrees of freedom = 4

probability = 0.001

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “I can learn with my own speed.”

Experimental Group B

Table 4.32 Chi Square Table for Exp Gp B for Statement 5 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	14	4.8
4	7	4.8
3	2	4.8
2	0	4.8
1	1	4.8

chi-square = 28.1

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore students strongly agree with the statement “I can learn with my own speed”.

Statement 6: I can immediately test myself because there is lot of practice exercise.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.33 Responses of Exp Gp A students in percentage for statement 6 for Initial Try-out

Points	Exp Gp A
5	22.22
4	37.04
3	37.04
2	3.70
1	0.00

22.22% of the students strongly agree with the statement “I can immediately test myself because there is lot of practice exercise.”

37.04% of the students agree with the statement “I can immediately test myself because there is lot of practice exercise.”

37.04% of the students not decided with the statement “I can immediately test myself because there is lot of practice exercise.”

3.70% of the students disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

0.00% of the students strongly disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

Experimental Group B: Responses of the students in percentage

Table 4.34 Responses of Exp Gp B students in percentage for statement 6 for Initial Try-out

Points	Exp Gp B
5	25.00
4	41.67
3	25.00
2	8.33
1	0.00

25.00% of the students strongly agree with the statement “I can immediately test myself because there is lot of practice exercise.”

41.67% of the students agree with the statement “I can immediately test myself because there is lot of practice exercise.”

25.00% of the students not decided with the statement “I can immediately test myself because there is lot of practice exercise.”

8.33% of the students disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

0.00% of the students strongly disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

Graphical Representation of analysis of statement 6 in Percentage

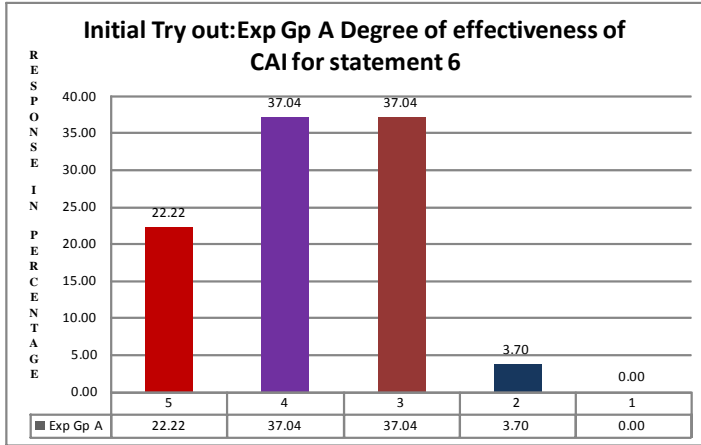


Figure 4.13 Graphical Representation of analysis of statement 6 in Percentage for Exp Gp A for Initial Try-out

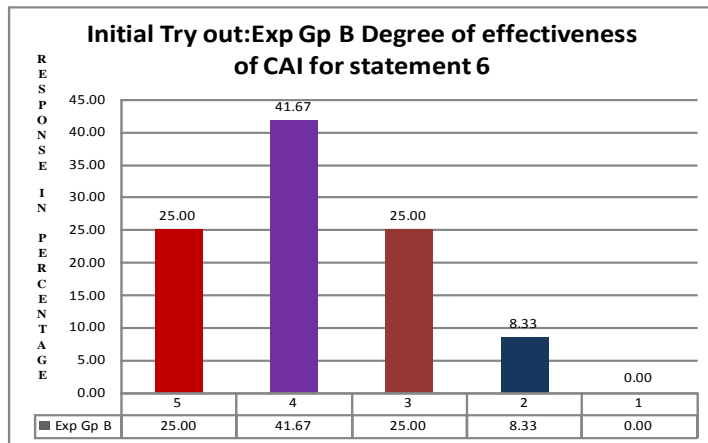


Figure 4.14 Graphical Representation of analysis of statement 6 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.35 Chi Square Table for Exp Gp A for Statement 6 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.4
4	10	5.4
3	10	5.4
2	1	5.4
1	0	5.4

chi-square = 16.9

degrees of freedom = 4

probability = 0.002

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. Equal load is on agree and not decided therefore there are equal number of students who agree as well as who are undecided with the statement “I can immediately test myself because there is lot of practice exercise.”

Experimental Group B

Table 4.36 Chi Square Table for Exp Gp B for Statement 6 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	10	4.8
3	6	4.8
2	2	4.8
1	0	4.8

chi-square = 12.7

degrees of freedom = 4

probability = 0.013

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I can immediately test myself because there is lot of practice exercise.”

Statement 7: This method is having more freedom to learn.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.37 Responses of Exp Gp A students in percentage for statement 7 for Initial Try-out

Points	Exp Gp A
5	22.22
4	40.74
3	25.93
2	7.41
1	3.70

22.22% of the students strongly agree with the statement “This method is having more freedom to learn.”

40.74% of the students agree with the statement “This method is having more freedom to learn.”

25.93% of the students not decided with the statement “This method is having more freedom to learn.”

7.41% of the students disagree with the statement “This method is having more freedom to learn.”

3.70% of the students strongly disagree with the statement “This method is having more freedom to learn.”

Experimental Group B: Responses of the students in percentage

Table 4.38 Responses of Exp Gp B students in percentage for statement 7 for Initial Try-out

Points	Exp Gp B
5	41.67
4	29.17
3	12.50
2	12.50
1	4.17

41.67% of the students strongly agree with the statement “This method is having more freedom to learn.”

29.17% of the students agree with the statement “This method is having more freedom to learn.”

12.50% of the students not decided with the statement “This method is having more freedom to learn.”

16.67% of the students disagree with the statement “This method is having more freedom to learn.”

4.17% of the students strongly disagree with the statement “This method is having more freedom to learn.”

Graphical Representation of analysis of statement 7 in Percentage

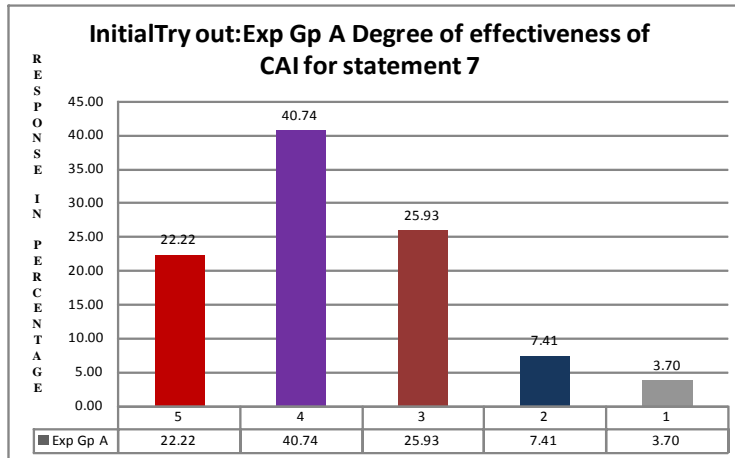


Figure 4.15 Graphical Representation of analysis of statement 7 in Percentage for Exp Gp A for Initial Try-out

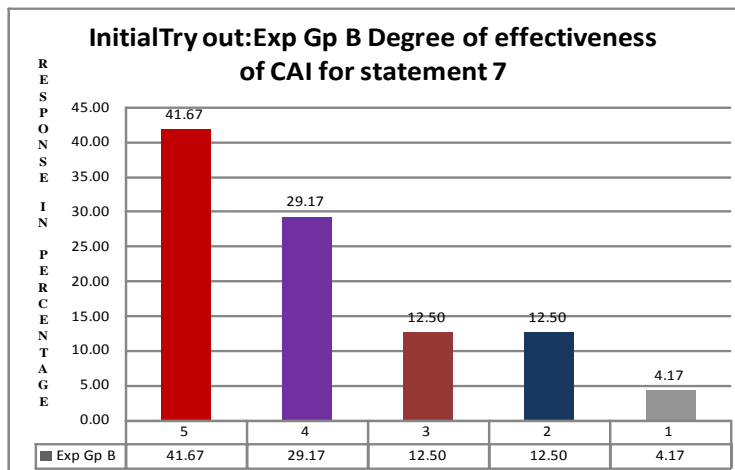


Figure 4.16 Graphical Representation of analysis of statement 7 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.39 Chi Square Table for Exp Gp A for Statement 7 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.4
4	11	5.4
3	7	5.4
2	2	5.4
1	1	5.4

chi-square = 12.1

degrees of freedom = 4

probability = 0.017

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “This method is having more freedom to learn.”

Experimental Group B

Table 4.40 Chi Square Table for Exp Gp B for Statement 7 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	10	4.8
4	7	4.8
3	3	4.8
2	3	4.8
1	1	4.8

chi-square = 11

degrees of freedom = 4

probability = 0.0266

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “This method is having more freedom to learn.”

Statement 8: CAI did not focus on more freedom situation.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.41 Responses of Exp Gp A students in percentage for statement 8 for Initial Try-out

Points	Exp Gp A
5	18.52
4	18.52
3	44.44
2	14.81
1	3.70

18.52% of the students strongly disagree with the statement “CAI didn’t focus on more freedom situation.”

18.52% of the students disagree with the statement “CAI didn’t focus on more freedom situation.”

44.44% of the students not decided with the statement “CAI didn’t focus on more freedom situation.”

14.81% of the students agree with the statement “CAI didn’t focus on more freedom situation.”

3.70% of the students strongly agree with the statement “CAI didn’t focus on more freedom situation.”

Experimental Group B: Responses of the students in percentage

Table 4.42 Responses of Exp Gp B students in percentage for statement 8 for Initial Try-out

Points	Exp Gp B
5	25.00
4	12.50
3	33.33
2	20.83
1	8.33

25.00% of the students strongly disagree with the statement “CAI didn’t focus on more freedom situation.”

12.50% of the students disagree with the statement “CAI didn’t focus on more freedom situation.”

33.33% of the students not decided with the statement “CAI didn’t focus on more freedom situation.”

20.83% of the students agree with the statement “CAI didn’t focus on more freedom situation.”

8.33% of the students strongly agree with the statement “CAI didn’t focus on more freedom situation.”

Graphical Representation of analysis of statement 8 in Percentage

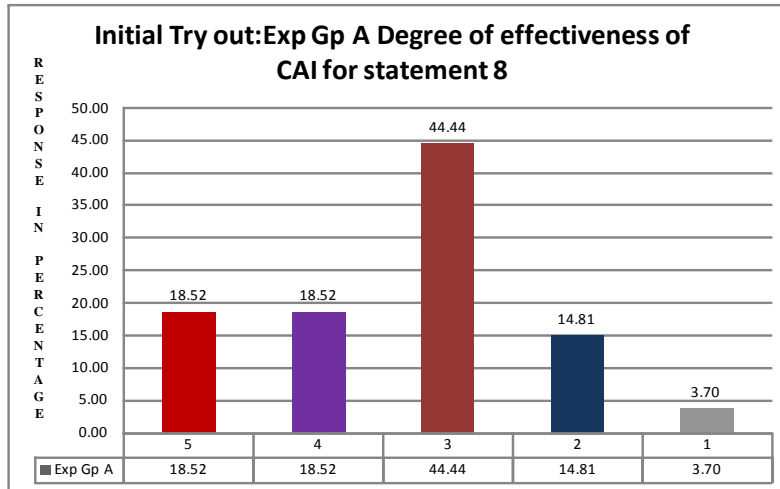


Figure 4.17 Graphical Representation of analysis of statement 8 in Percentage for Exp Gp A for Initial Try-out

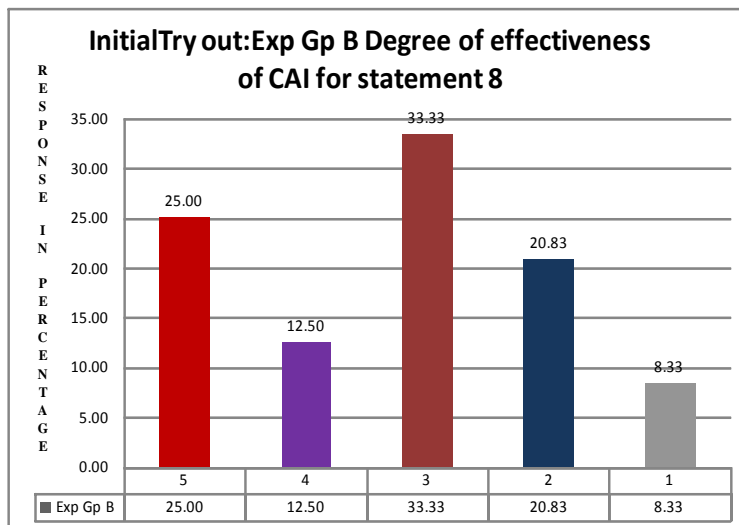


Figure 4.18 Graphical Representation of analysis of statement 8 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.43 Chi Square Table for Exp Gp A for Statement 8 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.4
4	5	5.4
3	12	5.4
2	4	5.4
1	1	5.4

chi-square = 12.07

degrees of freedom = 4

probability = 0.0168

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “CAI didn’t focus on more freedom situation.”

Experimental Group B

Table 4.44 Chi Square Table for Exp Gp B for Statement 8 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	3	4.8
3	8	4.8
2	5	4.8
1	2	4.8

chi-square = 4.75

degrees of freedom = 4

probability = 0.314

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.45 Responses of Exp Gp A students in percentage for statement 9 for Initial Try-out

Points	Exp Gp A
5	25.93
4	40.74
3	18.52
2	11.11
1	3.7

25.93% of the students strongly agree with the statement “Learning mathematics is fun in this CAI method.”

40.74% of the students agree with the statement “Learning mathematics is fun in this CAI method.”

18.52% of the students not decided with the statement “Learning mathematics is fun in this CAI method.”

11.11% of the students disagree with the statement “Learning mathematics is fun in this CAI method.”

3.70% of the students strongly disagree with the statement “Learning mathematics is fun in this CAI method.”

Experimental Group B: Responses of the students in percentage

Table 4.46 Responses of Exp Gp B students in percentage for statement 9 for Initial Try-out

Points	Exp Gp B
5	45.83
4	4.17
3	29.17
2	12.50
1	8.33

45.83% of the students strongly agree with the statement “Learning mathematics is fun in this CAI method.”

4.17% of the students agree with the statement “Learning mathematics is fun in this CAI method.”

29.17% of the students not decided with the statement “Learning mathematics is fun in this CAI method.”

12.50% of the students disagree with the statement “Learning mathematics is fun in this CAI method.”

8.33% of the students strongly disagree with the statement “Learning mathematics is fun in this CAI method.”

Graphical Representation of analysis of statement 9 in Percentage

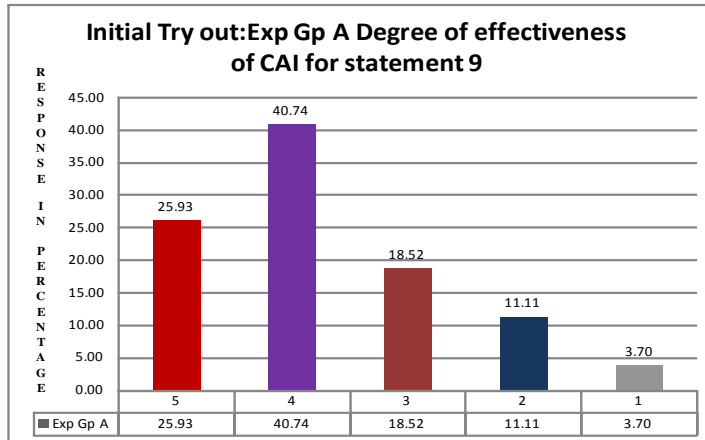


Figure 4.19 Graphical Representation of analysis of statement 9 in Percentage for Exp Gp A for Initial Try-out

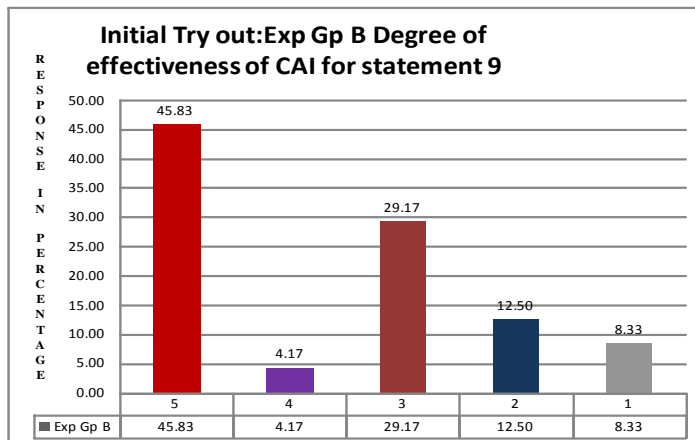


Figure 4.20 Graphical Representation of analysis of statement 9 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.47 Chi Square Table for Exp Gp A for Statement 9 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	5.4
4	11	5.4
3	5	5.4
2	3	5.4
1	1	5.4

chi-square = 10.96

degrees of freedom = 4

probability = 0.027

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Learning mathematics is fun in this CAI method”.

Experimental Group B

Table 4.48 Chi Square Table for Exp Gp B for Statement 9 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	4.8
4	1	4.8
3	7	4.8
2	3	4.8
1	2	4.8

chi-square = 14.3

degrees of freedom = 4

probability = 0.006

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Learning mathematics is fun in this CAI method”.

Statement 10: This method is not good in learning mathematics because my doubts are not cleared.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.49 Responses of Exp Gp A students in percentage for statement 10 for Initial Try-out

Points	Exp Gp A
5	7.14
4	39.29
3	21.43
2	25.00
1	7.14

7.14% of the students strongly disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

39.29% of the students disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

21.43% of the students not decided with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

25.00% of the students agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

7.14% of the students strongly agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

Experimental Group B: Responses of the students in percentage

Table 4.50 Responses of Exp Gp B students in percentage for statement 10 for Initial Try-out

Points	Exp Gp B
5	25.00
4	20.83
3	25.00
2	12.50
1	16.67

25.00% of the students strongly disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

20.83% of the students disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

25.00% of the students not decided with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

12.50% of the students agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

16.67% of the students strongly agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

Graphical Representation of analysis of statement 10 in Percentage

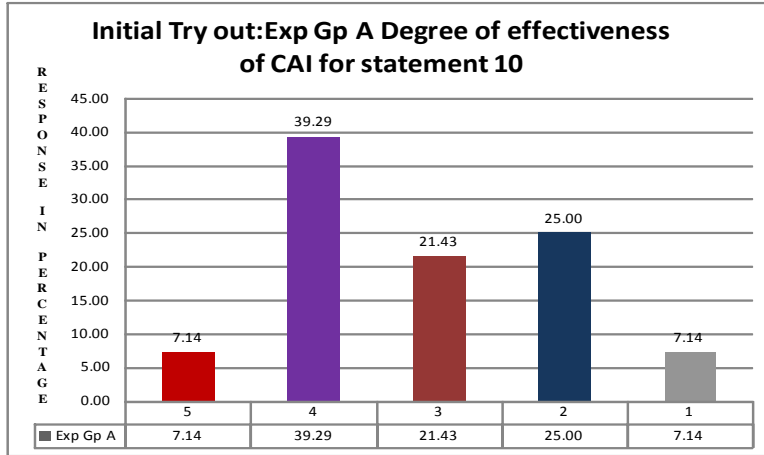


Figure 4.21 Graphical Representation of analysis of statement 10 in Percentage for Exp Gp A for Initial Try-out

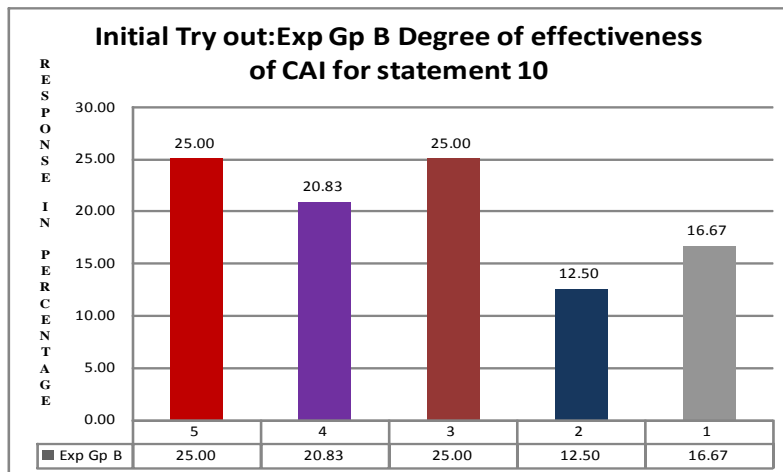


Figure 4.22 Graphical Representation of analysis of statement 10 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.51 Chi Square Table for Exp Gp A for Statement 10 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	5.6
4	11	5.6
3	6	5.6
2	7	5.6
1	2	5.6

chi-square = 10.2

degrees of freedom = 4

probability = 0.037

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

Experimental Group B

Table 4.52 Chi Square Table for Exp Gp B for Statement 10 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	5	4.8
3	6	4.8
2	3	4.8
1	4	4.8

chi-square = 1.42

degrees of freedom = 4

probability = 0.841

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 11: In CAI I can teach myself (self-study) without the help of others.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.53 Responses of Exp Gp A students in percentage for statement 11 for Initial Try-out

Points	Exp Gp A
5	29.63
4	37.04
3	7.41
2	25.93
1	0.00

29.63% of the students strongly agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

37.04% of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

7.41% of the students not decided with the statement “In CAI I can teach myself (self-study) without the help of others.”

25.93% of the students disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

0.00% of the students strongly disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

Experimental Group B: Responses of the students in percentage

Table 4.54 Responses of Exp Gp B students in percentage for statement 11 for Initial Try-out

Points	Exp Gp B
5	20.83
4	33.33
3	12.50
2	25.00
1	8.33

20.83% of the students strongly agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

33.33% of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

12.50% of the students not decided with the statement “In CAI I can teach myself (self-study) without the help of others.”

25.00% of the students disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

8.33% of the students strongly disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

Graphical Representation of analysis of statement 11 in Percentage

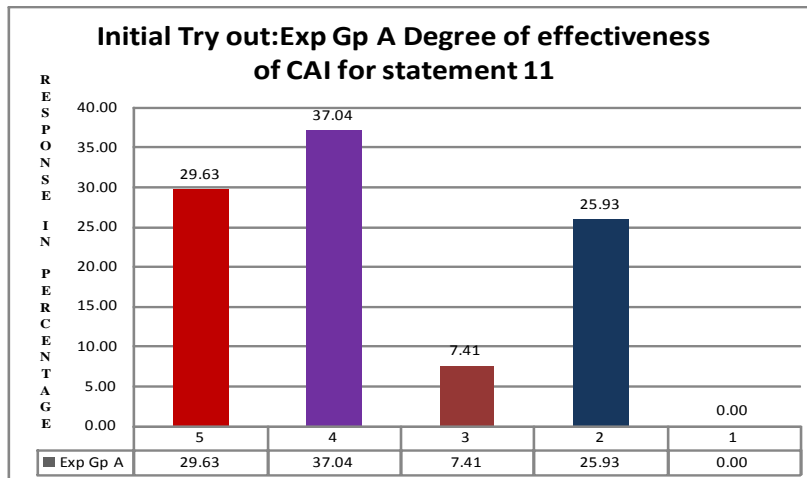


Figure 4.23 Graphical Representation of analysis of statement 11 in Percentage for Exp Gp A for Initial Try-out

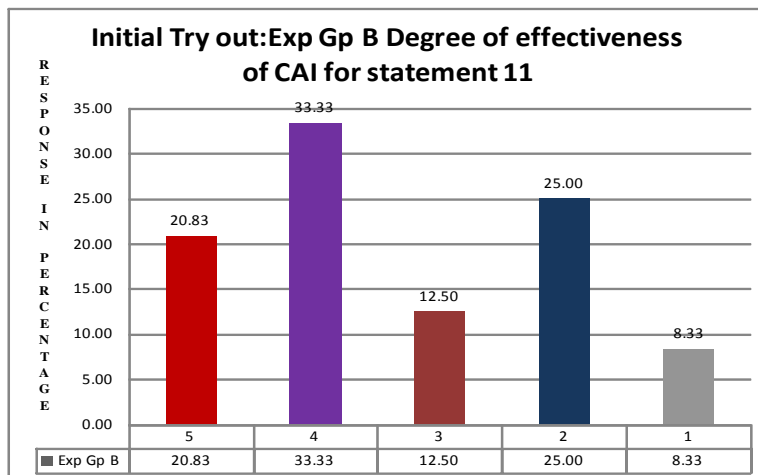


Figure 4.24 Graphical Representation of analysis of statement 11 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A**Table 4.55 Chi Square Table for Exp Gp A for Statement 11 for Initial Try-out**

Polarity	Observed Frequency	Expected Frequency
5	8	5.4
4	10	5.4
3	2	5.4
2	7	5.4
1	0	5.4

chi-square = 13.2

degrees of freedom = 4

probability = 0.010

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

Experimental Group B**Table 4.56 Chi Square Table for Exp Gp B for Statement 11 for Initial Try-out**

Polarity	Observed Frequency	Expected Frequency
5	5	4.8
4	8	4.8
3	3	4.8
2	6	4.8
1	2	4.8

chi-square = 4.75

degrees of freedom = 4

probability = 0.314

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage**Table 4.57 Responses of Exp Gp A students in percentage for statement 12 for Initial Try-out**

Points	Exp Gp A
5	10.71
4	17.86
3	28.57
2	28.57
1	14.29

10.71% of the students strongly disagree with the statement “Matter presented in CAI is not very clear.”

17.86% of the students disagree with the statement “Matter presented in CAI is not very clear.”

28.57% of the students not decided with the statement “Matter presented in CAI is not very clear.”

28.57% of the students agree with the statement “Matter presented in CAI is not very clear.”

14.29% of the students strongly agree with the statement “Matter presented in CAI is not very clear.”

Experimental Group B: Responses of the students in percentage**Table 4.58 Responses of Exp Gp B students in percentage for statement 12 for Initial Try-out**

Points	Exp Gp B
5	25.00
4	41.67
3	16.67
2	12.50
1	4.17

25.00% of the students strongly disagree with the statement “Matter presented in CAI is not very clear.”

41.67% of the students disagree with the statement “Matter presented in CAI is not very clear.”

16.67% of the students not decided with the statement “Matter presented in CAI is not very clear.”

12.50% of the students agree with the statement “Matter presented in CAI is not very clear.”

4.17% of the students strongly agree with the statement “Matter presented in CAI is not very clear.”

Graphical Representation of analysis of statement 12 in Percentage

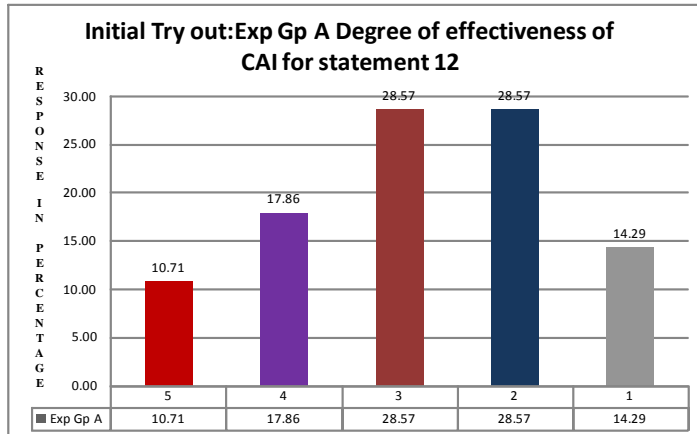


Figure 4.25 Graphical Representation of analysis of statement 12 in Percentage for Exp Gp A for Initial Try-out

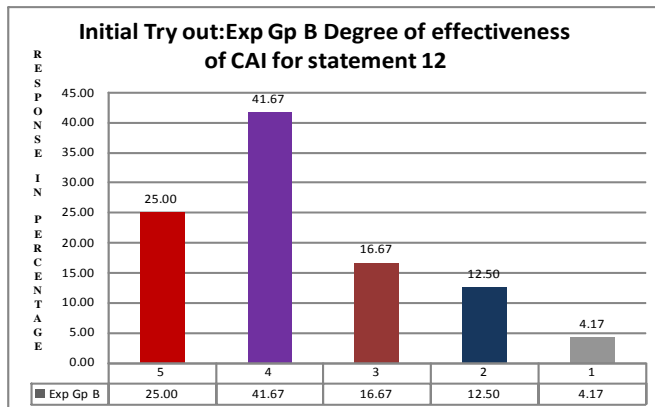


Figure 4.26 Graphical Representation of analysis of statement 12 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.59 Chi Square Table for Exp Gp A for Statement 12 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.6
4	5	5.6
3	8	5.6
2	8	5.6
1	4	5.6

chi-square = 3.79

degrees of freedom = 4

probability = 0.436

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.60 Chi Square Table for Exp Gp B for Statement 12 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	10	4.8
3	4	4.8
2	3	4.8
1	1	4.8

chi-square = 9.75

degrees of freedom = 4

probability = 0.0449

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Matter presented in CAI is not very clear.”

Statement 13: CAI is easy to understand.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.61 Responses of Exp Gp A students in percentage for statement 13 for Initial Try-out

Points	Exp Gp A
5	35.71
4	32.14
3	21.43
2	10.71
1	0.00

35.71% of the students strongly agree with the statement “CAI is easy to understand.”

32.14% of the students agree with the statement “CAI is easy to understand.”

21.43% of the students not decided with the statement “CAI is easy to understand.”

10.71% of the students disagree with the statement “CAI is easy to understand.”

0.00% of the students strongly disagree with the statement “CAI is easy to understand.”

Experimental Group B: Responses of the students in percentage

Table 4.62 Responses of Exp Gp B students in percentage for statement 13 for Initial Try-out

Points	Exp Gp B
5	29.17
4	29.17
3	20.83
2	16.67
1	4.17

29.17% of the students strongly agree with the statement “CAI is easy to understand.”

29.17% of the students agree with the statement “CAI is easy to understand.”

20.83% of the students not decided with the statement “CAI is easy to understand.”

16.67% of the students disagree with the statement “CAI is easy to understand.”

4.17% of the students strongly disagree with the statement “CAI is easy to understand.”

Graphical Representation of analysis of statement 13 in Percentage

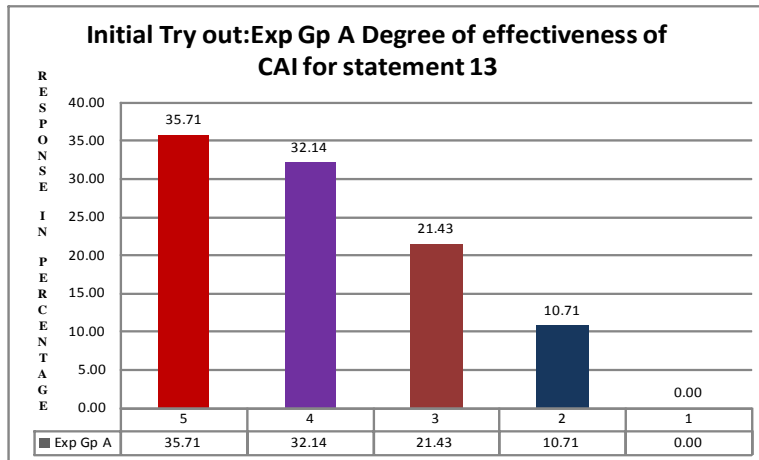


Figure 4.27 Graphical Representation of analysis of statement 13 in Percentage for Exp Gp A for Initial Try-out

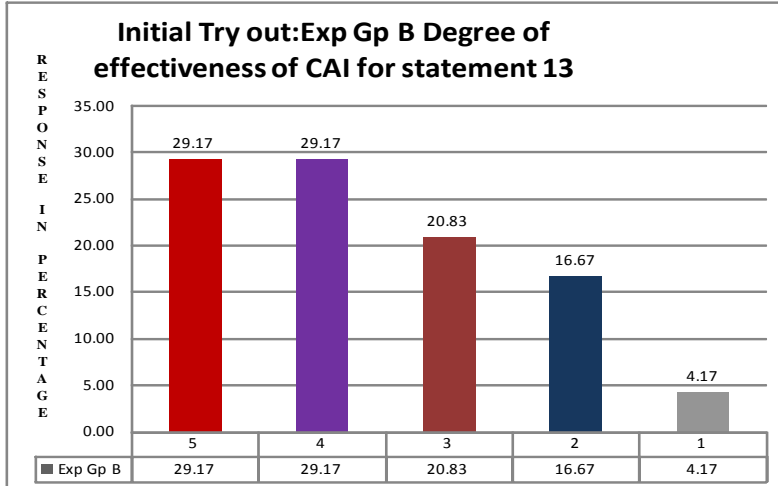


Figure 4.28 Graphical Representation of analysis of statement 13 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.63 Chi Square Table for Exp Gp A for Statement 13 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	10	5.6
4	9	5.6
3	6	5.6
2	3	5.6
1	0	5.6

chi-square = 12.4

degrees of freedom = 4

probability = 0.015

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “CAI is easy to understand.”

Experimental Group B**Table 4.64 Chi Square Table for Exp Gp B for Statement 13 for Initial Try-out**

Polarity	Observed Frequency	Expected Frequency
5	7	4.8
4	7	4.8
3	5	4.8
2	4	4.8
1	1	4.8

chi-square = 5.17

degrees of freedom = 4

probability = 0.271

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 14: Animations are distracting in understanding the concept.

Polarity: Negative

Experimental Group A : Responses of the students in percentage**Table 4.65 Responses of Exp Gp A students in percentage for statement 14 for Initial Try-out**

Points	Exp Gp A
5	10.71
4	25.00
3	32.14
2	17.86
1	14.29

10.71% of the students strongly disagree with the statement “Animations are distracting in understanding the concept.”

25.00% of the students disagree with the statement “Animations are distracting in understanding the concept.”

32.14% of the students not decided with the statement “Animations are distracting in understanding the concept.”

17.86% of the students agree with the statement “Animations are distracting in understanding the concept.”

14.29% of the students strongly agree with the statement “Animations are distracting in understanding the concept.”

Experimental Group B: Responses of the students in percentage

Table 4.66 Responses of Exp Gp B students in percentage for statement 14 for Initial Try-out

Points	Exp Gp B
5	45.83
4	12.50
3	8.33
2	8.33
1	25.00

45.83% of the students strongly disagree with the statement “Animations are distracting in understanding the concept.”

12.50% of the students disagree with the statement “Animations are distracting in understanding the concept.”

8.33% of the students not decided with the statement “Animations are distracting in understanding the concept.”

8.33% of the students agree with the statement “Animations are distracting in understanding the concept.”

25.00% of the students strongly agree with the statement “Animations are distracting in understanding the concept.”

Graphical Representation of analysis of statement 14 in Percentage

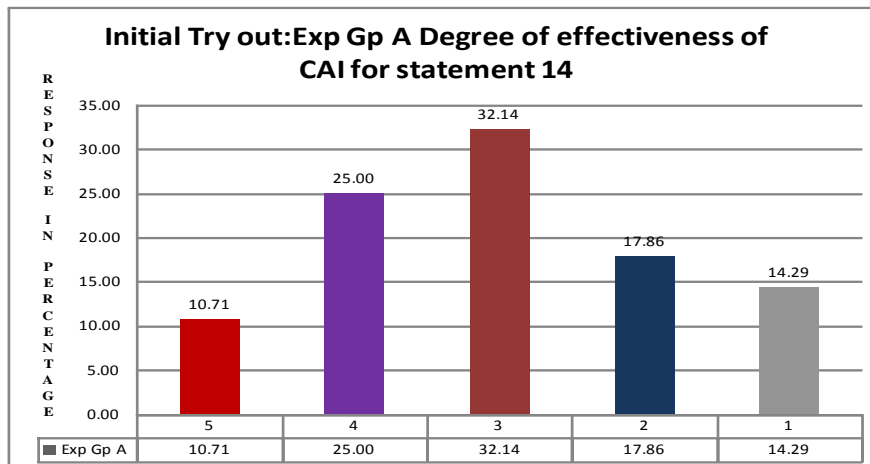


Figure 4.29 Graphical Representation of analysis of statement 14 in Percentage for Exp Gp A for Initial Try-out

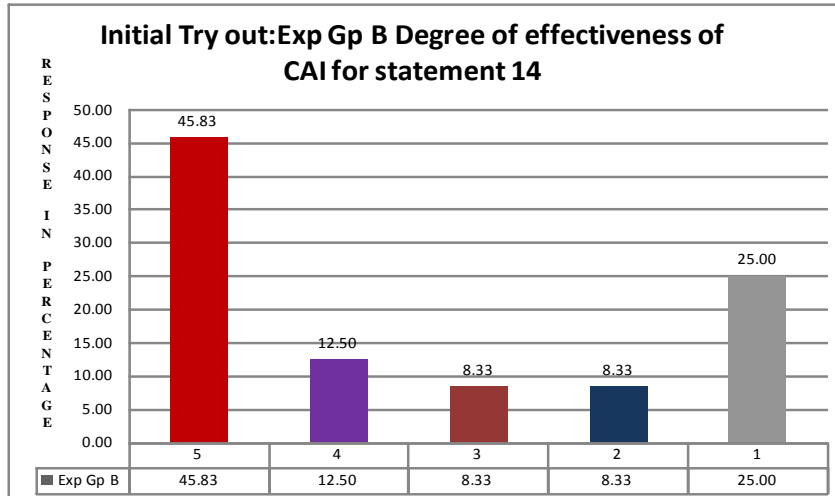


Figure 4.30 Graphical Representation of analysis of statement 14 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.67 Chi Square Table for Exp Gp A for Statement 14 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.6
4	7	5.6
3	9	5.6
2	5	5.6
1	4	5.6

chi-square = 4.14

degrees of freedom = 4

probability = 0.387

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.68 Chi Square Table for Exp Gp B for Statement 14 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	4.8
4	3	4.8
3	2	4.8
2	2	4.8
1	6	4.8

chi-square = 12.25

degrees of freedom = 4

probability = 0.063

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Animations are distracting in understanding the concept.”

Statement 15:CAI took more time to understand the concept than usual classroom teaching.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.69 Responses of Exp Gp A students in percentage for statement 15 for Initial Try-out

Points	Exp Gp
5	17.86
4	25.00
3	25.00
2	10.71
1	21.43

17.86% of the students strongly disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

25.00% of the students disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

25.00% of the students not decided with the statement “CAI took more time to understand the concept than usual classroom teaching.”

10.71% of the students agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

21.43% of the students strongly agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

Experimental Group B: Responses of the students in percentage

Table 4.70 Responses of Exp Gp B students in percentage for statement 15 for Initial Try-out

Points	Exp Gp B
5	33.33
4	16.67
3	20.83
2	16.67
1	12.50

33.33% of the students strongly disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

16.67% of the students disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

20.83% of the students not decided with the statement “CAI took more time to understand the concept than usual classroom teaching.”

16.67% of the students agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

12.50% of the students strongly agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

Graphical Representation of analysis of statement 15 in Percentage

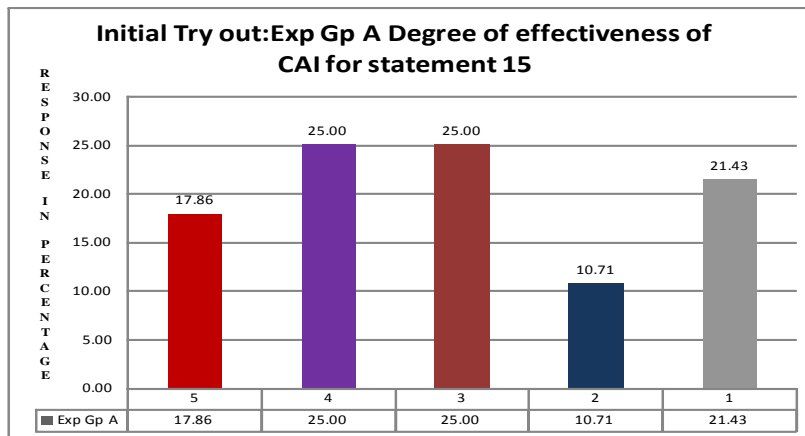


Figure 4.31 Graphical Representation of analysis of statement 15 in Percentage for Exp Gp A for Initial Try-out

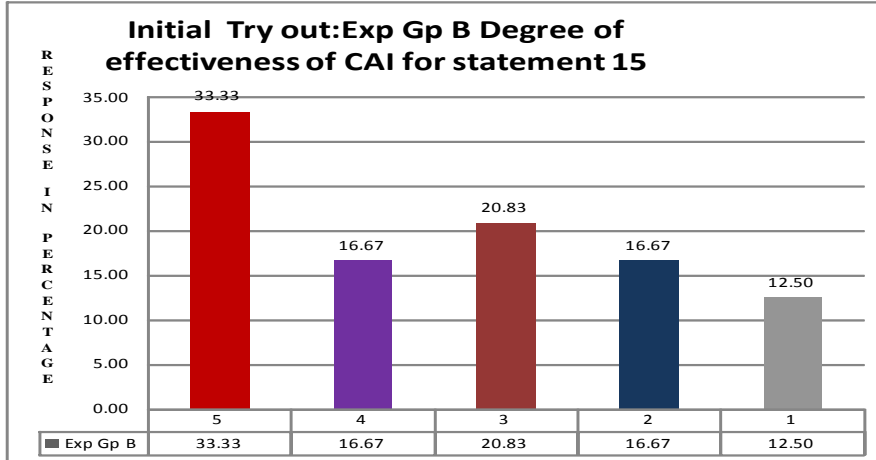


Figure 4.32 Graphical Representation of analysis of statement 15 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.71 Chi Square Table for Exp Gp A for Statement 15 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.6
4	7	5.6
3	7	5.6
2	3	5.6
1	6	5.6

Chi-square = 2.00

degrees of freedom = 4

probability = 0.736

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.72 Chi Square Table for Exp Gp B for Statement 15 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	8	4.8
4	4	4.8
3	5	4.8
2	4	4.8
1	3	4.8

chi-square = 3.08

degrees of freedom = 4

probability = 0.544

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 16: Illustrations given in CAI are enough to understand the concept clearly.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.73 Responses of Exp Gp A students in percentage for statement 16 for Initial Try-out

Points	Exp Gp A
5	25.00
4	32.14
3	14.29
2	17.86
1	10.71

25.00% of the students strongly agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

32.14% of the students agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

14.29% of the students not decided with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

17.86% of the students disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

10.71% of the students strongly disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

Experimental Group B : Responses of the students in percentage

Table 4.74 Responses of Exp Gp B students in percentage for statement 16 for Initial Try-out

Points	Exp Gp B
5	25.00
4	33.33
3	8.33
2	25.00
1	8.33

25.00% of the students strongly agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

33.33% of the students agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

8.33% of the students not decided with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

25.00% of the students disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

8.33% of the students strongly disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

Graphical Representation of analysis of statement 16 in Percentage

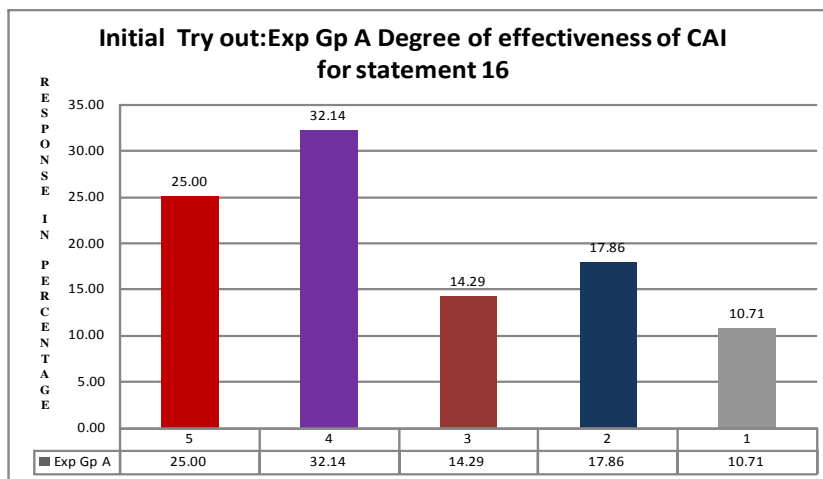


Figure 4.33 Graphical Representation of analysis of statement 16 in Percentage for Exp Gp A for Initial Try-out

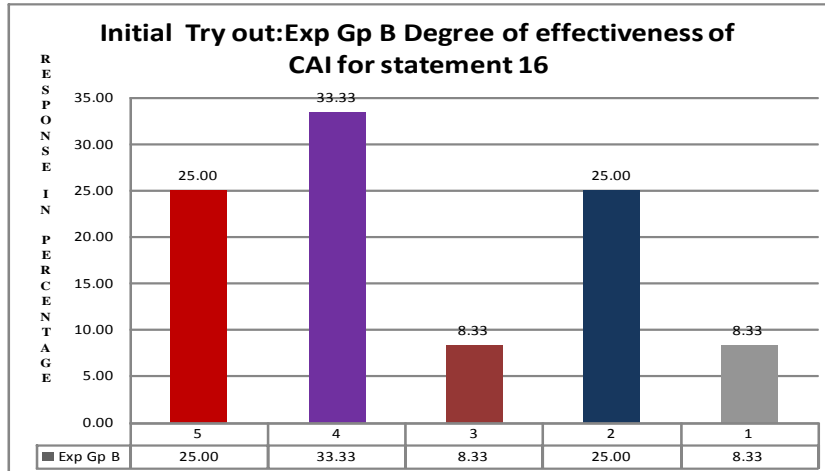


Figure 4.34 Graphical Representation of analysis of statement 16 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.75 Chi Square Table for Exp Gp A for Statement 16 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	5.6
4	9	5.6
3	4	5.6
2	5	5.6
1	3	5.6

chi-square = 4.14

degrees of freedom = 4

probability = 0.387

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.76 Chi Square Table for ExpGp B for Statement 16 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	8	4.8
3	2	4.8
2	6	4.8
1	2	4.8

chi-square = 6.00

degrees of freedom = 4

probability = 0.199

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 17: Matter presented in CAI was logically arranged.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.77 Responses of Exp Gp A students in percentage for statement 17 for Initial Try-out

Points	Exp Gp A
5	32.14
4	35.71
3	21.43
2	3.57
1	7.14

32.14% of the students strongly agree with the statement “Matter presented in CAI was logically arranged.”

35.71% of the students agree with the statement “Matter presented in CAI was logically arranged.”

21.43% of the students not decided with the statement “Matter presented in CAI was logically arranged.”

3.57% of the students disagree with the statement “Matter presented in CAI was logically arranged.”

7.14% of the students strongly disagree with the statement “Matter presented in CAI was logically arranged.”

Experimental Group B: Responses of the students in percentage

Table 4.78 Responses of Exp Gp B students in percentage for statement 17 for Initial Try-out

Points	Exp Gp B
5	20.83
4	20.83
3	33.33
2	12.50
1	12.50

20.83% of the students strongly agree with the statement “Matter presented in CAI was logically arranged.”

20.83% of the students agree with the statement “Matter presented in CAI was logically arranged.”

33.33% of the students not decided with the statement “Matter presented in CAI was logically arranged.”

12.50% of the students disagree with the statement “Matter presented in CAI was logically arranged.”

12.50% of the students strongly disagree with the statement “Matter presented in CAI was logically arranged.”

Graphical Representation of analysis of statement 17 in Percentage

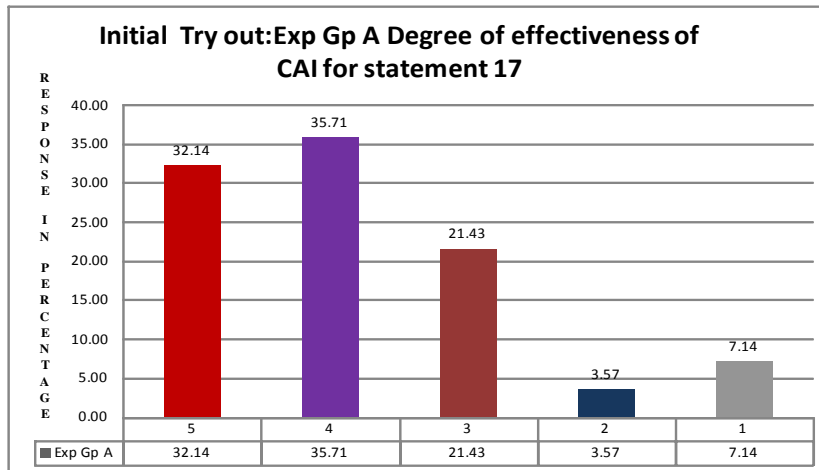


Figure 4.35 Graphical Representation of analysis of statement 17 in Percentage for Exp Gp A for Initial Try-out

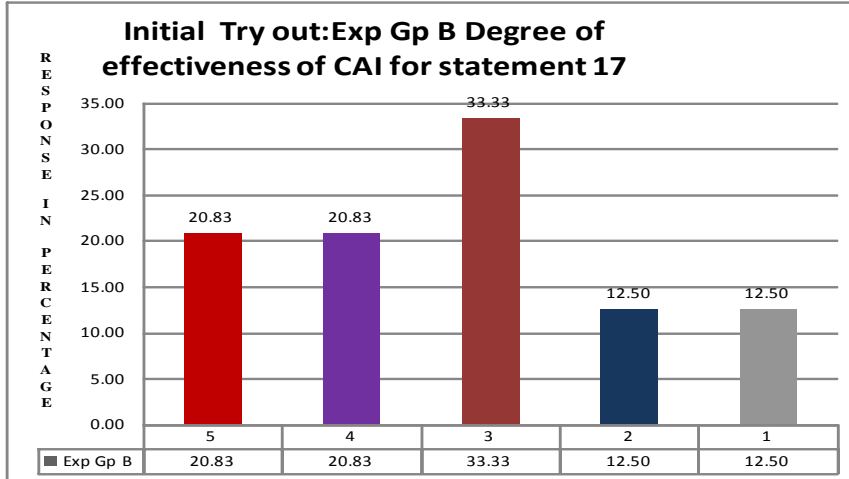


Figure 4.36 Graphical Representation of analysis of statement 17 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.79 Chi Square Table for Exp Gp A for Statement 17 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	9	5.6
4	10	5.6
3	6	5.6
2	1	5.6
1	2	5.6

chi-square = 11.6

degrees of freedom = 4

probability = 0.020

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Matter presented in CAI was logically arranged.”

Experimental Group B

Table 4.80 Chi Square Table for Exp Gp B for Statement 17 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	4.8
4	5	4.8
3	8	4.8
2	3	4.8
1	3	4.8

chi-square = 3.50

degrees of freedom = 4

probability = 0.478

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 18: Learning through CAI was waste of time.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.81 Responses of Exp Gp A students in percentage for statement 18 for Initial Try-out

Points	Exp Gp A
5	6.90
4	48.28
3	31.03
2	13.79
1	0.00

6.90% of the students strongly disagree with the statement“Learning through CAI was waste of time.”

48.28% of the students disagree with the statement“Learning through CAI was waste of time.”

31.03% of the students not decided with the statement “Learning through CAI was waste of time.”

13.79% of the students agree with the statement“Learning through CAI was waste of time.”

0.00% of the students strongly agree with the statement“Learning through CAI was waste of time.”

Experimental Group B: Responses of the students in percentage

Table 4.82 Responses of Exp Gp B students in percentage for statement 18 for Initial Try-out

Points	Exp Gp B
5	20.83
4	12.50
3	45.83
2	4.17
1	16.67

20.83% of the students strongly disagree with the statement“Learning through CAI was waste of time.”

12.50% of the students disagree with the statement“Learning through CAI was waste of time.”

45.83% of the students not decided with the statement“Learning through CAI was waste of time.”

4.17% of the students agree with the statement“Learning through CAI was waste of time.”

16.67% of the students strongly agree with the statement“Learning through CAI was waste of time.”

Graphical Representation of analysis of statement 18 in Percentage

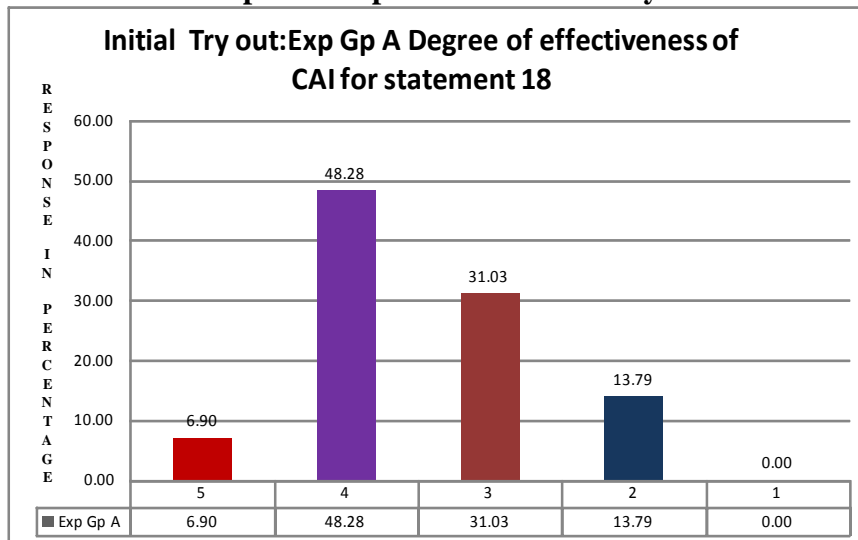


Figure 4.37 Graphical Representation of analysis of statement 18 in Percentage for Exp Gp A for Initial Try-out

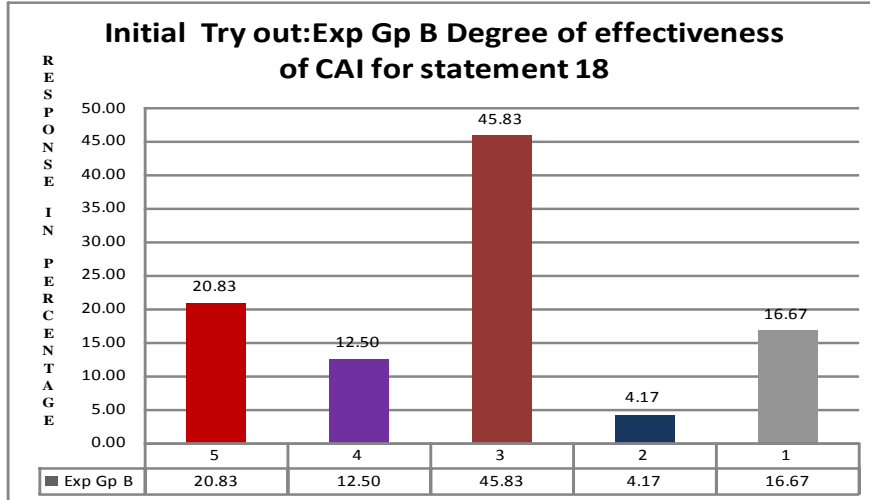


Figure 4.38 Graphical Representation of analysis of statement 18 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.83 Chi Square Table for Exp Gp A for Statement 18 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	5.8
4	14	5.8
3	9	5.8
2	4	5.8
1	0	5.8

chi-square = 22.2

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “Learning through CAI was waste of time.”

Experimental Group B

Table 4.84 Chi Square Table for Exp Gp B for Statement 18 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	4.8
4	3	4.8
3	11	4.8
2	1	4.8
1	4	4.8

chi-square = 11.8

degrees of freedom = 4

probability = 0.019

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “Learning through CAI was waste of time”.

Statement 19: Illustrations given in CAI are related to day today life experiences.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.85 Responses of Exp Gp A students in percentage for statement 19 for Initial Try-out

Points	Exp Gp A
5	39.29
4	25.00
3	28.57
2	7.14
1	0.00

39.29% of the students strongly agree with the statement “Illustrations given in CAI are related to day today life experiences.”

25.00% of the students agree with the statement “Illustrations given in CAI are related to day today life experiences.”

28.57% of the students not decided with the statement “Illustrations given in CAI are related to day today life experiences.”

7.14% of the students disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

0.00% of the students strongly disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

Experimental Group B: Responses of the students in percentage

Table 4.86 Responses of Exp Gp B students in percentage for statement 19 for Initial Try-out

Points	Exp Gp B
5	50.00
4	20.83
3	20.83
2	8.33
1	0.00

50.00% of the students strongly agree with the statement “Illustrations given in CAI are related to day today life experiences.”

20.83% of the students agree with the statement “Illustrations given in CAI are related to day today life experiences.”

20.83% of the students not decided with the statement “Illustrations given in CAI are related to day today life experiences.”

8.33% of the students disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

0.00% of the students strongly disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

Graphical Representation of analysis of statement 19 in Percentage

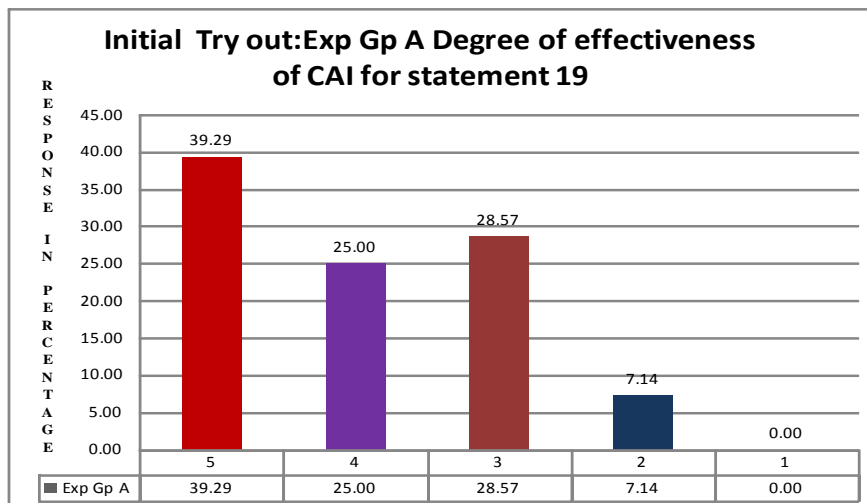


Figure 4.39 Graphical Representation of analysis of statement 19 in Percentage for Exp Gp A for Initial Try-out

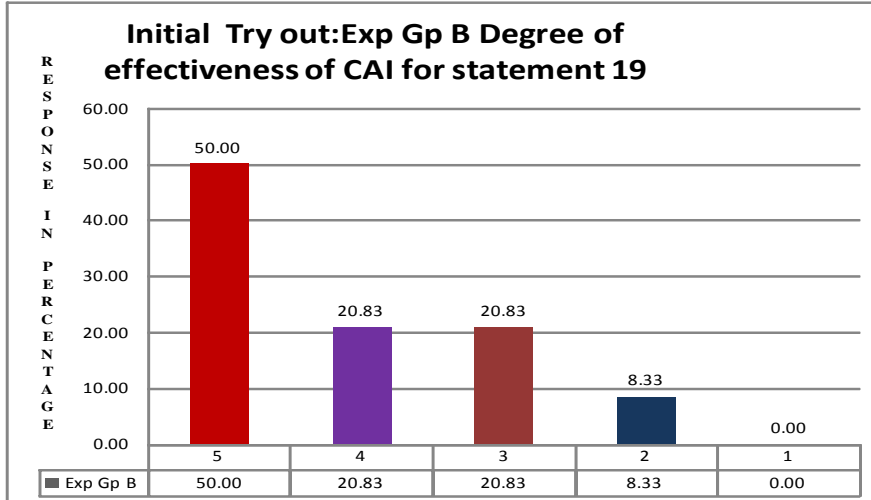


Figure 4.40 Graphical Representation of analysis of statement 19 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.87 Chi Square Table for ExpGp A for Statement 19 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	5.6
4	7	5.6
3	8	5.6
2	2	5.6
1	0	5.6

chi-square = 14.5

degrees of freedom = 4

probability = 0.006

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Illustrations given in CAI are related to day today life experiences.”

Experimental Group B

Table 4.88 Chi Square Table for Exp Gp B for Statement 19 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	12	4.8
4	5	4.8
3	5	4.8
2	2	4.8
1	0	4.8

chi-square = 17.2

degrees of freedom = 4

probability = 0.002

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Illustrations given in CAI are related to day today life experiences”.

Statement 20: Classroom teaching is more enjoyable.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.89 Responses of Exp Gp A students in percentage for statement 20 for Initial Try-out

Points	Exp Gp A
5	39.29
4	17.86
3	32.14
2	7.14
1	3.57

39.29% of the students strongly disagree with the statement “Classroom teaching is more enjoyable.”

17.86% of the students disagree with the statement “Classroom teaching is more enjoyable.”

32.14% of the students not decided with the statement “Classroom teaching is more enjoyable.”

7.14% of the students agree with the statement “Classroom teaching is more enjoyable.”

3.57% of the students strongly agree with the statement “Classroom teaching is more enjoyable.”

Experimental Group B: Responses of the students in percentage

Table 4.90 Responses of Exp Gp B students in percentage for statement 20 for Initial Try-out

Points	Exp Gp B
5	20.83
4	33.33
3	16.67
2	20.83
1	12.50

20.83% of the students strongly disagree with the statement “Classroom teaching is more enjoyable.”

33.33% of the students disagree with the statement “Classroom teaching is more enjoyable.”

16.67% of the students not decided with the statement “Classroom teaching is more enjoyable.”

20.83% of the students agree with the statement “Classroom teaching is more enjoyable.”

12.50% of the students strongly agree with the statement “Classroom teaching is more enjoyable.”

Graphical Representation of analysis of statement 20 in Percentage

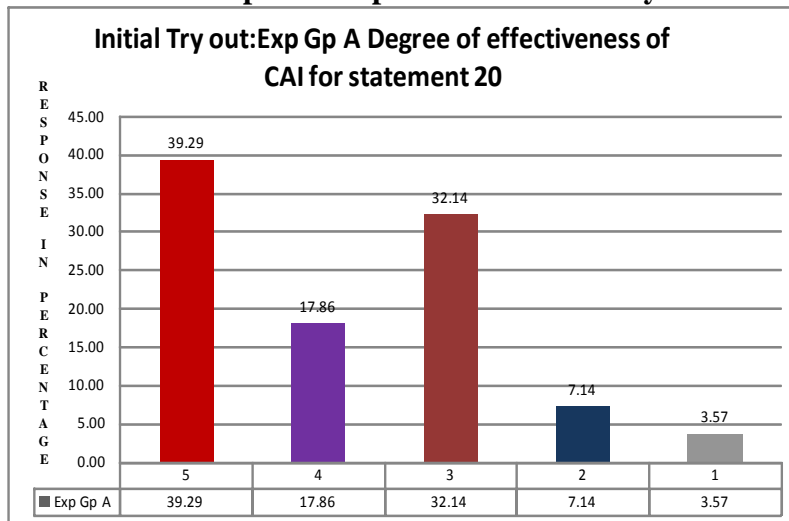


Figure 4.41 Graphical Representation of analysis of statement 20 in Percentage for Exp Gp A for Initial Try-out

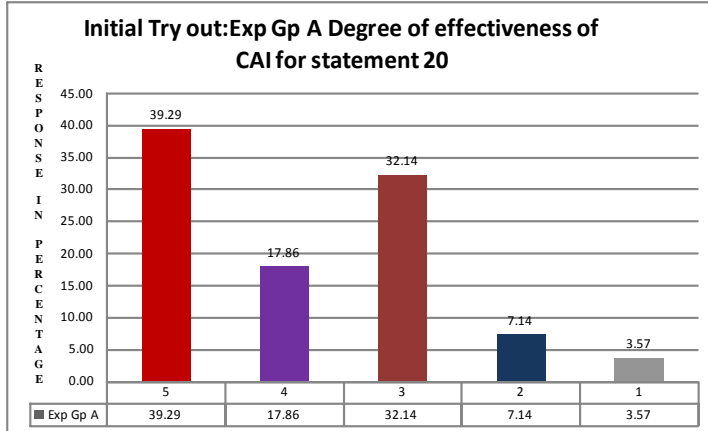


Figure 4.42 Graphical Representation of analysis of statement 20 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.91 Chi Square Table for ExpGp A for Statement 20 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	5.6
4	5	5.6
3	9	5.6
2	2	5.6
1	1	5.6

chi-square = 13.4

degrees of freedom = 4

probability = 0.009

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly disagree therefore most of the students strongly disagree with the statement “Classroom teaching is more enjoyable.”

Experimental Group B

Table 4.92 Chi Square Table for Exp Gp B for Statement 20 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5
4	8	5
3	4	5
2	5	5
1	3	5

chi-square = 2.80

degrees of freedom = 4

probability = 0.592

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 21: The language used in CAI is easy and simple to understand.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.93 Responses of Exp Gp A students in percentage for statement 21 for Initial Try-out

Points	Exp Gp A
5	24.14
4	58.62
3	17.24
2	0.00
1	0.00

24.14% of the students strongly agree with the statement “The language used in CAI is easy and simple to understand.”

58.62% of the students agree with the statement “The language used in CAI is easy and simple to understand.”

17.24% of the students not decided with the statement “The language used in CAI is easy and simple to understand.”

0.00% of the students disagree with the statement “The language used in CAI is easy and simple to understand.”

0.00% of the students strongly disagree with the statement “The language used in CAI is easy and simple to understand.”

Experimental Group B: Responses of the students in percentage

Table 4.94 Responses of Exp Gp B students in percentage for statement 21 for Initial Try-out

Points	Exp Gp B
5	44.00
4	12.00
3	20.00
2	24.00
1	0.00

44.00% of the students strongly agree with the statement “The language used in CAI is easy and simple to understand.”

12.00% of the students agree with the statement “The language used in CAI is easy and simple to understand.”

20.00% of the students not decided with the statement “The language used in CAI is easy and simple to understand.”

24.00% of the students disagree with the statement “The language used in CAI is easy and simple to understand.”

0.00% of the students strongly disagree with the statement “The language used in CAI is easy and simple to understand.”

Graphical Representation of analysis of statement 21 in Percentage

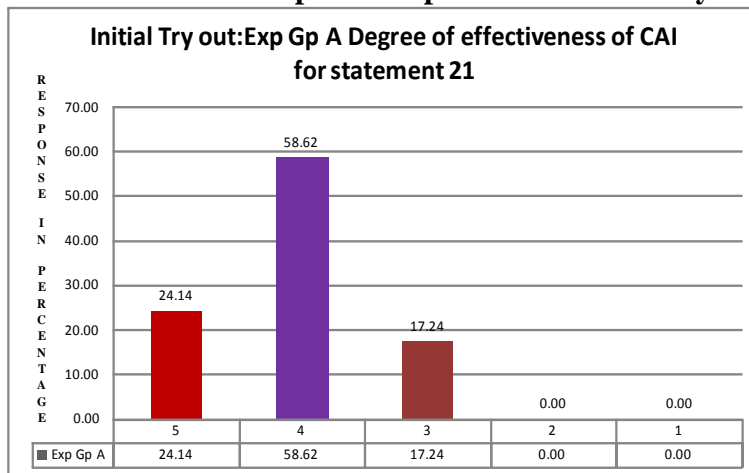


Figure 4.43 Graphical Representation of analysis of statement 21in Percentage for Exp Gp A for Initial Try-out

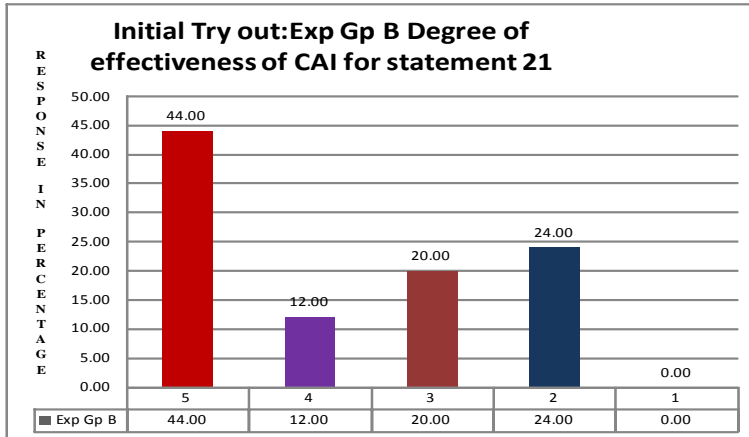


Figure 4.44 Graphical Representation of analysis of statement 21in Percentage for Exp Gp A for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.95 Chi Square Table for Exp Gp A for Statement 21 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	5.8
4	17	5.8
3	5	5.8
2	0	5.8
1	0	5.8

chi-square = 33.6

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “The language used in CAI is easy and simple to understand.”

Experimental Group B

Table 4.96 Chi Square Table for Exp Gp B for Statement 21 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	5
4	3	5
3	5	5
2	6	5
1	0	5

chi-square = 13.2

degrees of freedom = 4

probability = 0.010

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “The language used in CAI is easy and simple to understand”.

Statement 22: The exercises given in each chapter is adequate.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.97 Responses of Exp Gp A students in percentage for statement 22 for Initial Try-out

Points	Exp Gp A
5	21.43
4	28.57
3	14.29
2	25.00
1	10.71

21.43% of the students strongly agree with the statement “The exercises given in each chapter is adequate.”

28.57% of the students agree with the statement “The exercises given in each chapter is adequate.”

14.29% of the students not decided with the statement “The exercises given in each chapter is adequate.”

25.00% of the students disagree with the statement “The exercises given in each chapter is adequate.”

10.71% of the students strongly disagree with the statement “The exercises given in each chapter is adequate.”

Experimental Group B: Responses of the students in percentage

Table 4.98 Responses of Exp Gp B students in percentage for statement 22 for Initial Try-out

Points	Exp Gp B
5	29.17
4	41.67
3	8.33
2	8.33
1	12.50

29.17% of the students strongly agree with the statement “The exercises given in each chapter is adequate.”

41.67% of the students agree with the statement “The exercises given in each chapter is adequate.”

8.33% of the students not decided with the statement “The exercises given in each chapter is adequate.”

8.33% of the students disagree with the statement “The exercises given in each chapter is adequate.”

12.50% of the students strongly disagree with the statement “The exercises given in each chapter is adequate.”

Graphical Representation of analysis of statement 22 in Percentage

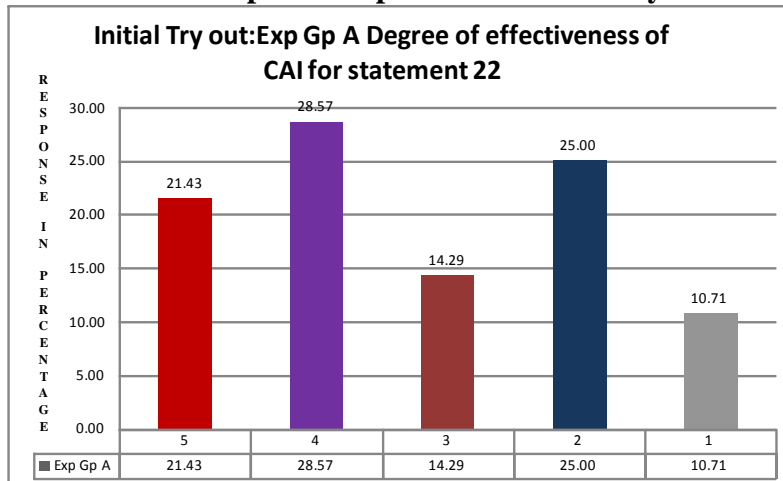


Figure 4.45 Graphical Representation of analysis of statement 22 in Percentage for Exp Gp A for Initial Try-out

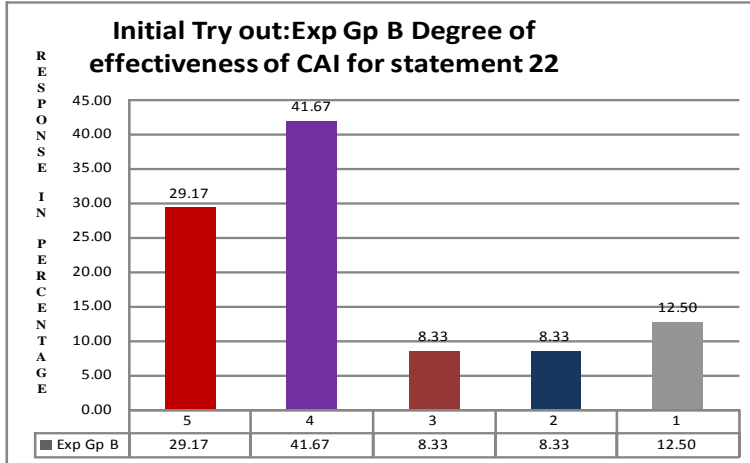


Figure 4.46 Graphical Representation of analysis of statement 22 in Percentage for Exp Gp B for Initial Try-out

Data Analysis Using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.99 Chi Square Table for Exp Gp A for Statement 22 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.6
4	8	5.6
3	4	5.6
2	7	5.6
1	3	5.6

chi-square = 3.07

degrees of freedom = 4

probability = 0.546

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.100 Chi Square Table for Exp Gp B for Statement 22for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	4.8
4	10	4.8
3	2	4.8
2	2	4.8
1	3	4.8

chi-square = 10.583

degrees of freedom = 4

probability = 0.0317

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “The exercises given in each chapter is adequate”.

Statement 23: CAI takes care of previous knowledge in the subject.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.101 Responses of Exp Gp A students in percentage for statement 23 for Initial Try-out

Points	Exp Gp A
5	21.43
4	57.14
3	21.43
2	0.00
1	0.00

21.43% of the students strongly agree with the statement “CAI takes care of previous knowledge in the subject.”

57.14% of the students agree with the statement “CAI takes care of previous knowledge in the subject.”

21.43% of the students not decided with the statement “CAI takes care of previous knowledge in the subject.”

0.00% of the students disagree with the statement “CAI takes care of previous knowledge in the subject.”

0.00% of the students strongly disagree with the statement “CAI takes care of previous knowledge in the subject.”

Experimental Group B: Responses of the students in percentage

Table 4.102 Responses of Exp Gp B students in percentage for statement 23 for Initial Try-out

Points	Exp Gp B
5	17.39
4	30.43
3	43.48
2	4.35
1	4.35

17.39% of the students strongly agree with the statement “CAI takes care of previous knowledge in the subject.”

30.43% of the students agree with the statement “CAI takes care of previous knowledge in the subject.”

43.48% of the students not decided with the statement “CAI takes care of previous knowledge in the subject.”

4.35% of the students disagree with the statement “CAI takes care of previous knowledge in the subject.”

4.35% of the students strongly disagree with the statement “CAI takes care of previous knowledge in the subject.”

Graphical Representation of analysis of statement 23 in Percentage

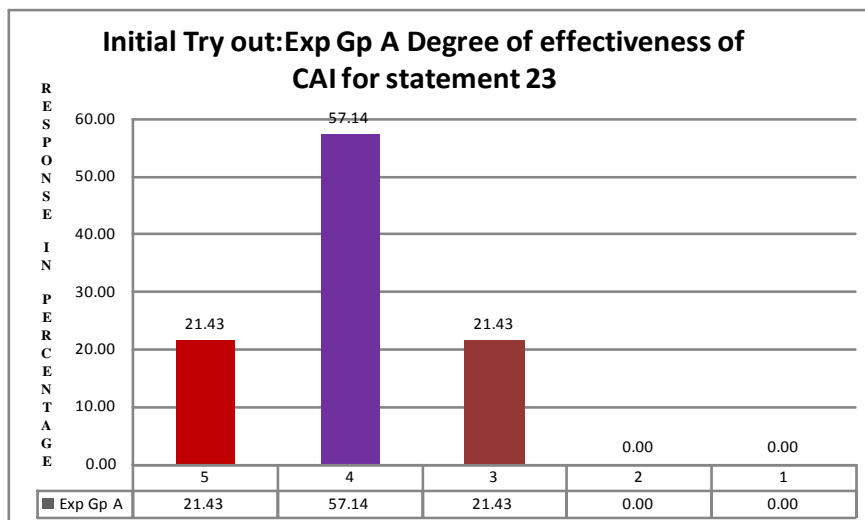


Figure 4.47 Graphical Representation of analysis of statement 23 in Percentage for Exp Gp A for Initial Try-out

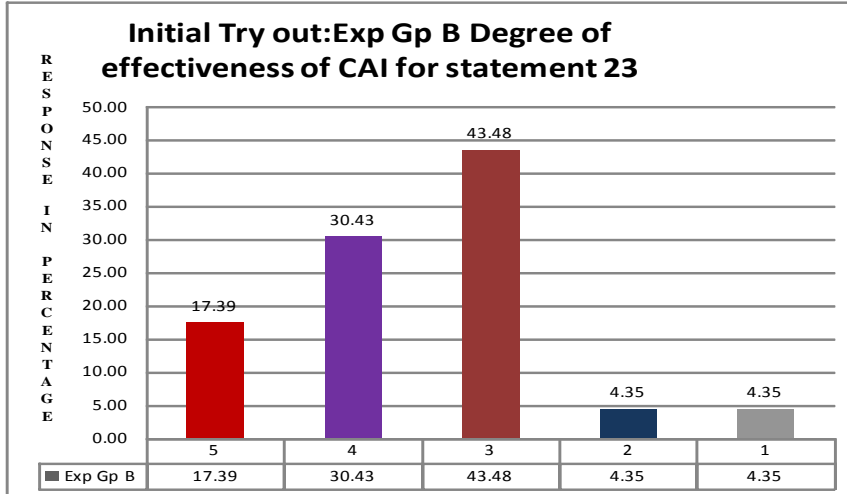


Figure 4.48 Graphical Representation of analysis of statement 23in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀ Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.103 Chi Square Table for Exp Gp A for Statement 23 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.6
4	16	5.6
3	6	5.6
2	0	5.6
1	0	5.6

chi-square = 30.6

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “CAI takes care of previous knowledge in the subject.”

Experimental Group B

Table 4.104 Chi Square Table for Exp Gp B for Statement 23 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	4.6
4	7	4.6
3	10	4.6
2	1	4.6
1	1	4.6

Chi-square = 13.3

degrees of freedom = 4

probability = 0.010

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “CAI takes care of previous knowledge in the subject”.

Statement 24 The solution to the problem is not easy to understand.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.105 Responses of Exp Gp A students in percentage for statement 24 for Initial Try-out

Points	Exp Gp A
5	10.71
4	32.14
3	14.29
2	21.43
1	21.43

10.71% of the students strongly disagree with the statement “The solution to the problem is not easy to understand.”

32.14% of the students disagree with the statement “The solution to the problem is not easy to understand.”

14.29% of the students not decided with the statement “The solution to the problem is not easy to understand.”

21.43% of the students agree with the statement “The solution to the problem is not easy to understand.”

21.43% of the students strongly agree with the statement “The solution to the problem is not easy to understand.”

Experimental Group B: Responses of the students in percentage

Table 4.106 Responses of Exp Gp B students in percentage for statement 24for Initial Try-out

Points	Exp Gp B
5	25.00
4	29.17
3	16.67
2	16.67
1	12.50

25.00% of the students strongly disagree with the statement “The solution to the problem is not easy to understand.”

29.17% of the students disagree with the statement “The solution to the problem is not easy to understand.”

16.67% of the students not decided with the statement “The solution to the problem is not easy to understand.”

16.67% of the students agree with the statement “The solution to the problem is not easy to understand.”

12.50% of the students strongly agree with the statement “The solution to the problem is not easy to understand.”

Graphical Representation of analysis of statement 24 in Percentage

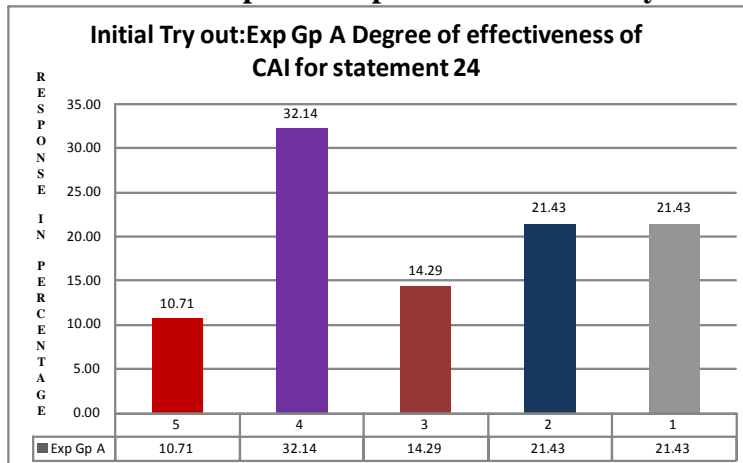


Figure 4.49 Graphical Representation of analysis of statement 24 in Percentage for Exp Gp A for Initial Try-out

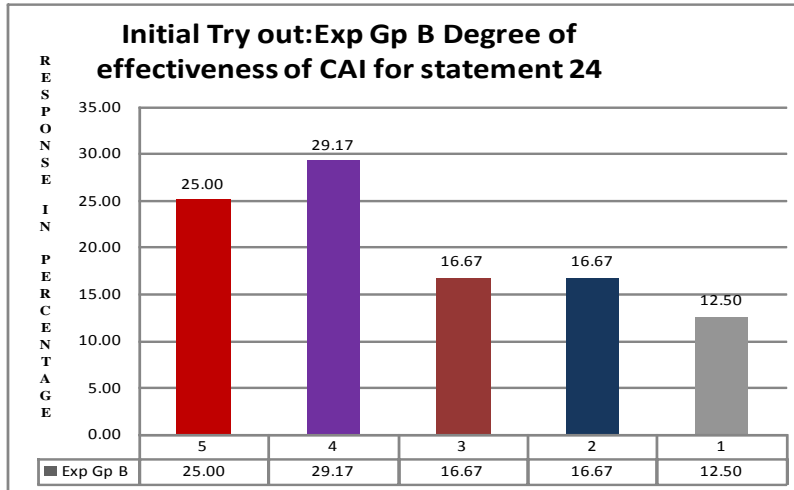


Figure 4.50 Graphical Representation of analysis of statement 24 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.107 Chi Square Table for Exp Gp A for Statement 24 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.6
4	9	5.6
3	4	5.6
2	6	5.6
1	6	5.6

chi-square = 3.79

degrees of freedom = 4

probability = 0.436

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.108 Chi Square Table for Exp Gp B for Statement 24 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	7	4.8
3	4	4.8
2	4	4.8
1	3	4.8

chi-square = 2.25

degrees of freedom = 4

probability = 0.690

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.109 Responses of Exp Gp A students in percentage for statement 25 for Initial Try-out

Points	Exp Gp A
5	10.71
4	21.43
3	53.57
2	10.71
1	3.57

10.71% of the students strongly agree with the statement “The exercises helped in understanding the chapter in depth.”

21.43% of the students agree with the statement “The exercises helped in understanding the chapter in depth.”

53.57% of the students not decided with the statement “The exercises helped in understanding the chapter in depth.”

10.71% of the students disagree with the statement “The exercises helped in understanding the chapter in depth.”

3.57% of the students strongly disagree with the statement “The exercises helped in understanding the chapter in depth.”

Experimental Group B: Responses of the students in percentage

Table 4.110 Responses of Exp Gp B students in percentage for statement 25 for Initial Try-out

Points	Exp Gp B
5	33.33
4	20.83
3	12.50
2	29.17
1	4.17

33.33% of the students strongly agree with the statement “The exercises helped in understanding the chapter in depth.”

20.83% of the students agree with the statement “The exercises helped in understanding the chapter in depth.”

12.50% of the students not decided with the statement “The exercises helped in understanding the chapter in depth.”

29.17% of the students disagree with the statement “The exercises helped in understanding the chapter in depth.”

4.17% of the students strongly disagree with the statement “The exercises helped in understanding the chapter in depth.”

Graphical Representation of analysis of statement 25 in Percentage

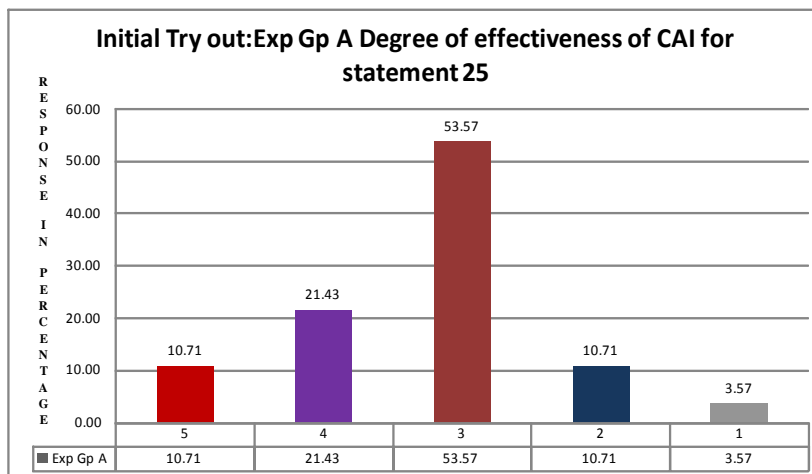


Figure 4.51 Graphical Representation of analysis of statement 25 in Percentage for Exp Gp A for Initial Try-out

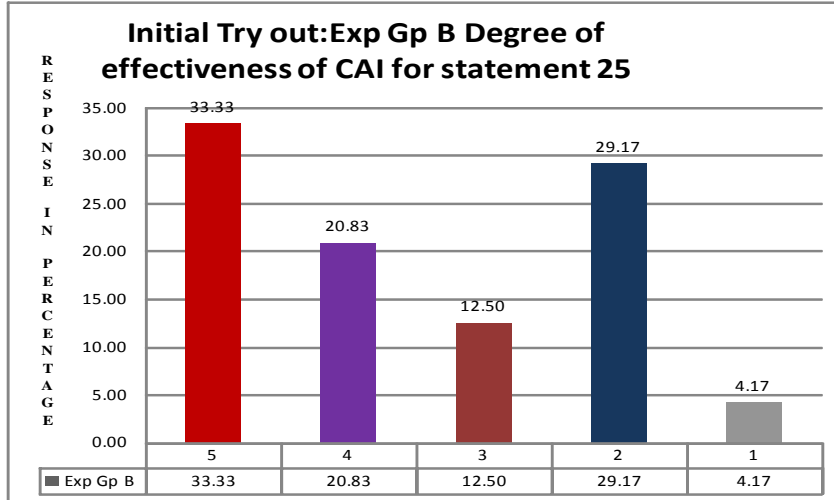


Figure 4.52 Graphical Representation of analysis of statement 25 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.111 Chi Square Table for Exp Gp A for Statement 25 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.6
4	6	5.6
3	15	5.6
2	3	5.6
1	1	5.6

chi-square = 22.0

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “The exercises helped in understanding the chapter in depth.”

Experimental Group B

Table 4.112 Chi Square Table for Exp Gp B for Statement 25 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	8	4.8
4	5	4.8
3	3	4.8
2	7	4.8
1	1	4.8

chi-square = 6.83

degrees of freedom = 4

probability = 0.145

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 26 Solutions didn't help me whenever I was not able to solve the problem.

Polarity: Negative.

Experimental Group A : Responses of the students in percentage

Table 4.113 Responses of Exp Gp A students in percentage for statement 26 for Initial Try-out

Points	Exp Gp A
5	10.71
4	42.86
3	14.29
2	17.86
1	14.29

10.71% of the students strongly disagree with the statement "Solutions didn't help me whenever I was not able to solve the problem."

42.86% of the students disagree with the statement "Solutions didn't help me whenever I was not able to solve the problem."

14.29% of the students not decided with the statement "Solutions didn't help me whenever I was not able to solve the problem."

17.86% of the students agree with the statement "Solutions didn't help me whenever I was not able to solve the problem."

14.29% of the students strongly agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

Experimental Group B: Responses of the students in percentage

Table 4.114 Responses of Exp Gp B students in percentage for statement 26 for Initial Try-out

Points	Exp Gp B
5	39.13
4	17.39
3	8.70
2	21.74
1	13.04

39.13% of the students strongly disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

17.39% of the students disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

8.70% of the students not decided with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

21.74% of the students agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

13.04% of the students strongly agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

Graphical Representation of analysis of statement 26 in Percentage

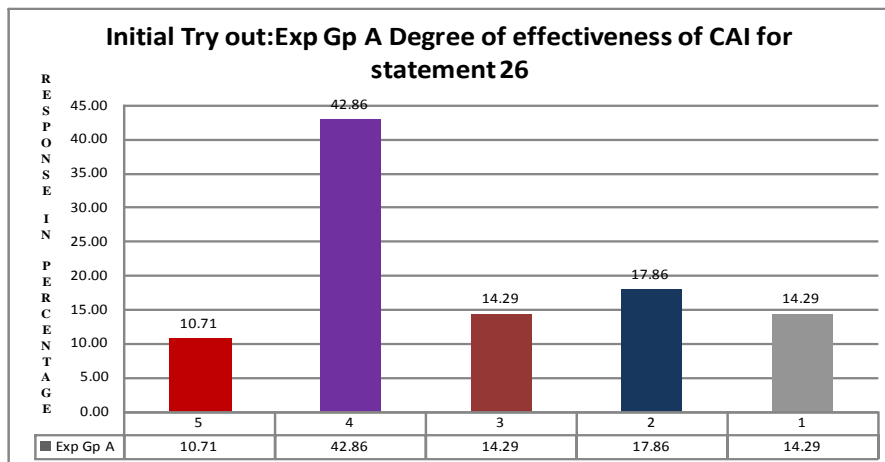


Figure 4.53 Graphical Representation of analysis of statement 26 in Percentage for Exp Gp A for Initial Try-out

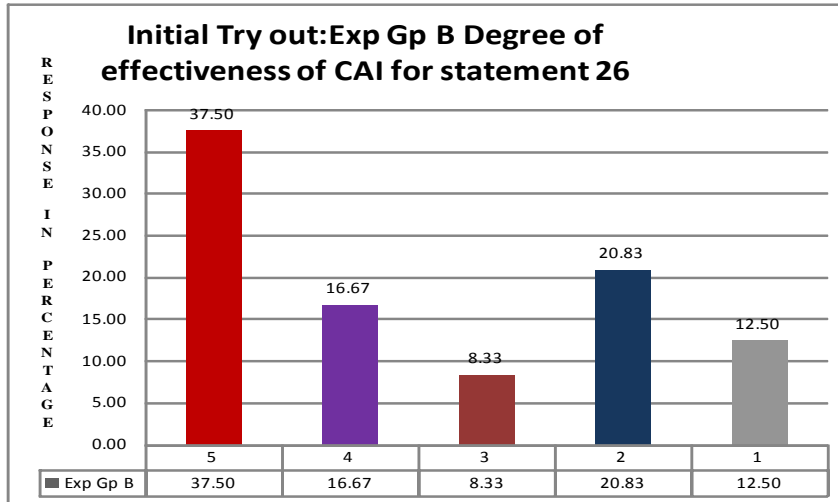


Figure 4.54 Graphical Representation of analysis of statement 26 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.115 Chi Square Table for ExpGp A for Statement 26 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.6
4	12	5.6
3	4	5.6
2	5	5.6
1	4	5.6

chi-square = 9.5

degrees of freedom = 4

probability = 0.0497

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

Experimental Group B

Table 4.116 Chi Square Table for Exp Gp B for Statement 26 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	9	4.6
4	4	4.6
3	2	4.6
2	5	4.6
1	3	4.6

chi-square = 6.35

degrees of freedom = 4

probability = 0.175

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.117 Responses of Exp Gp A students in percentage for statement 27 for Initial Try-out

Points	Exp Gp A
5	18.52
4	44.44
3	25.93
2	11.11
1	0.00

18.52% of the students strongly agree with the statement “Break given in CAI helped me to refresh my mind.”

44.44% of the students agree with the statement “Break given in CAI helped me to refresh my mind.”

25.93% of the students not decided with the statement “Break given in CAI helped me to refresh my mind.”

11.11% of the students disagree with the statement “Break given in CAI helped me to refresh my mind.”

0.00% of the students strongly disagree with the statement “Break given in CAI helped me to refresh my mind.”

Experimental Group B: Responses of the students in percentage

Table 4.118 Responses of Exp Gp B students in percentage for statement 27 for Initial Try-out

Points	Exp Gp B
5	37.50
4	25.00
3	29.17
2	0.00
1	8.33

37.50% of the students strongly agree with the statement “Break given in CAI helped me to refresh my mind.”

25.00% of the students agree with the statement “Break given in CAI helped me to refresh my mind.”

29.17% of the students not decided with the statement “Break given in CAI helped me to refresh my mind.”

0.00% of the students disagree with the statement “Break given in CAI helped me to refresh my mind.”

8.33% of the students strongly disagree with the statement “Break given in CAI helped me to refresh my mind.”

Graphical Representation of analysis of statement 27 in Percentage

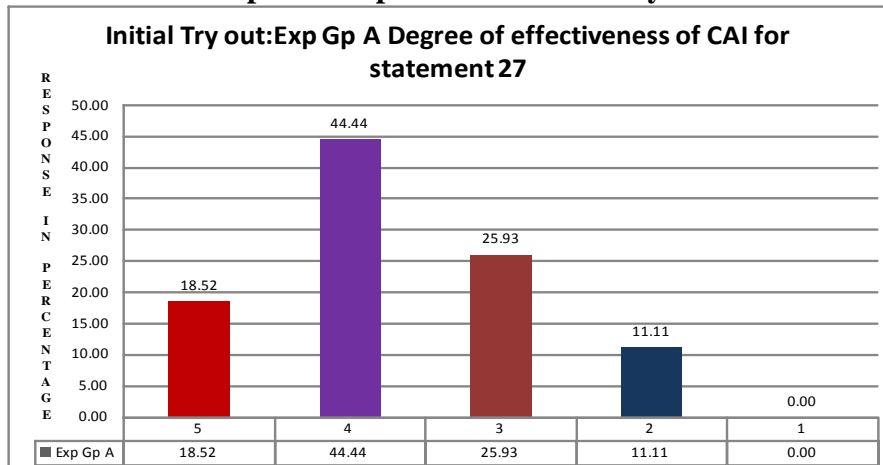


Figure 4.55 Graphical Representation of analysis of statement 27 in Percentage for Exp Gp A for Initial Try-out

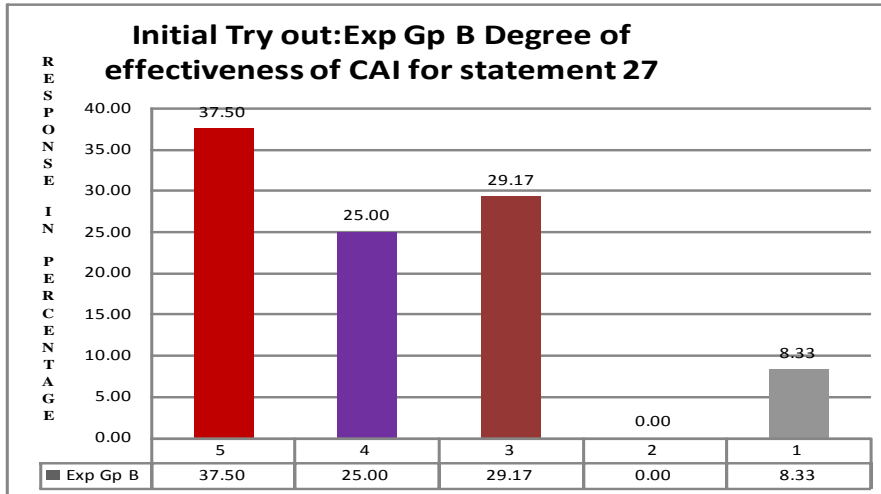


Figure 4.56 Graphical Representation of analysis of statement 27 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.119 Chi Square Table for Exp Gp A for Statement 27 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.4
4	12	5.4
3	7	5.4
2	3	5.4
1	0	5.4

chi-square = 15.0

degrees of freedom = 4

probability = 0.005

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Break given in CAI helped me to refresh my mind”

Experimental Group B

Table 4.120 Chi Square Table for Exp Gp B for Statement 27 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	9	4.8
4	6	4.8
3	7	4.8
2	0	4.8
1	2	4.8

chi-square = 11.4

degrees of freedom = 4

probability = 0.022

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Break given in CAI helped me to refresh my mind”.

Statement 28: I am feeling tired while going through the slide.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.121 Responses of Exp Gp A students in percentage for statement 28 for Initial Try-out

Points	Exp Gp A
5	14.81
4	25.93
3	29.63
2	18.52
1	11.11

14.81% of the students strongly disagree with the statement “I am feeling tired while going through the slide.”

25.93% of the students disagree with the statement “I am feeling tired while going through the slide.”

29.63% of the students not decided with the statement “I am feeling tired while going through the slide.”

18.52% of the students agree with the statement “I am feeling tired while going through the slide.”

11.11% of the students strongly agree with the statement “I am feeling tired while going through the slide.”

Experimental Group B: Responses of the students in percentage

Table 4.122 Responses of Exp Gp B students in percentage for statement 28 for Initial Try-out

Points	Exp Gp B
5	24.00
4	40.00
3	24.00
2	8.00
1	4.00

24.00% of the students strongly disagree with the statement “I am feeling tired while going through the slide.”

40.00% of the students disagree with the statement “I am feeling tired while going through the slide.”

24.00% of the students not decided with the statement “I am feeling tired while going through the slide.”

8.00% of the students agree with the statement “I am feeling tired while going through the slide.”

4.00% of the students strongly agree with the statement “I am feeling tired while going through the slide.”

Graphical Representation of analysis of statement 28 in Percentage

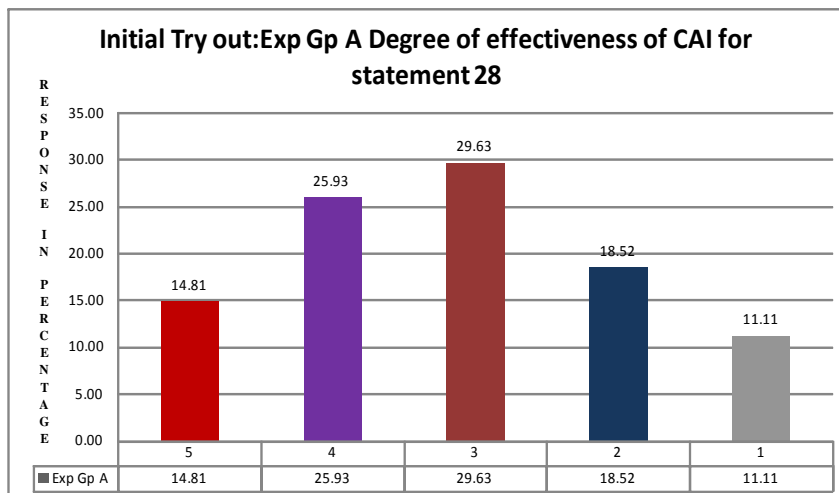


Figure 4.57 Graphical Representation of analysis of statement 28 in Percentage for Exp Gp A for Initial Try-out

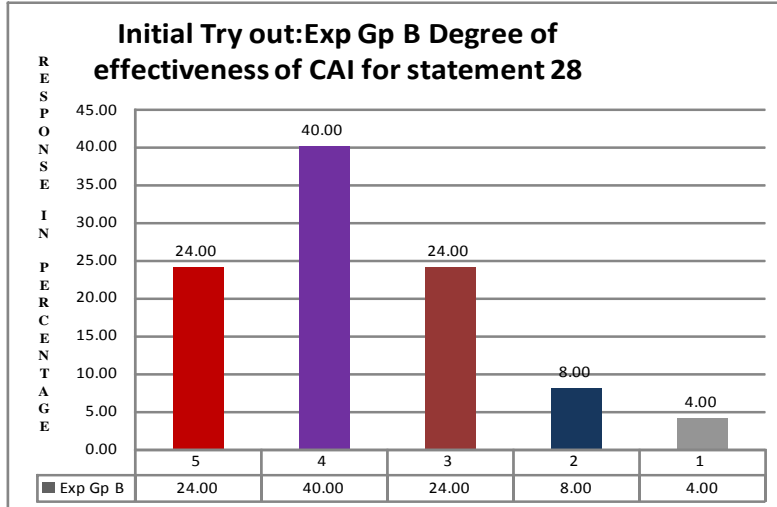


Figure 4.58 Graphical Representation of analysis of statement 28 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.123 Chi Square Table for Exp Gp A for Statement 28 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	7	5.4
3	8	5.4
2	5	5.4
1	3	5.4

chi-square = 3.19

degrees of freedom = 4

probability = 0.527

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.124 Chi Square Table for Exp Gp B for Statement 28 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5
4	10	5
3	6	5
2	2	5
1	1	5

chi-square = 10.4

degrees of freedom = 4

probability = 0.0342

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I am feeling tired while going through the slide”.

Statement 29: Animation shown in CAI is appropriate to help me in understanding the concept.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.125 Responses of Exp Gp A students in percentage for statement 29 for Initial Try-out

Points	Exp Gp A
5	44.44
4	33.33
3	18.52
2	3.70
1	0.00

44.44% of the students strongly agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

33.33% of the students agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

18.52% of the students not decided with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

3.70% of the students disagree with the statement “Animation shown in CAI is appropriate to

help me in understanding the concept.”

0.00% of the students strongly disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

Experimental Group B: Responses of the students in percentage

Table 4.126 Responses of Exp Gp B students in percentage for statement 29 for Initial Try-out

Points	Exp Gp B
5	45.83
4	20.83
3	16.67
2	12.50
1	4.17

45.83% of the students strongly agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

20.83% of the students agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

16.67% of the students not decided with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

12.50% of the students disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

4.17% of the students strongly disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

Graphical Representation of analysis of statement 29 in Percentage

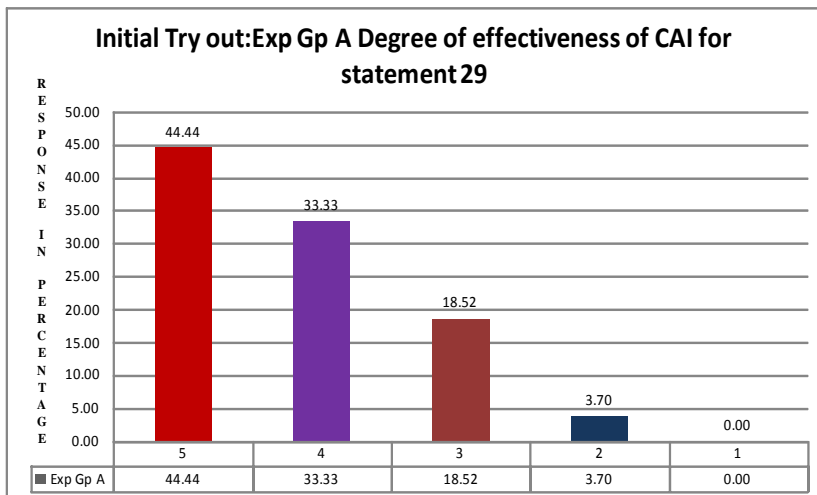


Figure 4.59 Graphical Representation of analysis of statement 29 in Percentage for Exp Gp A for Initial Try-out

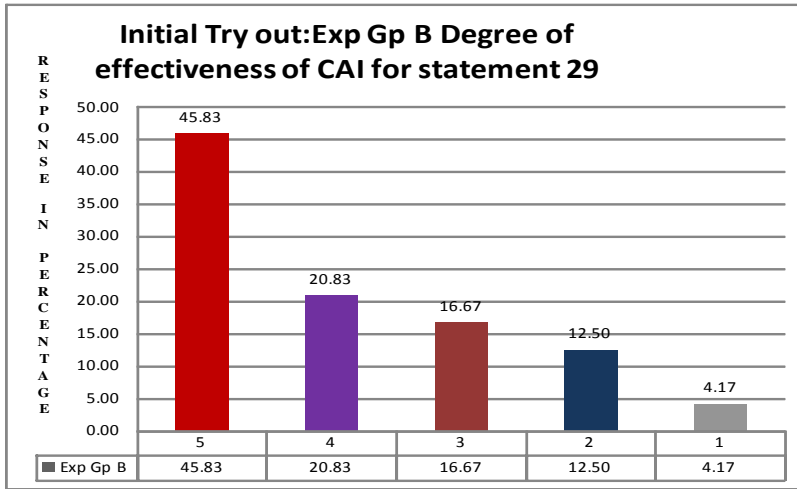


Figure 4.60 Graphical Representation of analysis of statement 29 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

Ho: Response is uniformly distributed in the 5 point scale

H1: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.127 Chi Square Table for Exp Gp A for Statement 29 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	12	5.4
4	9	5.4
3	5	5.4
2	1	5.4
1	0	5.4

chi-square = 19.5

degrees of freedom = 4

probability = 0.001

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept”

Experimental Group B

Table 4.128 Chi Square Table for Exp Gp B for Statement 29 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	4.8
4	5	4.8
3	4	4.8
2	3	4.8
1	1	4.8

chi-square = 11.8

degrees of freedom = 4

probability = 0.019

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept”.

Statement 30: Topic is not introduced properly.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.129 Responses of Exp Gp A students in percentage for statement 30 for Initial Try-out

Points	Exp Gp A
5	14.81
4	40.74
3	25.93
2	18.52
1	0.00

14.81% of the students strongly disagree with the statement “Topic is not introduced properly.”

40.74% of the students disagree with the statement “Topic is not introduced properly.”

25.93% of the students not decided with the statement “Topic is not introduced properly.”

18.52% of the students agree with the statement “Topic is not introduced properly.”

0.00% of the students strongly agree with the statement “Topic is not introduced properly.”

Experimental Group B: Responses of the students in percentage

Table 4.130 Responses of Exp Gp B students in percentage for statement 30 for Initial Try-out

Points	Exp Gp B
5	44.00
4	16.00
3	24.00
2	8.00
1	8.00

44.00% of the students strongly disagree with the statement “Topic is not introduced properly.”

16.00% of the students disagree with the statement “Topic is not introduced properly.”

24.00% of the students not decided with the statement “Topic is not introduced properly.”

8.00% of the students agree with the statement “Topic is not introduced properly.”

8.00% of the students strongly agree with the statement “Topic is not introduced properly.”

Graphical Representation of analysis of statement 30 in Percentage

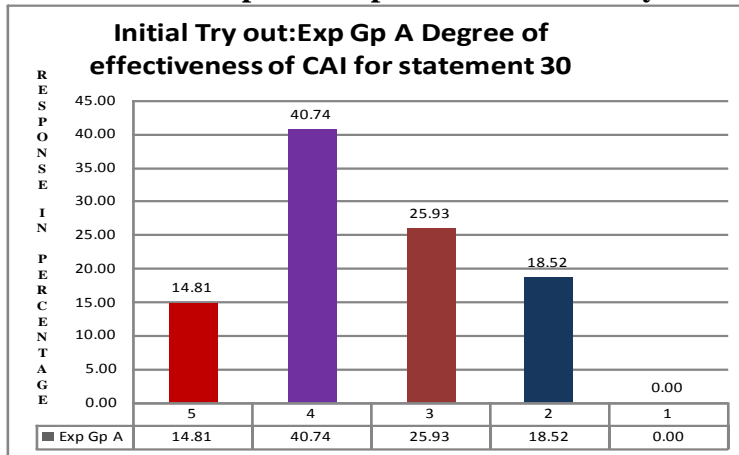


Figure 4.61 Graphical Representation of analysis of statement 30 in Percentage for Exp Gp A for Initial Try-out

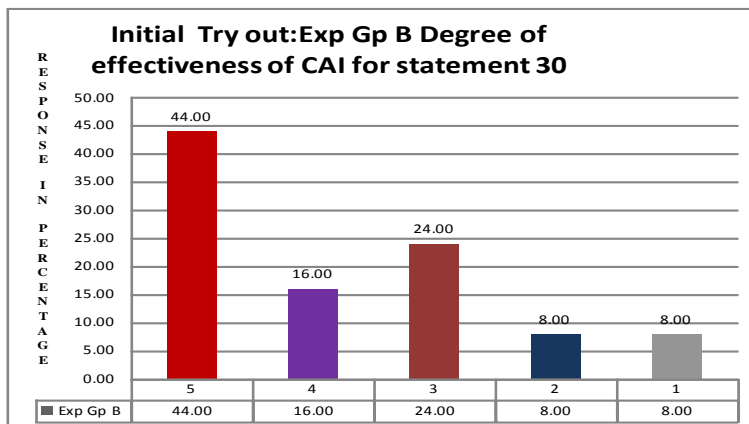


Figure 4.62 Graphical Representation of analysis of statement 30 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.131 Chi Square Table for Exp Gp A for Statement 30 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	11	5.4
3	7	5.4
2	5	5.4
1	0	5.4

chi-square = 12.1

degrees of freedom = 4

probability = 0.017

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “Topic is not introduced properly.”

Experimental Group B

Table 4.132 Chi Square Table for Exp Gp B for Statement 30 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	5
4	4	5
3	6	5
2	2	5
1	2	5

chi-square = 11.2

degrees of freedom = 4

probability = 0.024

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Topic is not introduced properly”.

Statement 31: CAI does not take care of previous knowledge (percentage) needed to understand the present concept.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.133 Responses of Exp Gp A students in percentage for statement 31 for Initial Try-out

Points	Exp Gp A
5	14.81
4	29.63
3	18.52
2	18.52
1	18.52

14.81% of the students strongly disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

29.63% of the students disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

18.52% of the students not decided with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

18.52% of the students agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

18.52% of the students strongly agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

Experimental Group B: Responses of the students in percentage

Table 4.134 Responses of Exp Gp B students in percentage for statement 31 for Initial Try-out

Points	Exp Gp B
5	26.09
4	8.70
3	21.74
2	26.09
1	17.39

26.09% of the students strongly disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

8.70% of the students disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

21.74% of the students not decided with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

26.09% of the students agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

17.39% of the students strongly agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

Graphical Representation of analysis of statement 31 in Percentage

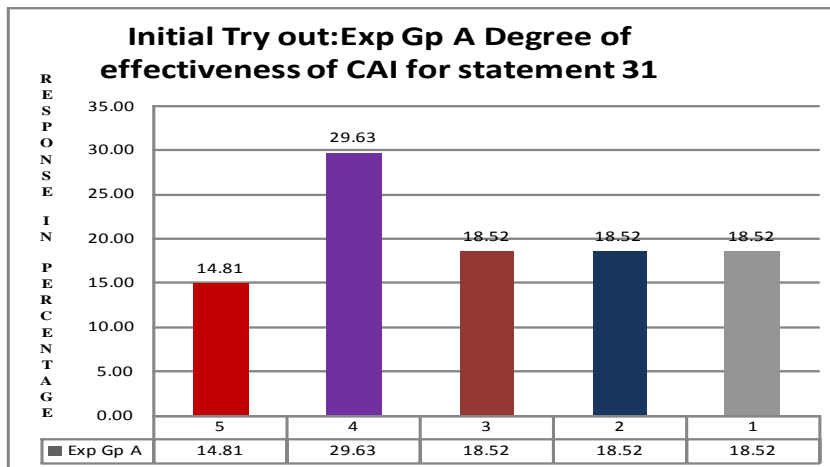


Figure 4.63 Graphical Representation of analysis of statement 31 in Percentage for Exp Gp A for Initial Try-out

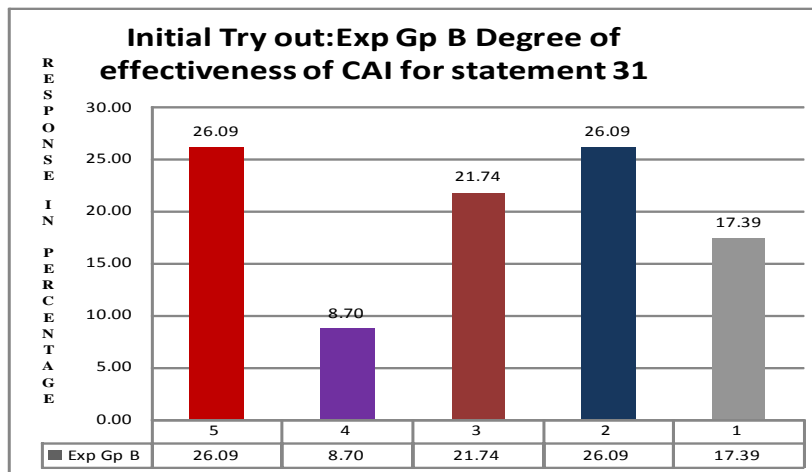


Figure 4.64 Graphical Representation of analysis of statement 31 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.135 Chi Square Table for Exp Gp A for Statement 31 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	8	5.4
3	5	5.4
2	5	5.4
1	5	5.4

chi-square = 1.70

degrees of freedom = 4

probability = 0.790

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.136 Chi Square Table for Exp Gp B for Statement 31 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.6
4	2	4.6
3	5	4.6
2	6	4.6
1	4	4.6

chi-square = 2.43

degrees of freedom = 4

probability = 0.656

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 32: Enough revision is not done in CAI after the topic simple interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.137 Responses of Exp Gp A students in percentage for statement 32 for Initial Try-out

Points	Exp Gp A
5	18.52
4	18.52
3	14.81
2	22.22
1	25.93

18.52% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

18.52% of the students disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

14.81% of the students not decided with the statement “Enough revision is not done in CAI after the topic simple interest.”

22.22% of the students agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

25.93% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

Experimental Group B: Responses of the students in percentage

Table 4.138 Responses of Exp Gp B students in percentage for statement 32 for Initial Try-out

Points	Exp Gp B
5	20.00
4	16.00
3	24.00
2	12.00
1	28.00

20.00% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

16.00% of the students disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

24.00% of the students not decided with the statement “Enough revision is not done in CAI after the topic simple interest.”

12.00% of the students agree with the statement “Enough revision is not done in CAI after the topic

simple interest.”

28.00% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

Graphical Representation of analysis of statement 32 in Percentage

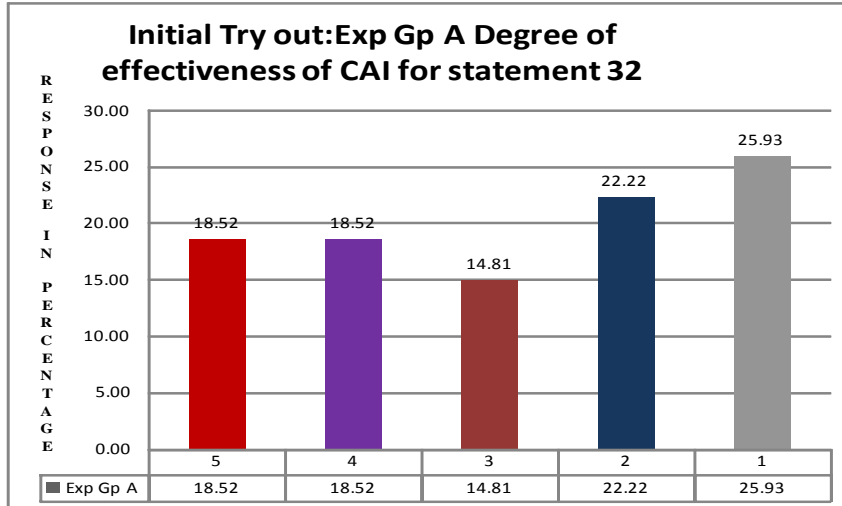


Figure 4.65 Graphical Representation of analysis of statement 32 in Percentage for Exp Gp A for Initial Try-out

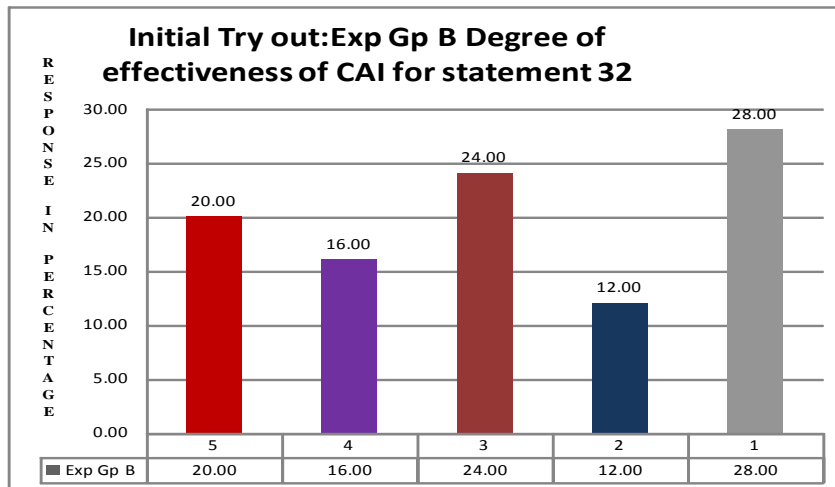


Figure 4.66 Graphical Representation of analysis of statement 32 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.139 Chi Square Table for ExpGp A for Statement 32 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.4
4	5	5.4
3	4	5.4
2	6	5.4
1	7	5.4

chi-square = 0.963

degrees of freedom = 4

probability = 0.915

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.140 Chi Square Table for Exp Gp B for Statement 32 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5
4	4	5
3	6	5
2	3	5
1	7	5

chi-square = 2.00

degrees of freedom = 4

probability = 0.736

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 33: Enough revision is not done in CAI after the topic compound interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage**Table 4.141 Responses of Exp Gp A students in percentage for statement 33 for Initial Try-out**

Points	Exp Gp A
5	7.41
4	18.52
3	22.22
2	22.22
1	29.63

7.41% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

18.52% of the students disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

22.22% of the students not decided with the statement “Enough revision is not done in CAI after the topic compound interest.”

22.22% of the students agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

29.63% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

Experimental Group B: Responses of the students in percentage**Table 4.142 Responses of Exp Gp B students in percentage for statement 33 for Initial Try-out**

Points	Exp Gp B
5	16.00
4	20.00
3	24.00
2	8.00
1	32.00

16.00% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

20.00% of the students disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

24.00% of the students not decided with the statement “Enough revision is not done in CAI after the topic compound interest.”

8.00% of the students agree with the statement “Enough revision is not done in CAI after the topic

compound interest.”

32.00% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

Graphical Representation of analysis of statement 33 in Percentage

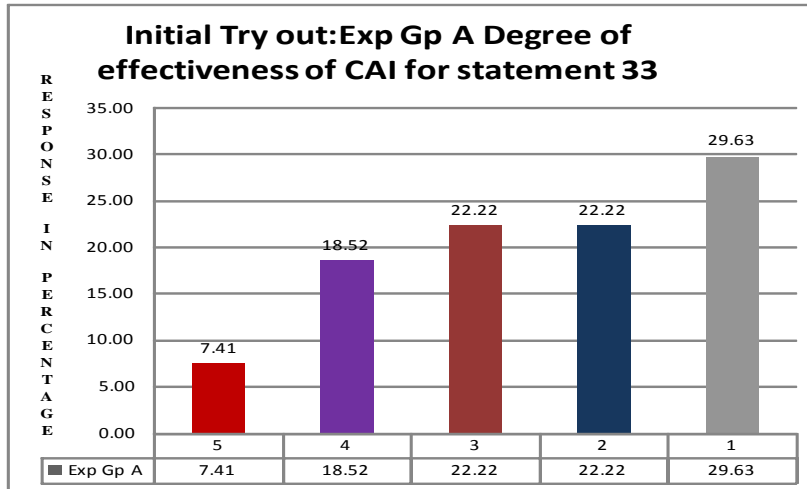


Figure 4.67 Graphical Representation of analysis of statement 33 in Percentage for Exp Gp A for Initial Try-out

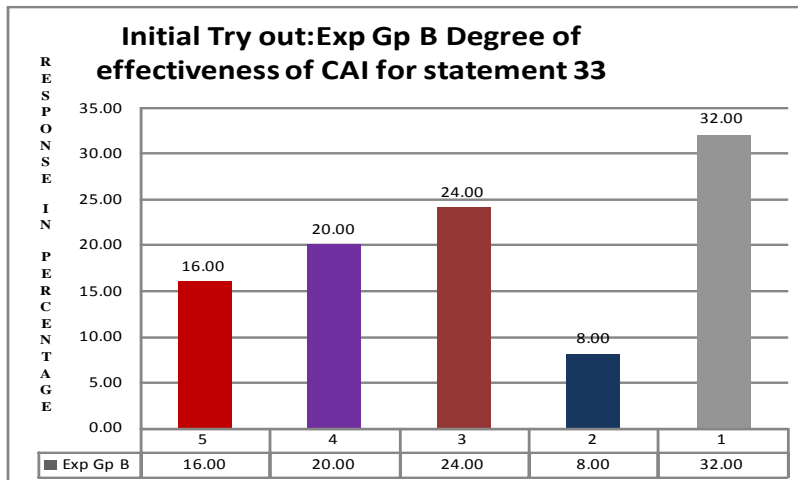


Figure 4.68 Graphical Representation of analysis of statement 33 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.143 Chi Square Table for ExpGp A for Statement 33 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	5.4
4	5	5.4
3	6	5.4
2	6	5.4
1	8	5.4

chi-square = 3.56

degrees of freedom = 4

probability = 0.469

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.144 Chi Square Table for Exp Gp B for Statement 33 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5
4	5	5
3	6	5
2	2	5
1	8	5

chi-square = 4.00

degrees of freedom = 4

probability = 0.406

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 34: Enough revision is not done in CAI after the topic profit and loss.

Polarity: Negative

Experimental Group A : Responses of the students in percentage**Table 4.145 Responses of Exp Gp A students in percentage for statement 34 for Initial Try-out**

Points	Exp Gp A
5	14.81
4	14.81
3	22.22
2	37.04
1	11.11

14.81% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

14.81% of the students disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

22.22% of the students not decided with the statement “Enough revision is not done in CAI after the topic profit and loss.”

37.04% of the students agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

11.11% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

Experimental Group B : Responses of the students in percentage**Table 4.146 Responses of Exp Gp B students in percentage for statement 34 for Initial Try-out**

Points	Exp Gp B
5	21.74
4	13.04
3	26.09
2	21.74
1	17.39

21.74% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

13.04% of the students disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

26.09% of the students not decided with the statement “Enough revision is not done in CAI after the topic profit and loss.”

21.74% of the students agree with the statement “Enough revision is not done in CAI after the topic

profit and loss.”

17.39% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

Graphical Representation of analysis of statement 34 in Percentage

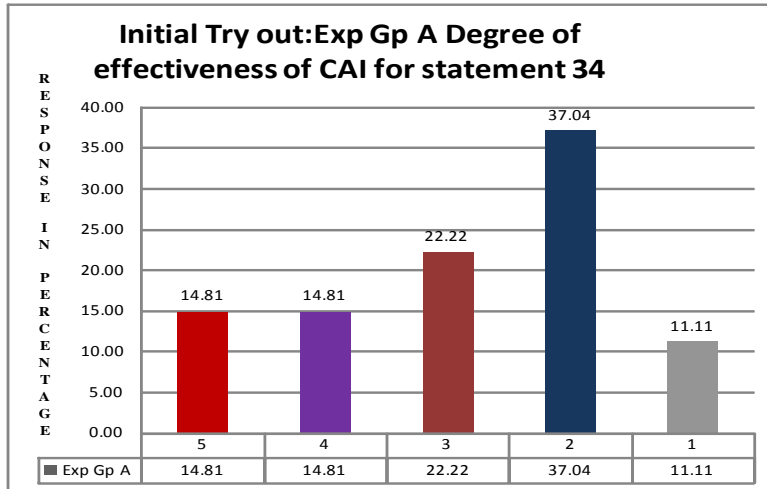


Figure 4.69 Graphical Representation of analysis of statement 34 in Percentage for Exp Gp A for Initial Try-out

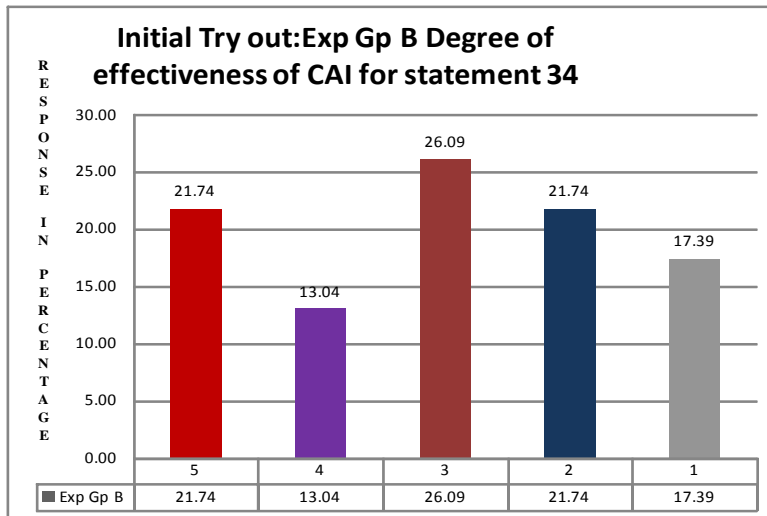


Figure 4.70 Graphical Representation of analysis of statement 34 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀ Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.147 Chi Square Table for Exp Gp A for Statement 34 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	4	5.4
3	6	5.4
2	10	5.4
1	3	5.4

chi-square = 5.78

degrees of freedom = 4

probability = 0.216

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.148 Chi Square Table for Exp Gp A for Statement 34 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	4.6
4	3	4.6
3	6	4.6
2	5	4.6
1	4	4.6

chi-square = 1.13

degrees of freedom = 4

probability = 0.889

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 35: Remedial (re teaching the difficult concept which is not understood by you)teaching is not done.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.149 Responses of Exp Gp A students in percentage for statement 35 for Initial Try-out

Points	Exp Gp A
5	11.11
4	22.22
3	29.63
2	29.63
1	7.41

11.11% of the students strongly disagree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

22.22% of the students disagree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

29.63%of the students not decided with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

29.63%of the students agree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

7.41%of the students strongly agree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

Experimental Group B : Responses of the students in percentage

Table 4.150 Responses of Exp Gp B students in percentage for statement 35 for Initial Try-out

Points	Exp Gp B
5	21.74
4	8.70
3	13.04
2	30.43
1	26.09

21.74% of the students strongly disagree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

8.70% of the students disagree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

13.04%of the students not decided with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

30.43%of the students agree with the statement“Remedial (re teaching the difficult concept which is

not understood by you) teaching is not done.”

26.09%of the students strongly agree with the statement“Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

Graphical Representation of analysis of statement 35

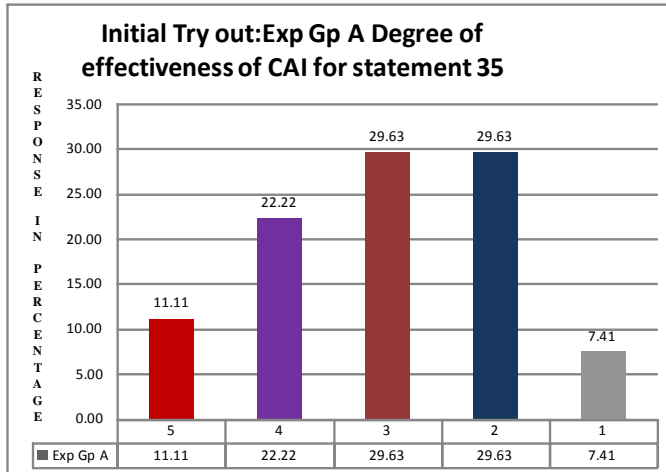


Figure 4.71 Graphical Representation of analysis of statement 35 in Percentage for Exp Gp A for Initial Tryout

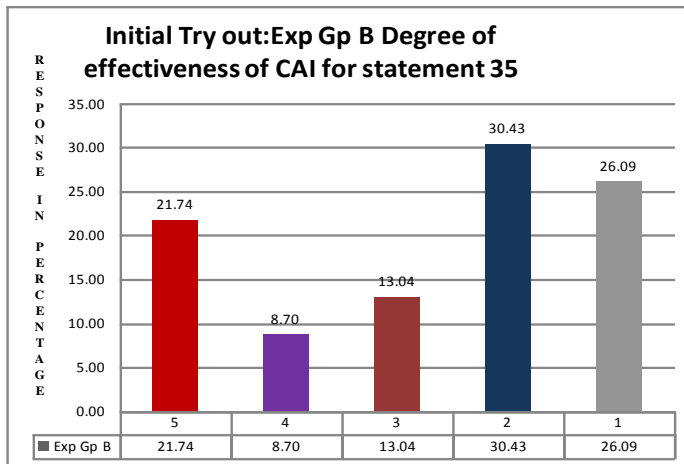


Figure 4.72 Graphical Representation of analysis of statement 35 in Percentage for Exp Gp B for Initial Tryout

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.151 Chi Square Table for Exp Gp A for Statement 35 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.4
4	6	5.4
3	8	5.4
2	8	5.4
1	2	5.4

chi-square = 5.78

degrees of freedom = 4

probability = 0.216

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.152 Chi Square Table for Exp Gp B for Statement 35 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	4.6
4	2	4.6
3	3	4.6
2	7	4.6
1	6	4.6

chi-square = 3.74

degrees of freedom = 4

probability = 0.442

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.153 Responses of Exp Gp A students in percentage for statement 36 for Initial Try-out

Points	Exp Gp A
5	7.41
4	14.81
3	29.63
2	33.33
1	14.81

7.41% of the students strongly disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

14.81% of the students disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

29.63% of the students not decided with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

33.33% of the students agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

14.81% of the students strongly agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

Experimental Group B : Responses of the students in percentage

Table 4.154 Responses of Exp Gp B students in percentage for statement 36 for Initial Try-out

Points	Exp Gp B
5	12.50
4	12.50
3	29.17
2	33.33
1	12.50

12.50% of the students strongly disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

12.50% of the students disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

29.17% of the students not decided with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

33.33% of the students agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

12.50% of the students strongly agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

Graphical Representation of analysis of statement 36

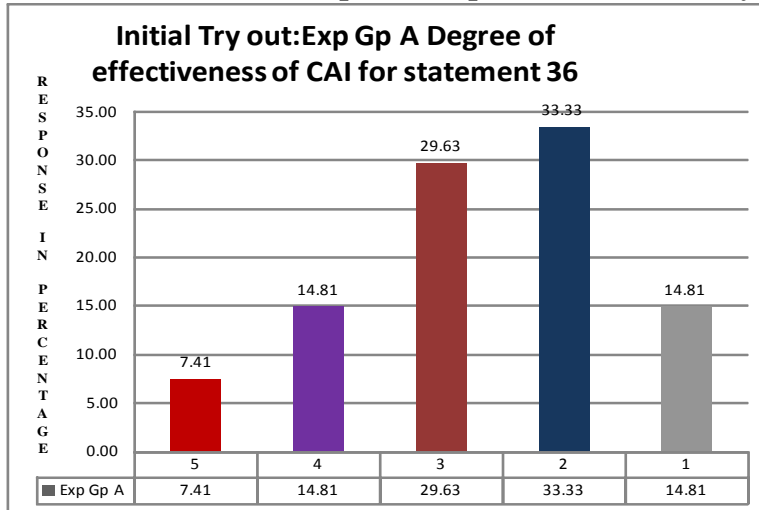


Figure 4.73 Graphical Representation of analysis of statement 36 in Percentage for Exp Gp A for Initial Try-out

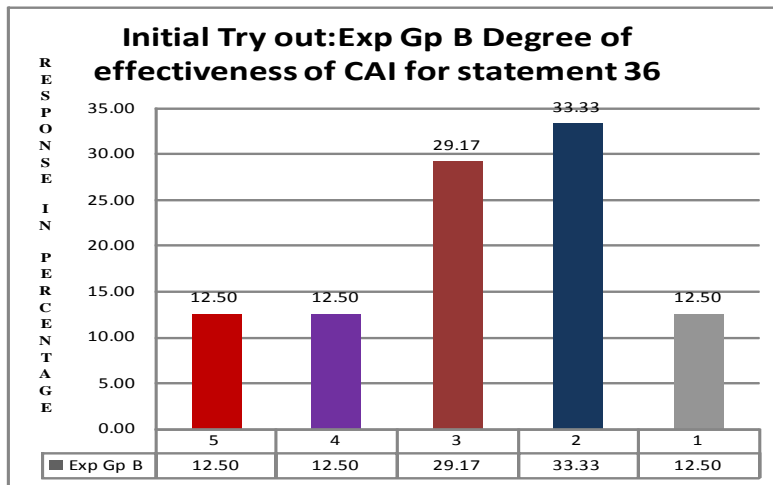


Figure 4.74 Graphical Representation of analysis of statement 36 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.155 Chi Square Table for ExpGp A for Statement 36 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	5.4
4	4	5.4
3	8	5.4
2	9	5.4
1	4	5.4

chi-square = 6.52

degrees of freedom = 4

probability = 0.164

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.156 Chi Square Table for Exp Gp B for Statement 36 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	4.8
4	3	4.8
3	7	4.8
2	8	4.8
1	3	4.8

chi-square = 5.17

degrees of freedom = 4

probability = 0.271

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 37: Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.157 Responses of Exp Gp A students in percentage for statement 37 for Initial Try-out

Points	Exp Gp A
5	40.74
4	29.63
3	14.81
2	11.11
1	3.70

40.74% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

29.63% of the students agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

14.81% of the students not decided with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

11.11% of the students disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

3.70% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Experimental Group B : Responses of the students in percentage

Table 4.158 Responses of Exp Gp B students in percentage for statement 37 for Initial Try-out

Points	Exp Gp B
5	43.48
4	21.74
3	21.74
2	0.00
1	13.04

43.48% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

21.74% of the students agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

21.74% of the students not decided with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

0.00% of the students disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

13.04% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Graphical Representation of analysis of statement 37

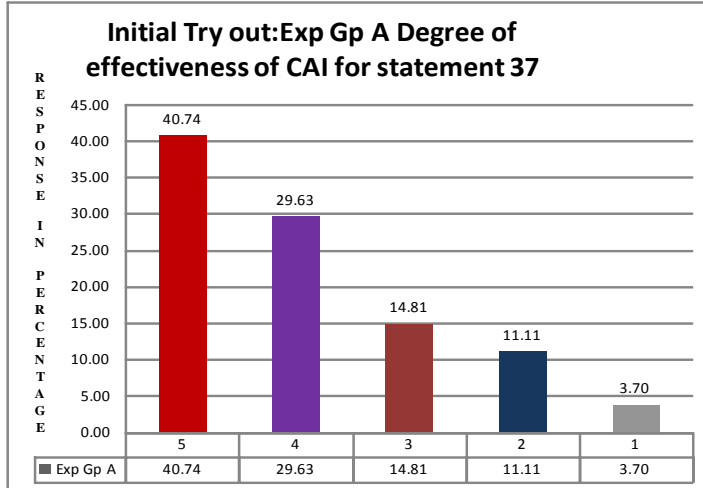


Figure 4.75 Graphical Representation of analysis of statement 37 in Percentage for Exp Gp A for Initial Try-out

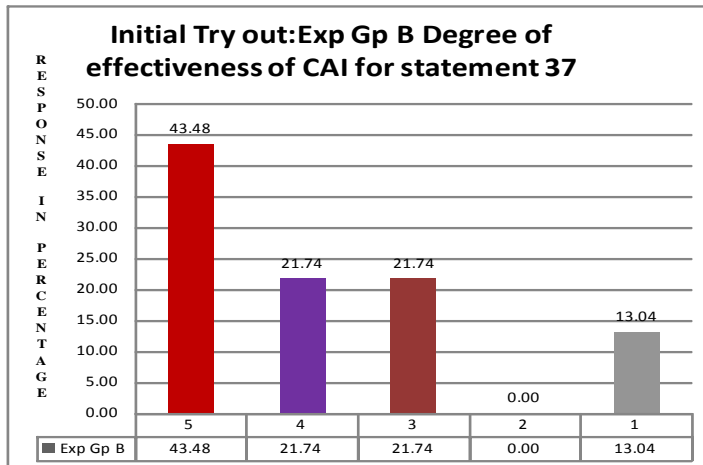


Figure 4.76 Graphical Representation of analysis of statement 37 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.159 Chi Square Table for Exp Gp A for Statement 37 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	5.4
4	8	5.4
3	4	5.4
2	3	5.4
1	1	5.4

chi-square = 12.074

degrees of freedom = 4

probability = 0.050

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Experimental Group B

Table 4.160 Chi Square Table for Exp Gp B for Statement 37 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	10	4.6
4	5	4.6
3	5	4.6
2	0	4.6
1	3	4.6

chi-square = 11.565

degrees of freedom = 4

probability = 0.021

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Statement 38: Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.161 Responses of Exp Gp A students in percentage for statement 38 for Initial Try-out

Points	Exp Gp A
5	14.81
4	48.15
3	22.22
2	11.11
1	3.70

14.81% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

48.15% of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

22.22% of the students not decided with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

11.11% of the students disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

3.70% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Experimental Group B : Responses of the students in percentage

Table 4.162 Responses of Exp Gp B students in percentage for statement 38 for Initial Try-out

Points	Exp Gp B
5	33.33
4	33.33
3	20.83
2	12.50
1	0.00

33.33% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

33.33% of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

20.83% of the students not decided with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

12.50% of the students disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

0.00% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Graphical Representation of analysis of statement 38 in Percentage

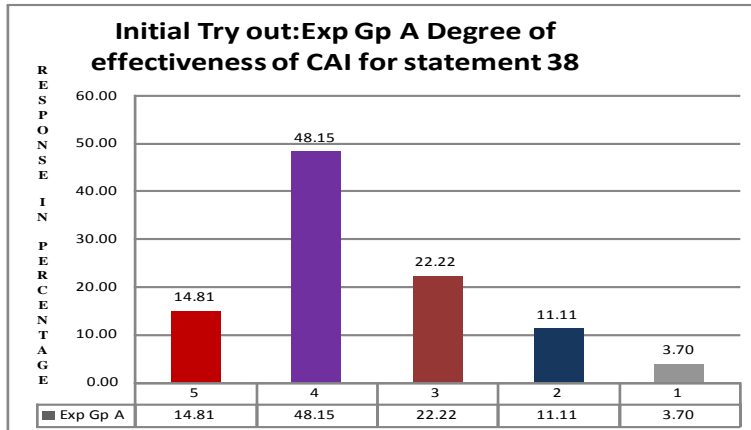


Figure 4.77 Graphical Representation of analysis of statement 38 in Percentage for Exp Gp A for Initial Try-out

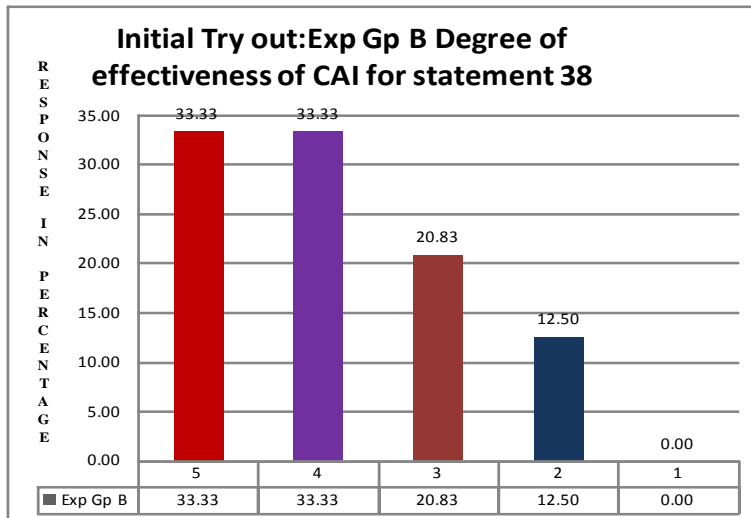


Figure 4.78 Graphical Representation of analysis of statement 38 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀ Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.163 Chi Square Table for Exp Gp A for Statement 38 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	13	5.4
3	6	5.4
2	3	5.4
1	1	5.4

chi-square = 15.8

degrees of freedom = 4

probability = 0.003

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Experimental Group B

Table 4.164 Chi Square Table for Exp Gp B for Statement 38 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	8	4.8
4	8	4.8
3	5	4.8
2	3	4.8
1	0	4.8

chi-square = 9.75

degrees of freedom = 4

probability = 0.045

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. Equal load is on strongly agree and agree therefore there are equal number of students who strongly agree as well as who agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Statement 39: Number of questions at the end of the slides for the topic compound interest is

adequate for providing practice.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.165 Responses of Exp Gp A students in percentage for statement 39 for Initial Try-out

Points	Exp Gp A
5	22.22
4	29.63
3	14.81
2	14.81
1	18.52

22.22% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

29.63% of the students agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

14.81% of the students not decided with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

14.81% of the students disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

18.52% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

Experimental Group B : Responses of the students in percentage

Table 4.166 Responses of Exp Gp B students in percentage for statement 39 for Initial Try-out

Points	Exp Gp B
5	44.00
4	20.00
3	28.00
2	4.00
1	4.00

44.00% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

20.00% of the students agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

28.00% of the students not decided with the statement “Number of questions at the end of the slides

for the topic compound interest is adequate for providing practice.”

4.00% of the students disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

4.00% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

Graphical Representation of analysis of statement 39 in Percentage

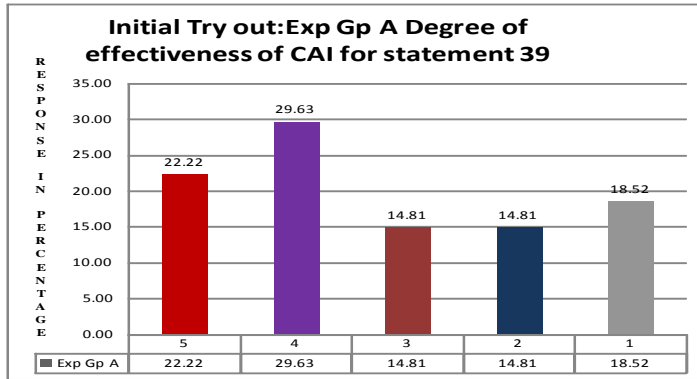


Figure 4.79 Graphical Representation of analysis of statement 39 in Percentage for Exp Gp A for Initial Try-out

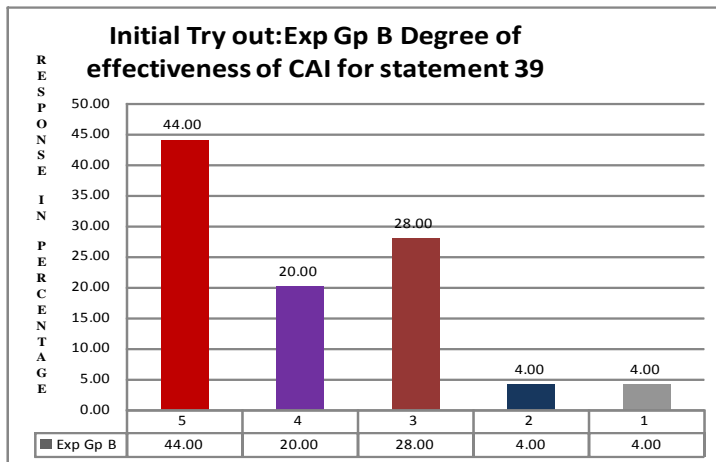


Figure 4.80 Graphical Representation of analysis of statement 39 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.167 Chi Square Table for Exp Gp A for Statement 39 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.4
4	8	5.4
3	4	5.4
2	4	5.4
1	5	5.4

chi-square = 2.07

degrees of freedom = 4

probability = 0.722

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.168 Chi Square Table for Exp Gp B for Statement 39 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	5
4	5	5
3	7	5
2	1	5
1	1	5

chi-square = 14.4

degrees of freedom = 4

probability = 0.006

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice”.

Statement 40: CAI is not enough in understanding the concept very clearly.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.169 Responses of Exp Gp A students in percentage for statement 40 for Initial Try-out

Points	Exp Gp A
5	11.11
4	22.22
3	22.22
2	29.63
1	14.81

11.11% of the students strongly disagree with the statement “CAI is not enough in understanding the concept very clearly.”

22.22% of the students disagree with the statement “CAI is not enough in understanding the concept very clearly.”

22.22% of the students not decided with the statement “CAI is not enough in understanding the concept very clearly.”

29.63% of the students agree with the statement “CAI is not enough in understanding the concept very clearly.”

14.81% of the students strongly agree with the statement “CAI is not enough in understanding the concept very clearly.”

Experimental Group B : Responses of the students in percentage

Table 4.170 Responses of Exp Gp B students in percentage for statement 40 for Initial Try-out

Points	Exp Gp B
5	29.17
4	12.50
3	25.00
2	12.50
1	20.83

29.17% of the students strongly disagree with the statement “CAI is not enough in understanding the concept very clearly.”

12.50% of the students disagree with the statement “CAI is not enough in understanding the concept very clearly.”

25.00% of the students not decided with the statement “CAI is not enough in understanding the concept very clearly.”

12.50% of the students agree with the statement “CAI is not enough in understanding the concept very clearly.”

20.83% of the students strongly agree with the statement “CAI is not enough in understanding the concept very clearly.”

Graphical Representation of analysis of statement 40 in Percentage

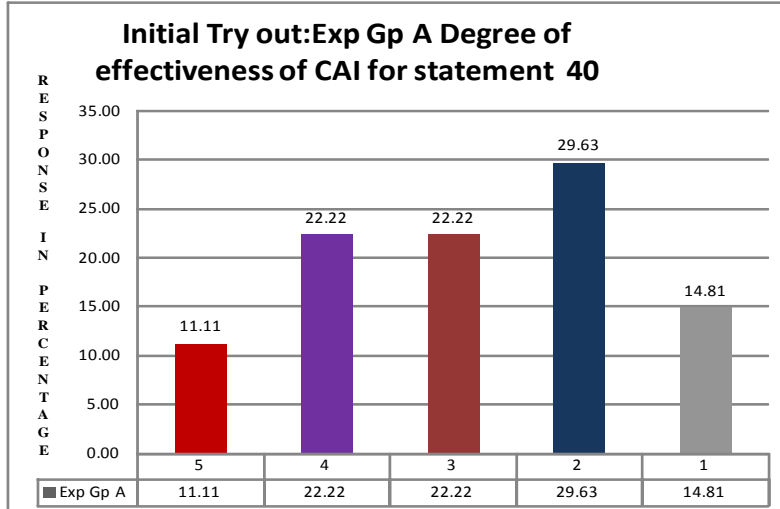


Figure 4.81 Graphical Representation of analysis of statement 40 in Percentage for Exp Gp A for Initial Try-out

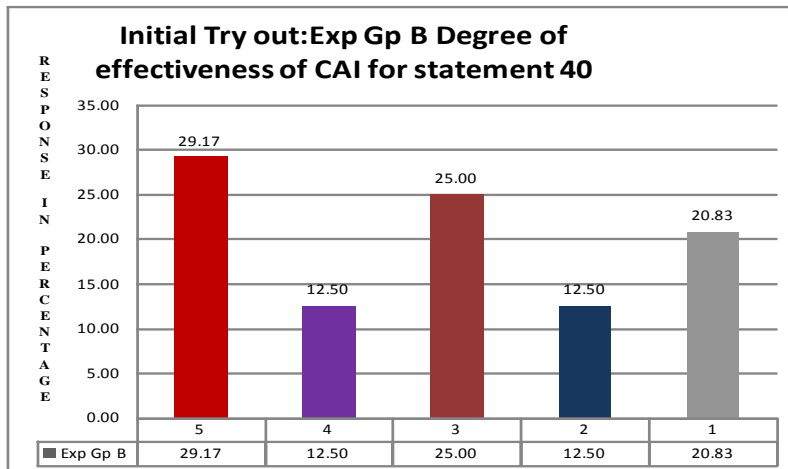


Figure 4.82 Graphical Representation of analysis of statement 40 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.171 Chi Square Table for Exp Gp A for Statement 40 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.4
4	6	5.4
3	6	5.4
2	8	5.4
1	4	5.4

chi-square = 2.81

degrees of freedom = 4

probability = 0.589

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.172 Chi Square Table for Exp Gp B for Statement 40 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	4.8
4	3	4.8
3	6	4.8
2	3	4.8
1	5	4.8

chi-square = 2.67

degrees of freedom = 4

probability = 0.615

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 41: Independent learning is not possible through CAI.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.173 Responses of Exp Gp A students in percentage for statement 41 for Initial Try-out

Points	Exp Gp A
5	3.70
4	40.74
3	14.81
2	18.52
1	22.22

3.70% of the students strongly disagree with the statement “Independent learning is not possible through CAI.”

40.74% of the students disagree with the statement “Independent learning is not possible through CAI.”

14.81% of the students not decided with the statement “Independent learning is not possible through CAI.”

18.52% of the students agree with the statement “Independent learning is not possible through CAI.”

22.22% of the students strongly agree with the statement “Independent learning is not possible through CAI.”

Experimental Group B : Responses of the students in percentage

Table 4.174 Responses of Exp Gp B students in percentage for statement 41 for Initial Try-out

Points	Exp Gp B
5	25.00
4	12.50
3	29.17
2	20.83
1	12.50

25.00% of the students strongly disagree with the statement “Independent learning is not possible through CAI.”

12.50% of the students disagree with the statement “Independent learning is not possible through CAI.”

29.17% of the students not decided with the statement “Independent learning is not possible through CAI.”

20.83% of the students agree with the statement “Independent learning is not possible through CAI.”

12.50% of the students strongly agree with the statement “Independent learning is not possible through CAI.”

Graphical Representation of analysis of statement 41 in Percentage

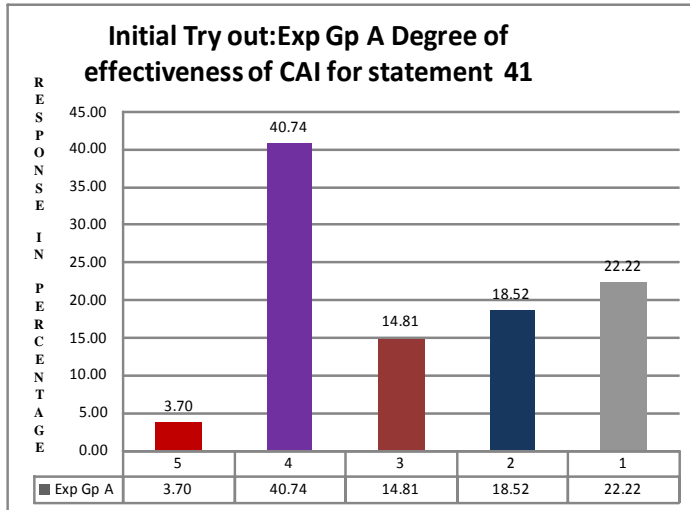


Figure 4.83 Graphical Representation of analysis of statement 41 in Percentage for Exp Gp A for Initial Try-out

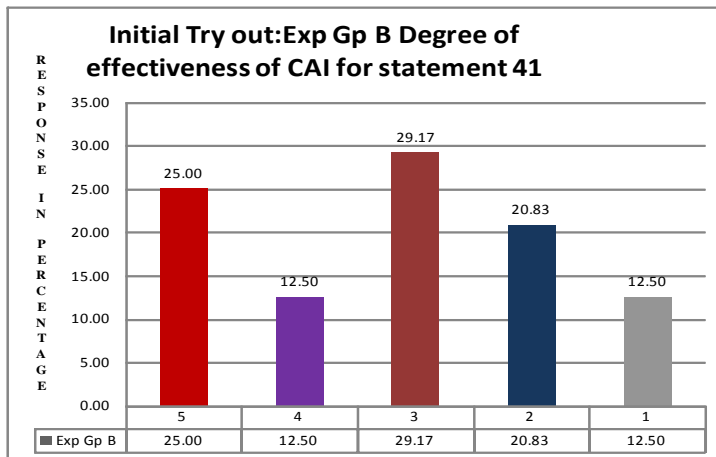


Figure 4.84 Graphical Representation of analysis of statement 41 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.175 Chi Square Table for Exp Gp A for Statement 41 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	1	5.4
4	11	5.4
3	4	5.4
2	5	5.4
1	6	5.4

chi-square = 9.85

degrees of freedom = 4

probability = 0.043

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “Independent learning is not possible through CAI.”

Experimental Group B

Table 4.176 Chi Square Table for Exp Gp B for Statement 41 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	3	4.8
3	7	4.8
2	5	4.8
1	3	4.8

chi-square = 2.67

degrees of freedom = 4

probability = 0.615

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 42: Evaluation is done objectively (objective questions) so no partiality is involved in scoring.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.177 Responses of Exp Gp A students in percentage for statement 42 for Initial Try-out

Points	Exp Gp A
5	14.81
4	44.44
3	33.33
2	7.41
1	0.00

14.81% of the students strongly agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

44.44% of the students agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

33.33% of the students not decided with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

7.41% of the students disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

0.00% of the students strongly disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

Experimental Group B : Responses of the students in percentage

Table 4.178 Responses of Exp Gp B students in percentage for statement 42 for Initial Try-out

Points	Exp Gp B
5	50.00
4	8.33
3	25.00
2	4.17
1	12.50

50.00% of the students strongly agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

8.33% of the students agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

25.00% of the students not decided with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

4.17% of the students disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

12.50% of the students strongly disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

Graphical Representation of analysis of statement 42 in Percentage

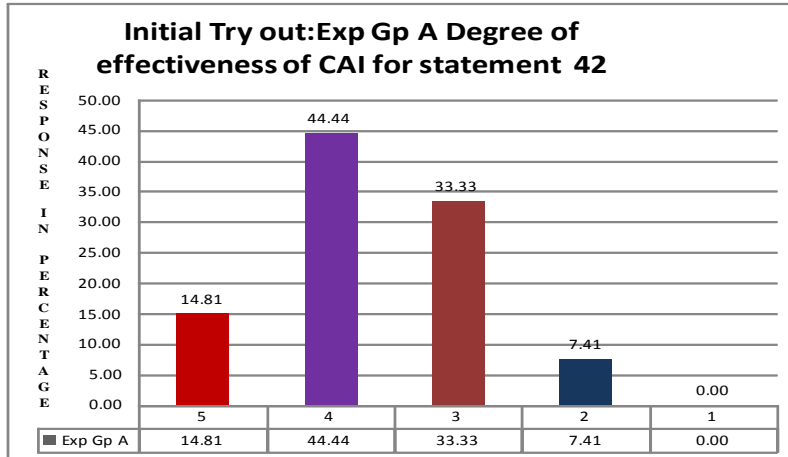


Figure 4.85 Graphical Representation of analysis of statement 42 in Percentage for Exp Gp A for Initial Try-out

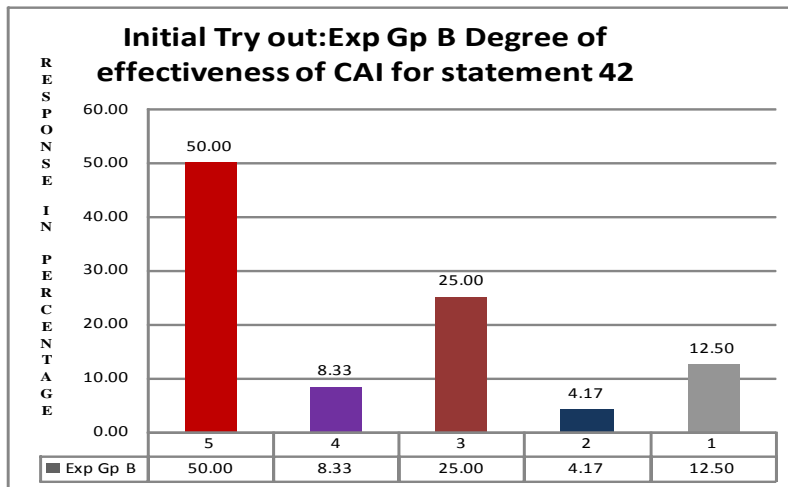


Figure 4.86 Graphical Representation of analysis of statement 42 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.179 Chi Square Table for Exp Gp A for Statement 42 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	12	5.4
3	9	5.4
2	2	5.4
1	0	5.4

chi-square = 18.4

degrees of freedom = 4

probability = 0.001

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

Experimental Group B

Table 4.180 Chi Square Table for Exp Gp B for Statement 42 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	12	4.8
4	2	4.8
3	6	4.8
2	1	4.8
1	3	4.8

chi-square = 16.4

degrees of freedom = 4

probability = 0.003

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

Statement 43:Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.181 Responses of Exp Gp A students in percentage for statement 43 for Initial Try-out

Points	Exp Gp A
5	14.81
4	18.52
3	25.93
2	29.63
1	11.11

14.81% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

18.52% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

25.93% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

29.63% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

11.11% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.182 Responses of Exp Gp B students in percentage for statement 43 for Initial Try-out

Points	Exp Gp B
5	8.33
4	37.50
3	33.33
2	8.33
1	12.50

8.33% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

37.50% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

33.33% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

8.33% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

12.50% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 43 in Percentage

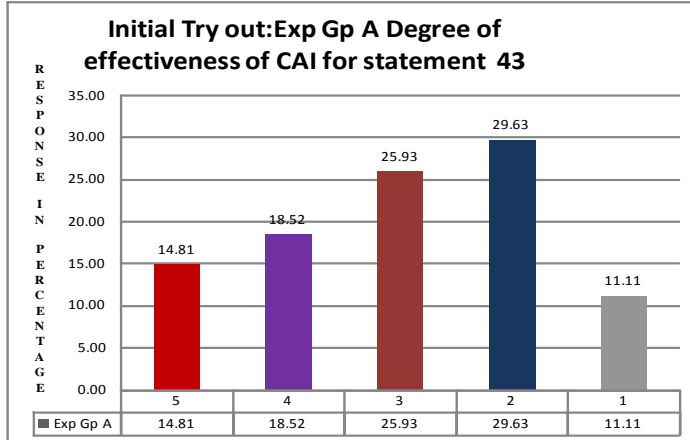


Figure 4.87 Graphical Representation of analysis of statement 43 in Percentage for Exp Gp A for Initial Try-out

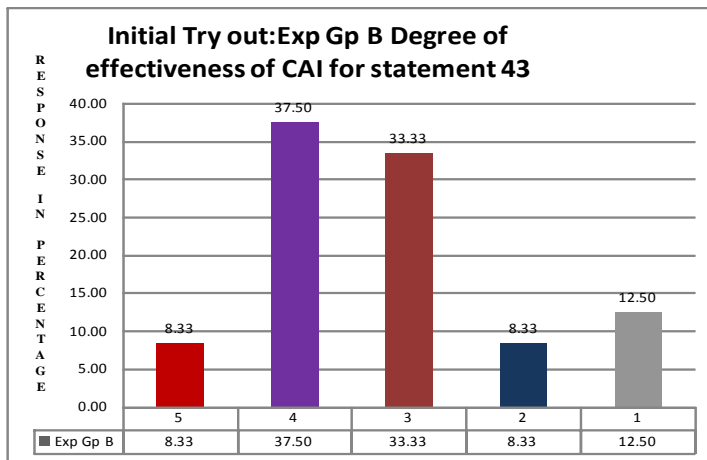


Figure 4.88 Graphical Representation of analysis of statement 43 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.183 Chi Square Table for Exp Gp A for Statement 43 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	5.4
4	5	5.4
3	7	5.4
2	8	5.4
1	3	5.4

chi-square = 3.19

degrees of freedom = 4

probability = 0.527

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.184 Chi Square Table for Exp Gp B for Statement 43 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	4.8
4	9	4.8
3	8	4.8
2	2	4.8
1	3	4.8

chi-square = 9.75

degrees of freedom = 4

probability = 0.045

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

Statement 44:Instruction given in each slide of CAI is easy and clear to follow.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.185 Responses of Exp Gp A students in percentage for statement 44 for Initial Try-out

Points	Exp Gp A
5	18.52
4	40.74
3	29.63
2	11.11
1	0.00

18.52% of the students strongly agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

40.74% of the students agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

29.63% of the students not decided with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

11.11% of the students disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

0.00% of the students strongly disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

Experimental Group B : Responses of the students in percentage

Table 4.186 Responses of Exp Gp B students in percentage for statement 44 for Initial Try-out

Points	Exp Gp B
5	58.33
4	12.50
3	12.50
2	12.50
1	4.17

58.33% of the students strongly agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

12.50% of the students agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

12.50% of the students not decided with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

12.50% of the students disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

4.17% of the students strongly disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

Graphical Representation of analysis of statement 44 in Percentage

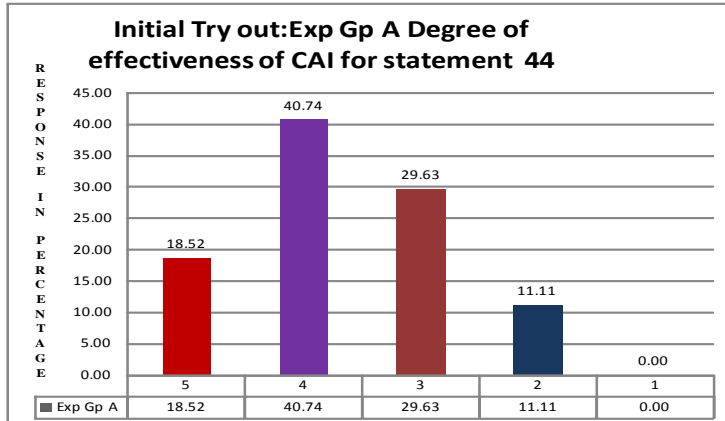


Figure 4.89 Graphical Representation of analysis of statement 44 in Percentage for Exp Gp A for Initial Try-out

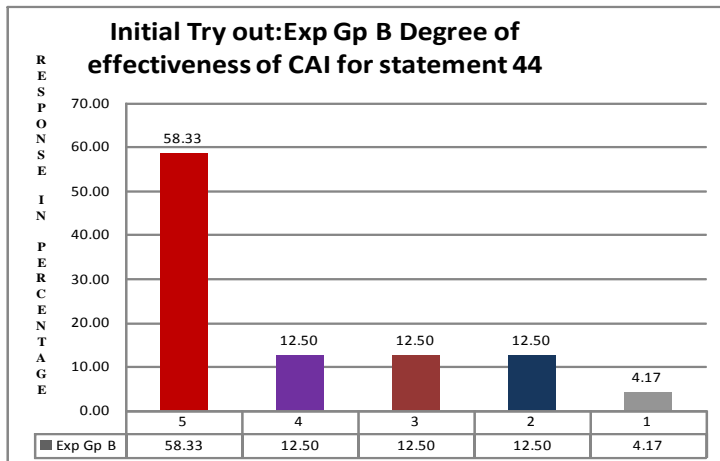


Figure 4.90 Graphical Representation of analysis of statement 44 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.187 Chi Square Table for Exp Gp A for Statement 44 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.4
4	11	5.4
3	8	5.4
2	3	5.4
1	0	5.4

chi-square = 13.6

degrees of freedom = 4

probability = 0.009

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

Experimental Group B

Table 4.188 Chi Square Table for Exp Gp B for Statement 44 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	14	4.8
4	3	4.8
3	3	4.8
2	3	4.8
1	1	4.8

chi-square = 22.7

degrees of freedom = 4

probability = 0.000

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.189 Responses of Exp Gp A students in percentage for statement 45 for Initial Try-out

Points	Exp Gp A
5	18.52
4	18.52
3	22.22
2	25.93
1	14.81

18.52% of the students strongly disagree with the statement “Evaluation done at the end of the topic

profit and loss is not suitable measure to know my Understanding about that topic.”

18.52% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

22.22%of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

25.93%of the students agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

14.81%of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.190 Responses of Exp Gp B students in percentage for statement 45 for Initial Try-out

Points	Exp Gp B
5	25.00
4	16.67
3	37.50
2	8.33
1	12.50

25.00% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

16.67% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

37.50of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

8.33%of the students agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

12.50%of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

Graphical Representation of analysis of statement 45 in Percentage

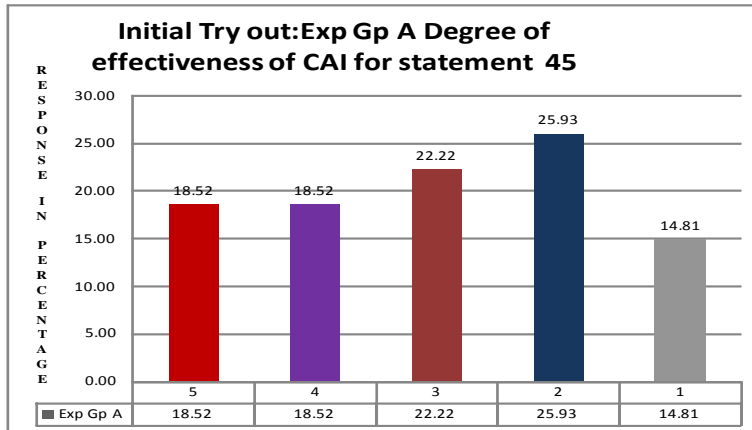


Figure 4.91 Graphical Representation of analysis of statement 45 in Percentage for Exp Gp A for Initial Try-out

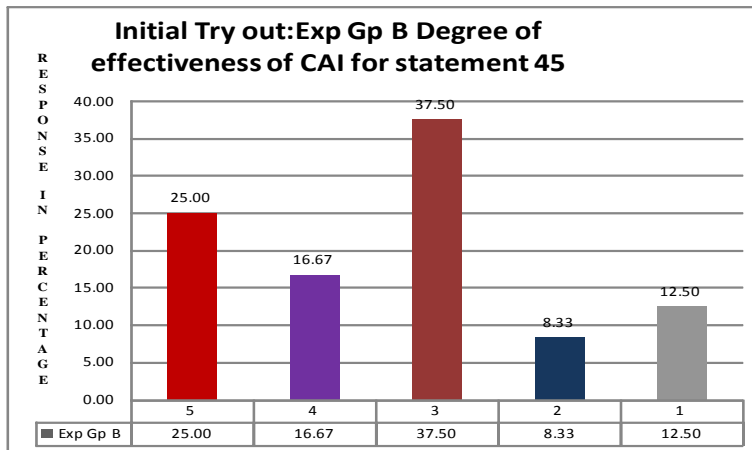


Figure 4.92 Graphical Representation of analysis of statement 45 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.191 Chi Square Table for Exp Gp A for Statement 45 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.4
4	5	5.4
3	6	5.4
2	7	5.4
1	4	5.4

chi-square = 0.963

degrees of freedom = 4

probability = 0.915

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.192 Chi Square Table for Exp Gp B for Statement 45 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	4	4.8
3	9	4.8
2	2	4.8
1	3	4.8

chi-square = 6.42

degrees of freedom = 4

probability = 0.170

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 46: Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.193 Responses of Exp Gp A students in percentage for statement 46 for Initial Try-out

Points	Exp Gp A
5	18.52
4	25.93
3	22.22
2	11.11
1	22.22

18.52% of the students strongly disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

25.93% of the students disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).”

22.22%of the students not decided with the statement “Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).”

11.11%of the students agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

22.22%of the students strongly agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

Experimental Group B : Responses of the students in percentage

Table 4.194 Responses of Exp Gp B students in percentage for statement 46 for Initial Try-out

Points	Exp Gp B
5	25.00
4	12.50
3	25.00
2	25.00
1	12.50

25.00% of the students strongly disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

12.50% of the students disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

25.00%of the students not decided with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

25.00%of the students agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

12.50%of the students strongly agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

Graphical Representation of analysis of statement 46 in Percentage

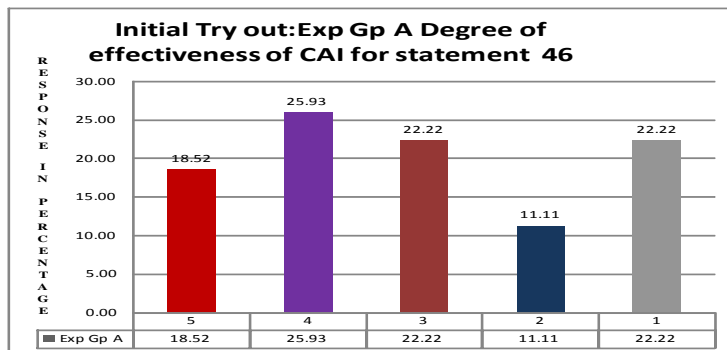


Figure 4.93 Graphical Representation of analysis of statement 46 in Percentage for Exp Gp A for Initial Try-out

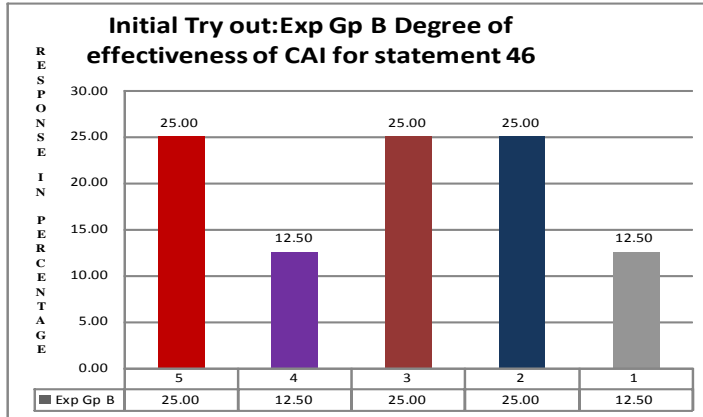


Figure 4.94 Graphical Representation of analysis of statement 46 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.195 Chi Square Table for Exp Gp A for Statement 46 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	5	5.4
4	7	5.4
3	6	5.4
2	3	5.4
1	6	5.4

chi-square = 1.70

degrees of freedom = 4

probability = 0.790

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.196 Chi Square Table for Exp Gp B for Statement 46 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	4.8
4	3	4.8
3	6	4.8
2	6	4.8
1	3	4.8

chi-square = 2.25

degrees of freedom = 4

probability = 0.690

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 47: To get the correct answer I had to go back to the slide/s many times for topic simple interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.197 Responses of Exp Gp A students in percentage for statement 47 for Initial Try-out

Points	Exp Gp A
5	7.41
4	37.04
3	11.11
2	22.22
1	22.22

7.41% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

37.04% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

11.11% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

22.22% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

22.22% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

Experimental Group B : Responses of the students in percentage

Table 4.198 Responses of Exp Gp B students in percentage for statement 47 for Initial Try-out

Points	Exp Gp B
5	33.33
4	25.00
3	12.50
2	12.50
1	16.67

33.33% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

25.00% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

12.50% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

12.50% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

16.67% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

Graphical Representation of analysis of statement 47 in Percentage

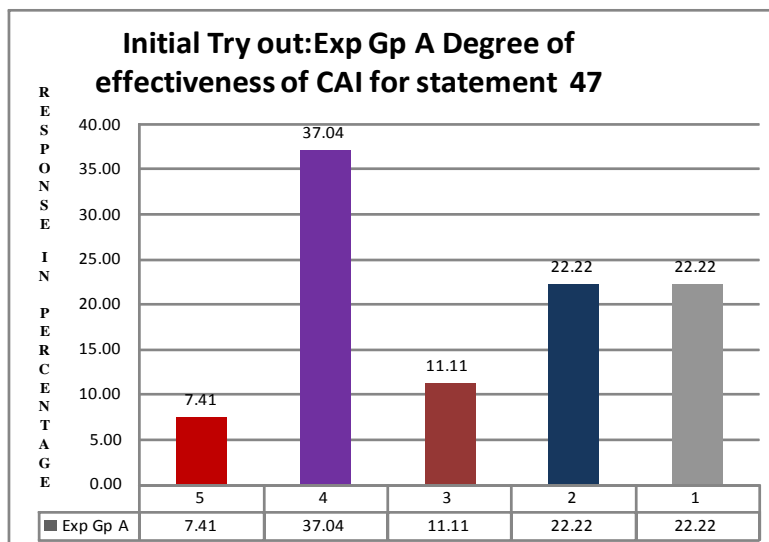


Figure 4.95 Graphical Representation of analysis of statement 47 in Percentage for Exp Gp A for Initial Try-out

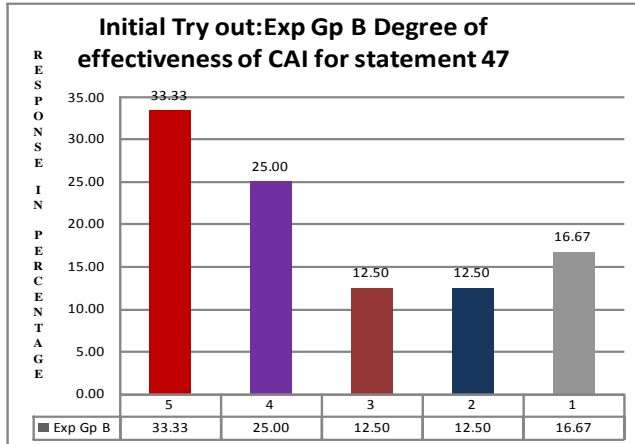


Figure 4.96 Graphical Representation of analysis of statement 47 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.199 Chi Square Table for Exp Gp A for Statement 47 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	2	5.4
4	10	5.4
3	3	5.4
2	6	5.4
1	6	5.4

chi-square = 7.26

degrees of freedom = 4

probability = 0.123

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.200 Chi Square Table for Exp Gp B for Statement 47 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	8	4.8
4	6	4.8
3	3	4.8
2	3	4.8
1	4	4.8

chi-square = 3.92

degrees of freedom = 4

probability = 0.417

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 48: To get the correct answer I had to go back to the slide/s many times for topic Compound interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.201 Responses of Exp Gp A students in percentage for statement 48 for Initial Try-out

Points	Exp Gp A
5	3.57
4	14.29
3	35.71
2	14.29
1	32.14

3.57% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

14.29% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

35.71% of the students 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.”

14.29% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

32.14% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

Experimental Group B : Responses of the students in percentage

Table 4.202 Responses of Exp Gp B students in percentage for statement 48 for Initial Try-out

Points	Exp Gp B
5	29.17
4	12.50
3	16.67
2	29.17
1	12.50

29.17% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

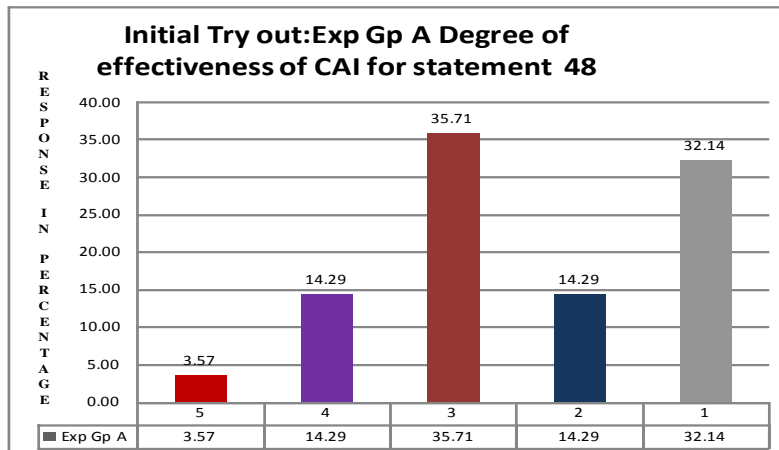
12.50% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

16.67% of the students 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.”

29.17% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

12.50% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

Graphical Representation of analysis of statement 48 in Percentage

**Figure 4.97 Graphical Representation of analysis of statement 48 in Percentage for Exp Gp A for Initial Try-out**

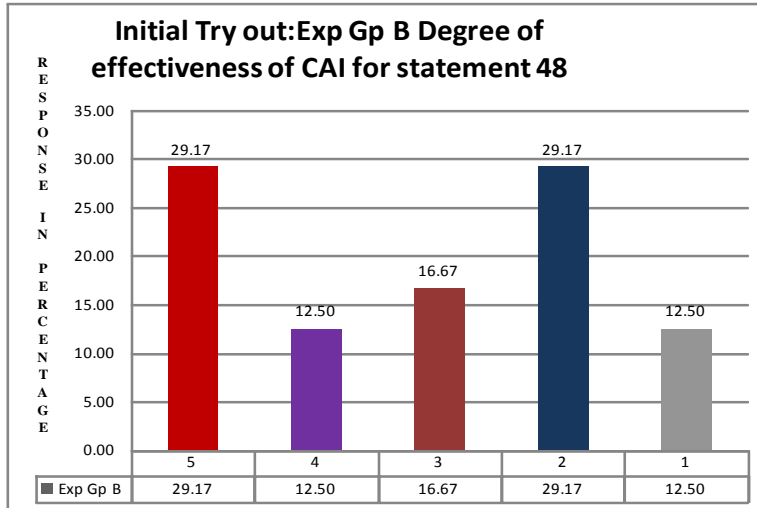


Figure 4.98 Graphical Representation of analysis of statement 48 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.203 Chi Square Table for Exp Gp A for Statement 48 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	1	5.6
4	4	5.6
3	10	5.6
2	4	5.6
1	9	5.6

chi-square = 10.2

degrees of freedom = 4

probability = 0.037

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students 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.”

Experimental Group B

Table 4.204 Chi Square Table for Exp Gp B for Statement 48 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	4.8
4	3	4.8
3	4	4.8
2	7	4.8
1	3	4.8

chi-square = 3.50

degrees of freedom = 4

probability = 0.478

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.205 Responses of Exp Gp A students in percentage for statement 49 for Initial Try-out

Points	Exp Gp A
5	11.11
4	33.33
3	7.41
2	22.22
1	25.93

11.11% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

33.33% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

7.41% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

22.22% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

25.93% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

Experimental Group B: Responses of the students in percentage

Table 4.206 Responses of Exp Gp B students in percentage for statement 49 for Initial Try-out

Points	Exp Gp B
5	16.67
4	12.50
3	33.33
2	16.67
1	20.83

16.67% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

12.50% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

33.33% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

16.67% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

20.83% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

Graphical Representation of analysis of statement 49 in Percentage

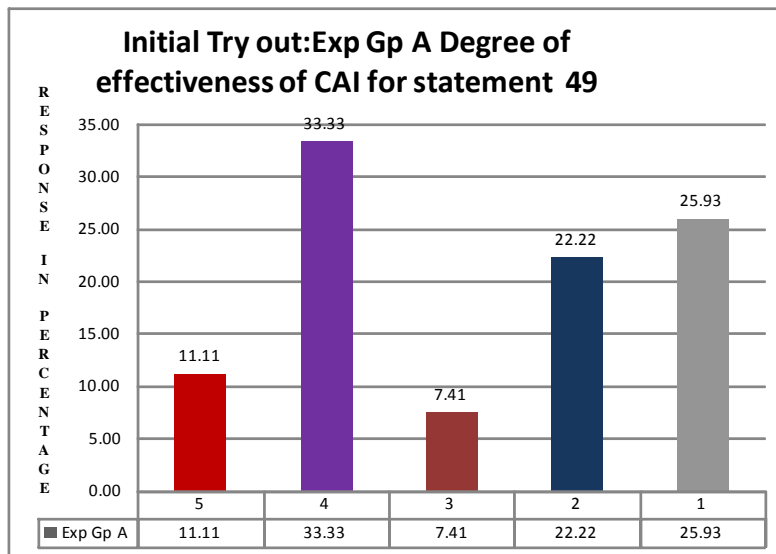


Figure 4.99 Graphical Representation of analysis of statement 49 in Percentage for Exp Gp A for Initial Try-out

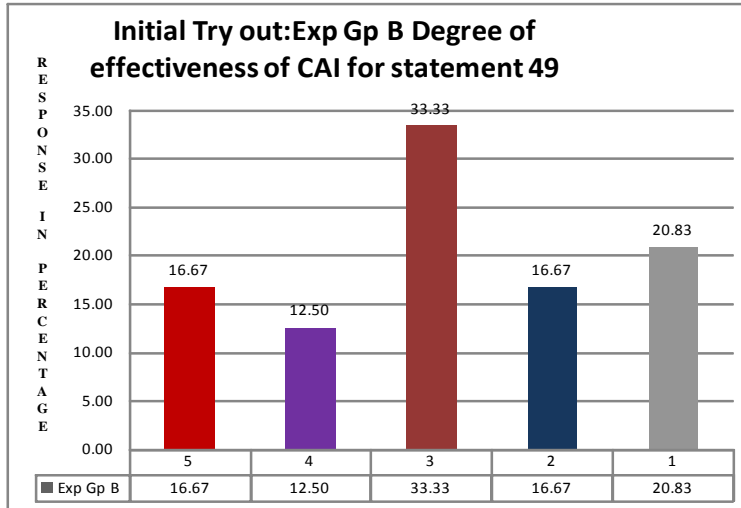


Figure 4.100 Graphical Representation of analysis of statement 49 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.207 Chi Square Table for Exp Gp A for Statement 49 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	3	5.4
4	9	5.4
3	2	5.4
2	6	5.4
1	7	5.4

chi-square = 6.15

degrees of freedom = 4

probability = 0.188

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.208 Chi Square Table for Exp Gp B for Statement 49 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	4.8
4	3	4.8
3	8	4.8
2	4	4.8
1	5	4.8

chi-square = 3.08

degrees of freedom = 4

probability = 0.544

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.209 Responses of Exp Gp A students in percentage for statement 50 for Initial Try-out

Points	Exp Gp A
5	22.22
4	29.63
3	37.04
2	11.11
1	0.00

22.22% of the students strongly agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

29.63% of the students agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

37.04% of the students not decided with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

11.11% of the students disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

0.00% of the students strongly disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Experimental Group B: Responses of the students in percentage

Table 4.210 Responses of Exp Gp A students in percentage for statement 50 for Initial Try-out

Points	Exp Gp B
5	41.67
4	20.83
3	25.00
2	4.17
1	8.33

41.67% of the students strongly agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

20.83% of the students agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

25.00% of the students not decided with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

4.17% of the students disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

8.33% of the students strongly disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Graphical Representation of analysis of statement 50 in Percentage

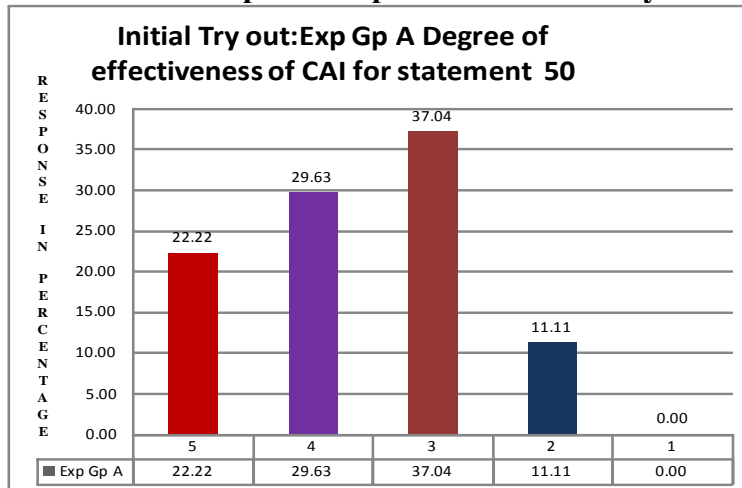


Figure 4.101 Graphical Representation of analysis of statement 50 in Percentage for Exp Gp A for Initial Try-out

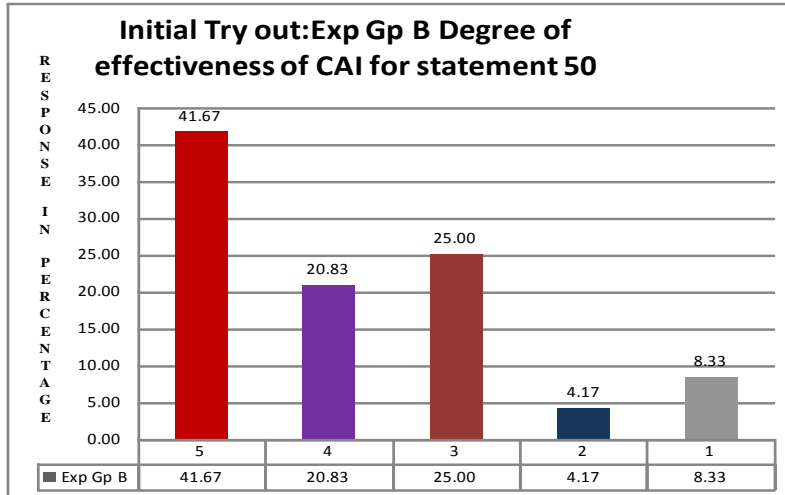


Figure 4.102 Graphical Representation of analysis of statement 50 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.211 Chi Square Table for Exp Gp A for Statement 50 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	6	5.4
4	8	5.4
3	10	5.4
2	3	5.4
1	0	5.4

chi-square = 11.7

degrees of freedom = 4

probability = 0.020

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Experimental Group B

Table 4.212 Chi Square Table for Exp Gp B for Statement 50 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	10	4.8
4	5	4.8
3	6	4.8
2	1	4.8
1	2	4.8

chi-square = 10.6

degrees of freedom = 4

probability = 0.032

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Statement 51: Discussion with mathematics teacher is needed along with CAI.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.213 Responses of Exp Gp A students in percentage for statement 51 for Initial Try-out

Points	Exp Gp A
5	25.93
4	11.11
3	11.11
2	25.93
1	25.93

25.93% of the students strongly disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

11.11% of the students disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

11.11% of the students not decided with the statement “Discussion with mathematics teacher is needed along with CAI.”

25.93% of the students agree with the statement “Discussion with mathematics teacher is needed

along with CAI.”

25.93% of the students strongly agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

Experimental Group B: Responses of the students in percentage

Table 4.214 Responses of Exp Gp B students in percentage for statement 51 for Initial Try-out

Points	Exp Gp B
5	16.67
4	20.83
3	25.00
2	4.17
1	33.33

16.67% of the students strongly disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

20.83% of the students disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

25.00% of the students not decided with the statement “Discussion with mathematics teacher is needed along with CAI.”

4.17% of the students agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

33.33% of the students strongly agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

Graphical Representation of analysis of statement 51 in Percentage

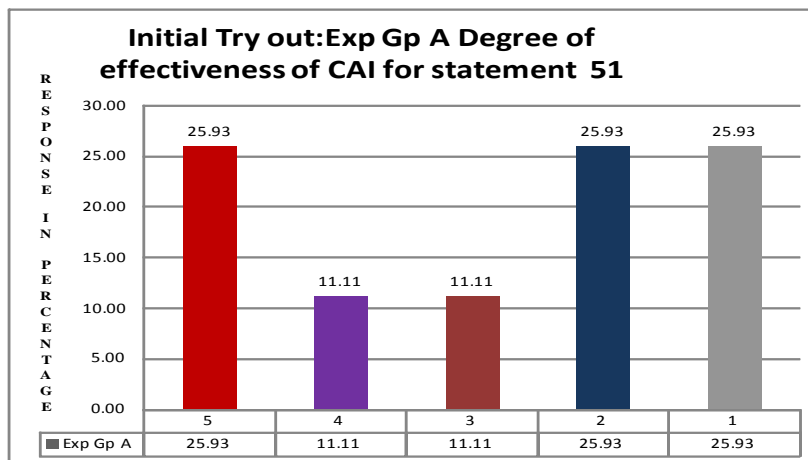


Figure 4.103 Graphical Representation of analysis of statement 51 in Percentage for Exp Gp A for Initial Try-out

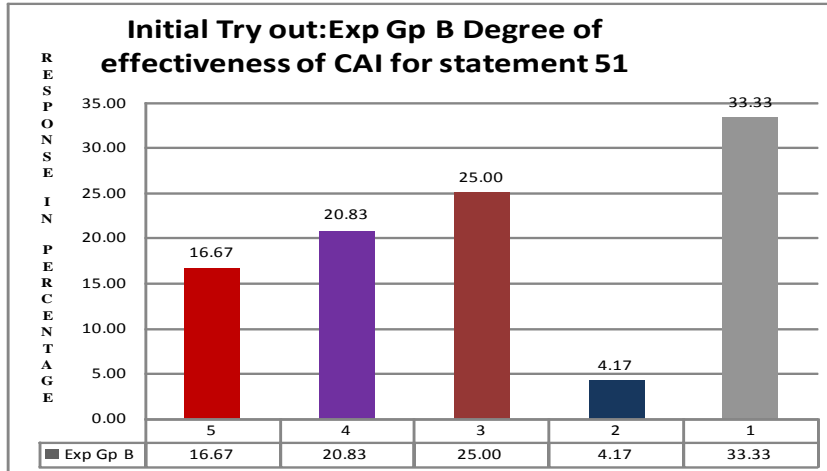


Figure 4.104 Graphical Representation of analysis of statement 51 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.215 Chi Square Table for Exp Gp A for Statement 51 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	5.4
4	3	5.4
3	3	5.4
2	7	5.4
1	7	5.4

chi-square = 3.56

degrees of freedom = 4

probability = 0.469

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.216 Chi Square Table for Exp Gp B for Statement 51 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	4	4.8
4	5	4.8
3	6	4.8
2	1	4.8
1	8	4.8

chi-square = 5.58

degrees of freedom = 4

probability = 0.233

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 52: Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.217 Responses of Exp Gp A students in percentage for statement 52 for Initial Try-out

Points	Exp Gp A
5	29.63
4	25.93
3	25.93
2	7.41
1	11.11

29.63% of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

25.93% of the students agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

25.93% of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

7.41% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

11.11% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

Experimental Group B: Responses of the students in percentage

Table 4.218 Responses of Exp Gp B students in percentage for statement 52 for Initial Try-out

Points	Exp Gp B
5	37.50
4	12.50
3	41.67
2	8.33
1	0.00

37.50% of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

12.50% of the students agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

41.67% of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

8.33% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

0.00% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 52 in Percentage

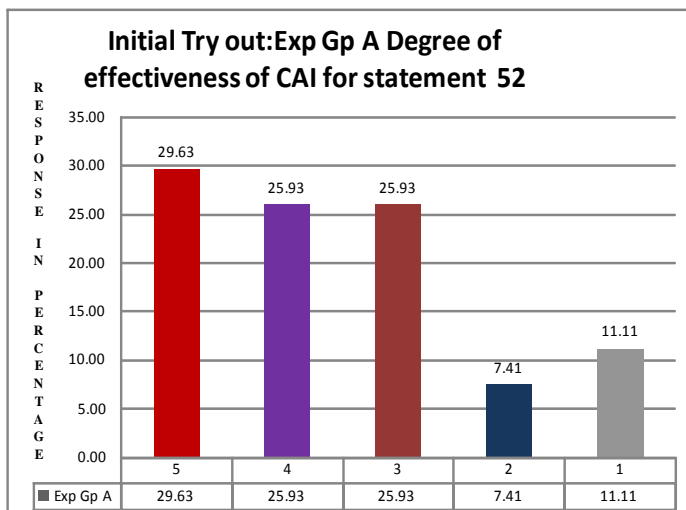


Figure 4.105 Graphical Representation of analysis of statement 52 in Percentage for Exp Gp A for Initial Try-out

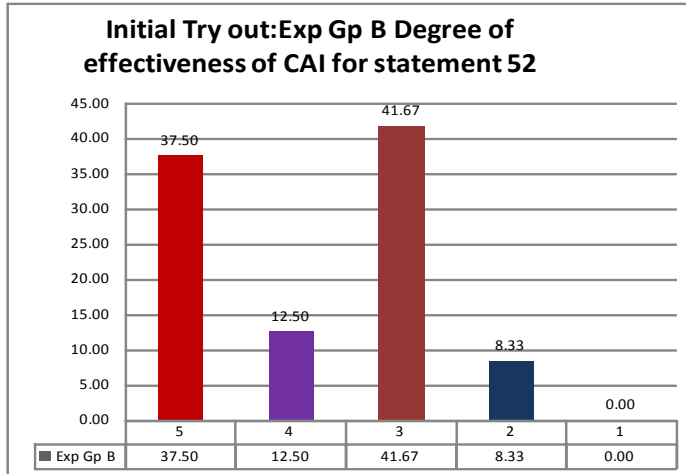


Figure 4.106 Graphical Representation of analysis of statement 52 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.219 Chi Square Table for Exp Gp A for Statement 52 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	8	5.4
4	7	5.4
3	7	5.4
2	2	5.4
1	3	5.4

chi-square = 5.41

degrees of freedom = 4

probability = 0.248

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.220 Chi Square Table for Exp Gp Bfor Statement 52 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	9	4.8
4	3	4.8
3	10	4.8
2	2	4.8
1	0	4.8

chi-square = 16.4

degrees of freedom = 4

probability = 0.003

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.221 Responses of Exp Gp A students in percentage for statement 53 for Initial Try-out

Points	Exp Gp A
5	29.63
4	37.04
3	14.81
2	7.41
1	11.11

29.63% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

37.04% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

14.81% of the students not decided with the statement “Evaluation done at the end of the topic

“simple interest” is suitable measure to know my understanding about that topic.”

7.41% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

11.11% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

Experimental Group B: Responses of the students in percentage

Table 4.222 Responses of Exp Gp B students in percentage for statement 53 for Initial Try-out

Points	Exp Gp B
5	41.67
4	12.50
3	33.33
2	4.17
1	8.33

41.67% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

12.50% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

33.33% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

4.17% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

8.33% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 53 in Percentage

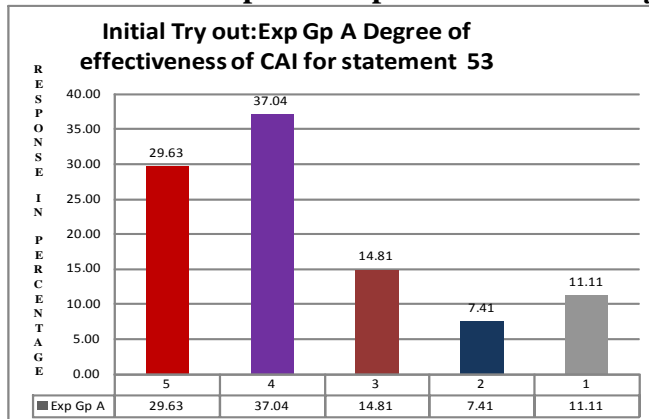


Figure 4.107 Graphical Representation of analysis of statement 53 in Percentage for Exp Gp A for Initial Try-out

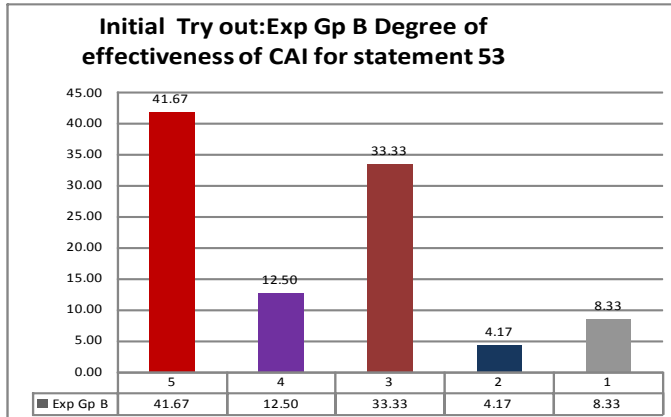


Figure 4.108 Graphical Representation of analysis of statement 53 in Percentage for Exp Gp B for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.223 Chi Square Table for Exp Gp A for Statement 53 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	8	5.4
4	10	5.4
3	4	5.4
2	2	5.4
1	3	5.4

chi-square = 8.74

degrees of freedom = 4

probability = 0.068

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.224 Chi Square Table for Exp Gp B for Statement 53 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	10	4.8
4	3	4.8
3	8	4.8
2	1	4.8
1	2	4.8

chi-square = 13.1

degrees of freedom = 4

probability = 0.011

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.225 Responses of Exp Gp A students in percentage for statement 54 for Initial Try-out

Points	Exp Gp A
5	25.93
4	22.22
3	22.22
2	3.70
1	25.93

25.93% of the students strongly agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

22.22% of the students agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

22.22% of the students not decided with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

3.70% of the students disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

25.93% of the students strongly disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

Experimental Group B: Responses of the students in percentage

Table 4.226 Responses of Exp Gp B students in percentage for statement 54 for Initial Try-out

Points	Exp Gp B
5	45.83
4	20.83
3	20.83
2	8.33
1	4.17

45.83% of the students strongly agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

20.83% of the students agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

20.83% of the students not decided with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

8.33% of the students disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

4.17% of the students strongly disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 54 in Percentage

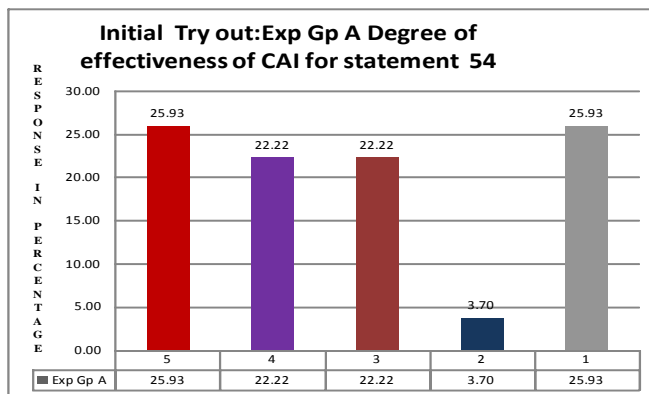


Figure 4.109 Graphical Representation of analysis of statement 54 in Percentage for Exp Gp A for Initial Try-out

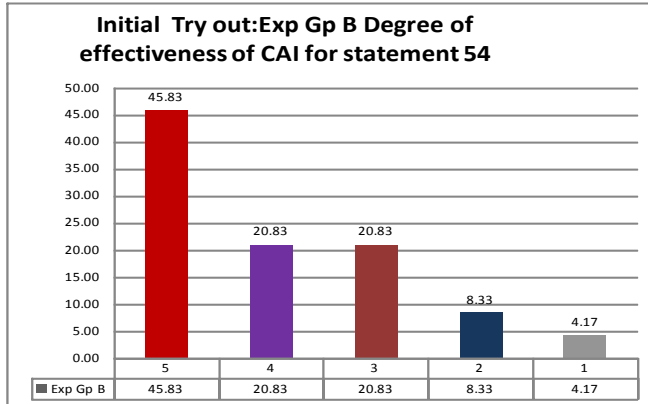


Figure 4.110 Graphical Representation of analysis of statement 54 in Percentage for Exp Gp A for Initial Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.227 Chi Square Table for Exp Gp A for Statement 54 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	7	5.4
4	6	5.4
3	6	5.4
2	1	5.4
1	7	5.4

chi-square = 4.67

degrees of freedom = 4

probability = 0.323

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.228 Chi Square Table for Exp Gp B for Statement 54 for Initial Try-out

Polarity	Observed Frequency	Expected Frequency
5	11	4.8
4	5	4.8
3	5	4.8
2	2	4.8
1	1	4.8

chi-square = 12.7

degrees of freedom = 4

probability = 0.013

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

4.09 Comprehensive Analysis of Reaction Scale for Initial Try-out

Data were analysed through the statistical technique χ^2 . Data analysis of responses of Experimental Group A is presented through table 4.229 while that of Experimental Group B is presented through table 4.30.

Tabulated Value of χ^2 at 4 df at .05 level is 9.49.

Table 4.229 Analysis of responses on Reaction Scale given by the Experimental Group A for Initial Try-out

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	12.8	Yes	Positive Side
2	I like illustrations given in the slides, which actually made me learn the lesson.	50.5	Yes	Positive Side
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	28.1	Yes	Positive Side
4	CAI is effective way of presentation because there is little stress in learning situation.	12.8	Yes	Neutral
5	I can learn with my own speed.	19.0	Yes	Positive Side
6	I can immediately test myself because there is lot of practice exercise.	16.9	Yes	Positive Side
7	This method is having more freedom to learn.	12.1	Yes	Positive Side
8	CAI didn't focus on more freedom situation.	12.07	Yes	Positive Side
9	Learning mathematics is fun in this CAI method.	10.96	Yes	Positive Side
10	This method is not good in learning mathematics because my doubts are not cleared.	10.2	Yes	Positive Side
11	In CAI I can teach myself (self-study) without the help of others.	13.2	Yes	Positive Side
12	Matter presented in CAI is not very clear.	3.79	No	-
13	CAI is easy to understand.	12.4	Yes	Positive Side
14	Animations are distracting in understanding the concept.	4.14	No	-
15	CAI took more time to understand the concept than usual classroom teaching.	2.00	No	-

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
16	Illustrations given in CAI are enough to understand the concept clearly.	4.14	No	-
17	Matter presented in CAI was logically arranged.	11.6	Yes	Positive Side
18	Learning through CAI was waste of time.	22.2	Yes	Positive Side
19	Illustrations given in CAI are related to day today life experiences.	14.5	Yes	Positive Side
20	Classroom teaching is more enjoyable.	13.4	Yes	Positive Side
21	The language used in CAI is easy and simple to understand.	33.6	Yes	Positive Side
22	The exercises given in each chapter is adequate.	3.07	No	-
23	CAI takes care of previous knowledge in the subject.	30.6	Yes	Positive Side
24	The solution to the problem is not easy to understand.	3.79	No	-
25	The exercises helped in understanding the chapter in depth.	22.0	Yes	Neutral
26	Solutions didn't help me whenever I was not able to solve the problem.	9.5	Yes	Positive Side
27	Break given in CAI helped me to refresh my mind.	15.0	Yes	Positive Side
28	I am feeling tired while going through the slide.	3.19	No	-
29	Animation shown in CAI is appropriate to help me in understanding the concept.	19.5	Yes	Positive Side
30	Topic is not introduced properly.	12.1	Yes	Positive Side
31	CAI does not take care of previous knowledge (percentage) needed to understand the present concept.	1.70	No	-
32	Enough revision is not done in CAI after the topic simple interest.	0.96	No	-
33	Enough revision is not done in CAI after the topic compound interest.	3.56	No	-
34	Enough revision is not done in CAI after the topic profit and loss.	5.78	No	-
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	5.78	No	-
36	I have to read the slide many times to understand what is being said as there was no clarity.	6.52	No	-
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	12.07	Yes	Positive Side
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	15.8	Yes	Positive Side
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	2.07	No	-
40	CAI is not enough in understanding the concept very clearly.	2.81	No	-
41	Independent learning is not possible through CAI.	9.85	Yes	Positive Side
42	Evaluation is done objectively (objective questions) so no partiality is involved in scoring.	18.4	Yes	Positive side

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
43	Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.	3.19	No	-
44	Instruction given in each slide of CAI is easy and clear to follow.	13.6	Yes	Positive Side
45	Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.	0.96	No	-
46	Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).	1.70	No	-
47	To get the correct answer I had to go back to the slide/s many times for topic simple interest.	7.26	No	-
48	To get the correct answer I had to go back to the slide/s many times for topic Compound interest.	10.2	Yes	Neutral
49	To get the correct answer I had to go back to the slide/s many times for topic profit and loss.	6.15	No	-
50	Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.	11.7	Yes	Neutral
51	Discussion with mathematics teacher is needed along with CAI.	3.56	No	-
52	Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.	5.41	No	-
53	Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.	8.74	No	-
54	Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.	4.67	No	-

Table 4.230 Analysis of responses on Reaction Scale given by the Experimental Group B for Initial Try-out

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	17.2	Yes	Positive Side
2	I like illustrations given in the slides, which actually made me learn the lesson.	19.3	Yes	Positive Side
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	13.9	Yes	Neutral

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
4	CAI is effective way of presentation because there is little stress in learning situation.	23.1	Yes	Neutral
5	I can learn with my own speed.	28.1	Yes	Positive Side
6	I can immediately test myself because there is lot of practice exercise.	12.7	Yes	Positive Side
7	This method is having more freedom to learn.	11.00	Yes	Positive Side
8	CAI didn't focus on more freedom situation.	4.75	No	-
9	Learning mathematics is fun in this CAI method.	14.3	Yes	Positive Side
10	This method is not good in learning mathematics because my doubts are not cleared.	1.4	No	-
11	In CAI I can teach myself (self-study) without the help of others.	4.75	No	-
12	Matter presented in CAI is not very clear.	9.75	Yes	Positive Side
13	CAI is easy to understand.	5.17	No	-
14	Animations are distracting in understanding the concept.	12.25	Yes	Positive Side
15	CAI took more time to understand the concept than usual classroom teaching.	3.08	No	-
16	Illustrations given in CAI are enough to understand the concept clearly.	6.0	No	-
17	Matter presented in CAI was logically arranged.	3.5	No	-
18	Learning through CAI was waste of time.	11.8	Yes	Neutral
19	Illustrations given in CAI are related to day today life experiences.	17.2	Yes	Positive Side
20	Classroom teaching is more enjoyable.	2.8	Yes	Positive Side
21	The language used in CAI is easy and simple to understand.	13.2	Yes	Positive Side
22	The exercises given in each chapter is adequate.	10.58	Yes	Positive Side
23	CAI takes care of previous knowledge in the subject.	13.3	Yes	Neutral
24	The solution to the problem is not easy to understand.	2.25	No	-
25	The exercises helped in understanding the chapter in depth.	6.83	No	-
26	Solutions didn't help me whenever I was not able to solve the problem.	6.35	No	-
27	Break given in CAI helped me to refresh my mind.	11.4	Yes	Positive Side

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
28	I am feeling tired while going through the slide.	10.40	Yes	Positive Side
29	Animation shown in CAI is appropriate to help me in understanding the concept.	11.8	Yes	Positive Side
30	Topic is not introduced properly.	11.2	Yes	Positive Side
31	CAI does not take care of previous knowledge (percentage) needed to understand the present concept.	2.43	No	-
32	Enough revision is not done in CAI after the topic simple interest.	2.00	No	-
33	Enough revision is not done in CAI after the topic compound interest.	4.00	No	-
34	Enough revision is not done in CAI after the topic profit and loss.	1.13	No	-
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	3.74	No	-
36	I have to read the slide many times to understand what is being said as there was no clarity.	5.17	No	-
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	11.6	Yes	Positive Side
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	9.75	Yes	Positive Side
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	14.4	Yes	Positive Side
40	CAI is not enough in understanding the concept very clearly.	2.67	No	-
41	Independent learning is not possible through CAI.	2.67	No	-
42	Evaluation is done objectively (objective questions) so no partiality is involved in scoring.	16.4	Yes	Positive side
43	Evaluation done at the end of the topic "simple interest" is not suitable measure to know my understanding about that topic.	9.75	Yes	Positive Side
44	Instruction given in each slide of CAI is easy and clear to follow.	22.7	Yes	Positive Side
45	Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.	6.42	No	-
46	Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).	2.25	No	-

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
47	To get the correct answer I had to go back to the slide/s many times for topic simple interest.	3.92	No	-
48	To get the correct answer I had to go back to the slide/s many times for topic Compound interest.	3.50	No	-
49	To get the correct answer I had to go back to the slide/s many times for topic profit and loss.	3.08	No	-
50	Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.	10.6	Yes	Positive Side
51	Discussion with mathematics teacher is needed along with CAI.	5.58	No	-
52	Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.	16.4	Yes	Neutral
53	Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.	13.1	Yes	Positive Side
54	Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.	12.7	Yes	Positive Side

4.10 Findings from the Analysis of Reaction Scale for Initial Try-out

I. Experimental Group A

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *twenty six* statements were found to have statistically significant *higher values than the tabulated value of chi-square* at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have positive reaction and favorable attitude towards the statements carrying such higher values.*

The computed chi-square values in *twenty four* statements were *not found to be significant* at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is *uniformly distributed* in the 5-point scale.

The computed chi-square values of remaining *four statements* were found to have statistically significant higher values than the chi-square table value at 4 degrees of freedom and at

.05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have neutral attitude* towards the statements carrying such higher values.

II. Experimental Group B

Out of total *fifty four* statements bearing positive as well as negative nature, *the computed chi-square values of twenty five statements were found to have statistically significant higher values than the chi-square table values* at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *twenty four* statements were *not found to be significant* at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *five statements* were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have neutral attitude* towards the statements carrying such higher values.

4.11 Statement wise Analysis of Reaction Scale for Final Try-out

Points for positive polarity statements and negative polarity statements Refer Table 39 and 40 respectively.

Level of Significance is .05 for analysis using Chi Square for all statements. Chi Square was calculated using online calculator (Tools for science).

Note: Exp Gp denote Experimental Group

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

Polarity Positive

Experimental Group A : Responses of the students in percentage

Table 4.231 Responses of Exp Gp A students in percentage for statement 1 for Final Try-out

Points	Exp Gp A
5	22.58
4	35.48
3	29.03
2	3.23
1	3.23

22.58% of the students strongly agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

35.48% of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

29.03% of the students not decided with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

3.23% of the students disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

3.23% of the students strongly disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

Experimental Group B : Responses of the students in percentage

Table 4.232 Responses of Exp Gp B students in percentage for statement 1 for Final Try-out

Points	Exp Gp B
5	12.50
4	40.63
3	6.25
2	37.50
1	9.38

12.50% of the students strongly agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

40.63% of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

6.25% of the students not decided with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

37.50% of the students disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

9.38% of the students strongly disagree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.”

Graphical Representation of analysis of statement 1 in Percentage

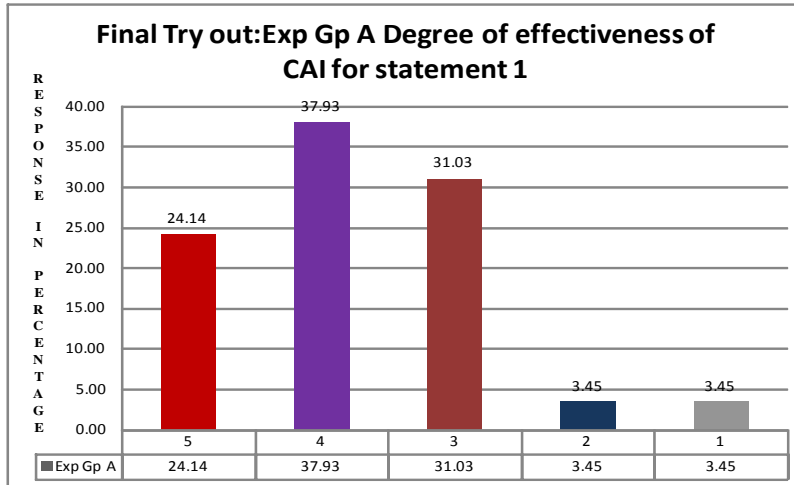


Figure 4.111 Graphical Representation of analysis of statement 1 in Percentage for Exp Gp B for Final Try-out

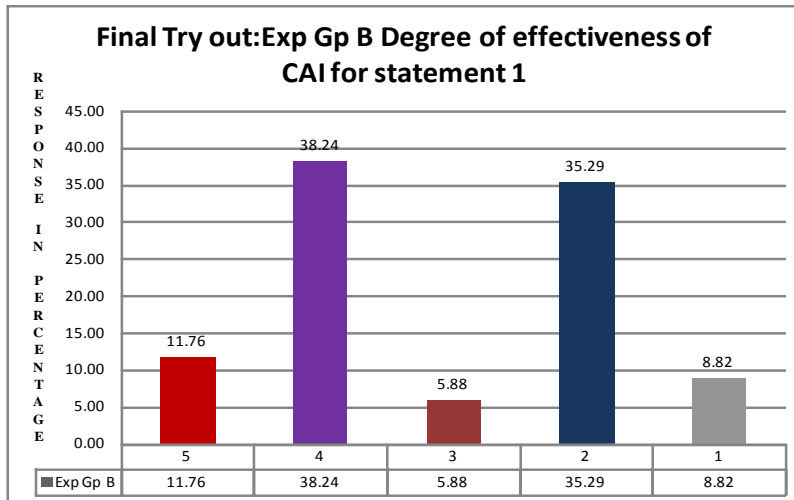


Figure 4.112 Graphical Representation of analysis of statement 1 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.233 Chi Square Table for Exp Gp A for Statement 1 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	11	5.8
3	9	5.8
2	1	5.8
1	1	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.6207

degrees of freedom = 4

probability = 0.00556

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures”.

Experimental Group B

Table 4.234 Chi Square Table for Exp Gp B for Statement 1 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	6.8
4	13	6.8
3	2	6.8
2	12	6.8
1	3	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 16.2941

degrees of freedom = 4

probability = 0.00265

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures”.

Statement 2: I like illustrations given in the slides, which actually made me learn the lesson.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.235 Responses of Exp Gp A students in percentage for statement 2 for Final Try-out

Points	Exp Gp A
5	9.68
4	67.74
3	12.90
2	3.23
1	0.00

9.86% of the students strongly agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

67.74% of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

12.90% of the students not decided with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

3.23% of the students disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

0% of the students strongly disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

Experimental Group B : Responses of the students in percentage

Table 4.236 Responses of Exp Gp B students in percentage for statement 2 for Final Try-out

Points	Exp Gp B
5	25.00
4	40.63
3	9.38
2	25.00
1	3.13

25.00% of the students strongly agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

40.63% of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

9.38% of the students not decided with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

25.00% of the students disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

3.13% of the students strongly disagree with the statement “I like illustrations given in the slides, which actually made me learn the lesson”.

Graphical Representation of analysis of statement 2 in Percentage

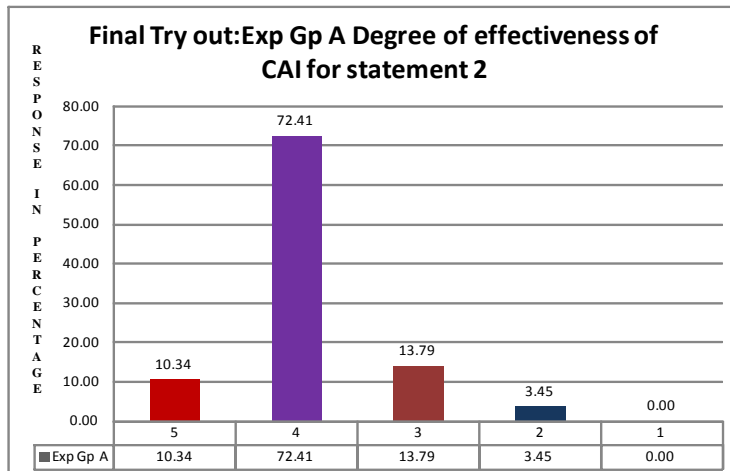


Figure 4.113 Graphical Representation of analysis of statement 2 in Percentage for Exp Gp A for Final Try-out

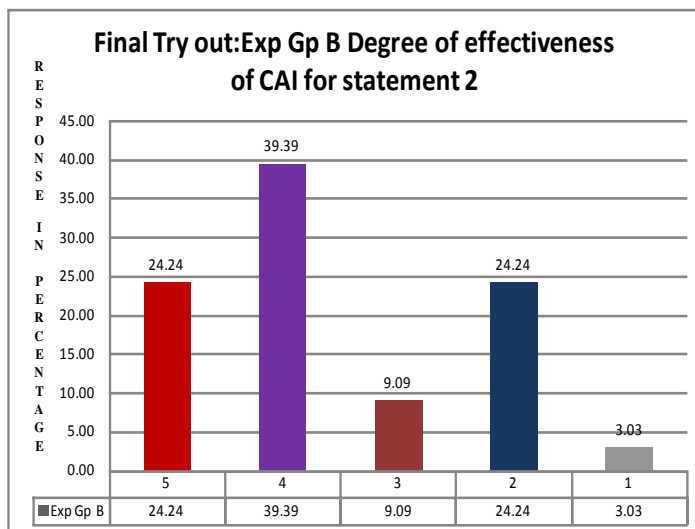


Figure 4.114 Graphical Representation of analysis of statement 2 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.237 Chi Square Table for Exp Gp A for Statement 2 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	3	5.8
4	21	5.8
3	4	5.8
2	1	5.8
1	0	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 51.517241

degrees of freedom = 4

probability = 0

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson.”

Experimental Group B

Table 4.238 Chi Square Table for Exp Gp B for Statement 2 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	13	6.6
3	3	6.6
2	8	6.6
1	1	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 13.5152

degrees of freedom = 4

probability = 0.00901

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I like illustrations given in the slides, which actually made me learn the lesson.”

Statement 3: Illustrations didn't help me to relate what we learned in mathematics to real life situation.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.239 Responses of Exp Gp A students in percentage for statement 3 for Final Try-out

Points	Exp Gp A
5	16.13
4	35.48
3	12.90
2	19.35
1	6.45

16.13% of the students strongly disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

35.48% of the students disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

12.90% of the students not decided with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

19.35% of the students agree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

6.45% of the students strongly agree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

Experimental Group B : Responses of the students in percentage

Table 4.240 Responses of Exp Gp B students in percentage for statement 3 for Final Try-out

Points	Exp Gp B
5	25.00
4	21.88
3	21.88
2	31.25
1	3.13

25.00% of the students strongly disagree with the statement "Illustrations didn't help me to relate what we learned in mathematics to real life situation."

21.88% of the students disagree with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

21.88% of the students not decided with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

31.25% of the students agree with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

3.13% of the students strongly agree with the statement “Illustrations didn’t help me to relate what we learned in mathematics to real life situation.”

Graphical Representation of analysis of statement 3 in Percentage

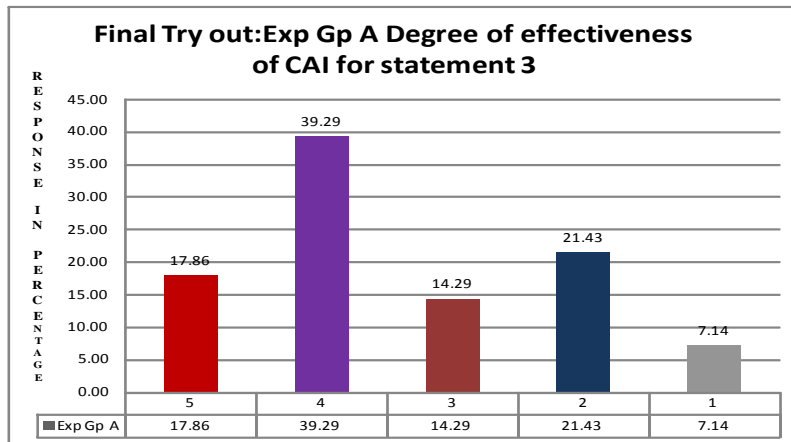


Figure 4.115 Graphical Representation of analysis of statement 3 in Percentage for Exp Gp A for Final Try-out

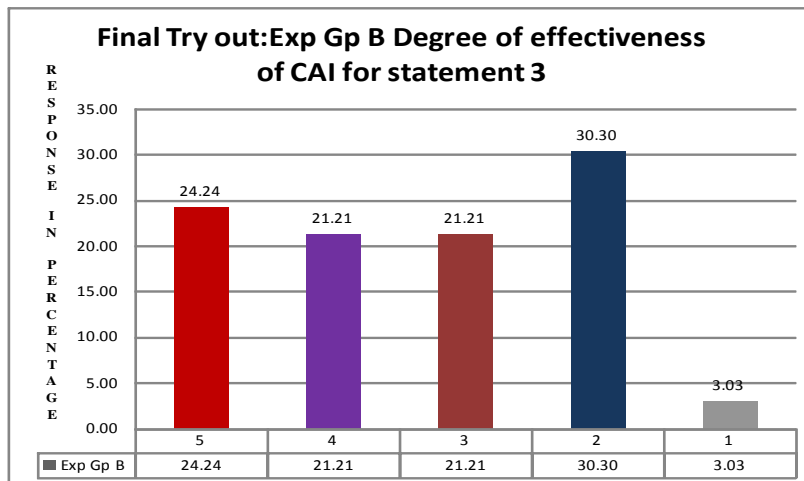


Figure 4.116 Graphical Representation of analysis of statement 3 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.241 Chi Square Table for Exp Gp A for Statement 3 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	5.6
4	11	5.6
3	4	5.6
2	6	5.6
1	2	5.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.07143

degrees of freedom =4

probability = 0.089

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.242 Chi Square Table for Exp Gp B for Statement 3 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	7	6.6
3	7	6.6
2	10	6.6
1	1	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 6.84848

degrees of freedom = 4

probability = 0.14412

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 4: CAI is effective way of presentation because there is little stress in learning situation.

Polarity: Positive

Experimental Group A : Responses of the students in percentage**Table 4.243 Responses of Exp Gp A students in percentage for statement 4 for Final Try-out**

Points	Exp Gp A
5	6.45
4	29.03
3	38.71
2	12.90
1	6.45

6.45% of the students strongly agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

29.03% of the students agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

38.71% of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

12.90% of the students disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

6.45% of the students strongly disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

Experimental Group B : Responses of the students in percentage**Table 4.244 Responses of Exp Gp B students in percentage for statement 4 for Final Try-out**

Points	Exp Gp B
5	15.63
4	37.50
3	15.63
2	25.00
1	9.38

15.63% of the students strongly agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

37.50% of the students agree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

15.63% of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

25.00% of the students disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

9.38% of the students strongly disagree with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

Graphical Representation of analysis of statement 4 in Percentage

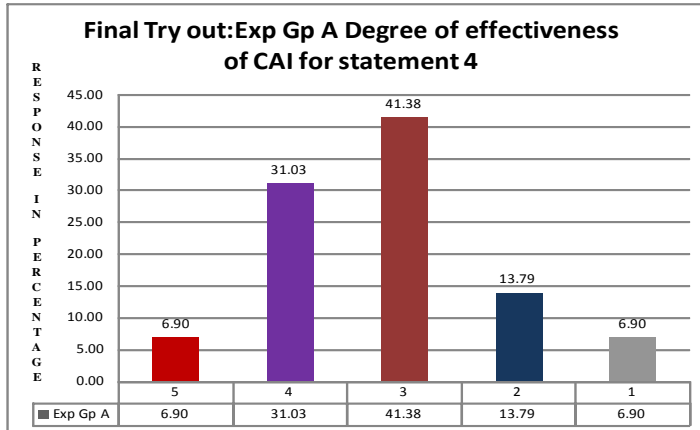


Figure 4.117 Graphical Representation of analysis of statement 4 in Percentage for Exp Gp A for Final Try-out

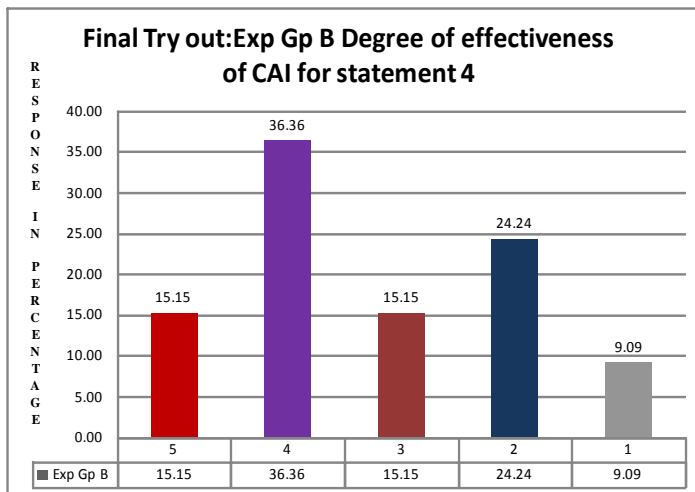


Figure 4.118 Graphical Representation of analysis of statement 4 in Percentage for Exp Gp A for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.245 Chi Square Table for Exp Gp A for Statement 4 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	5.8
4	9	5.8
3	12	5.8
2	4	5.8
1	2	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 13.931

degrees of freedom = 4

probability = 0.00752

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “CAI is effective way of presentation because there is little stress in learning situation.”

Experimental Group B

Table 4.246 Chi Square Table for Exp Gp B for Statement 4 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	12	6.6
3	5	6.6
2	8	6.6
1	3	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 7.45455

degrees of freedom = 4

probability = 0.11373

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 5: I can learn with my own speed.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.247 Responses of Exp Gp A students in percentage for statement 5 for Final Try-out

Points	Exp Gp A
5	25.81
4	48.39
3	12.90
2	9.68
1	0.00

25.81% of the students strongly agree with the statement “I can learn with my own speed.”

48.39% of the students agree with the statement “I can learn with my own speed.”

12.90% of the students not decided with the statement “I can learn with my own speed.”

9.68% of the students disagree with the statement “I can learn with my own speed.”

0.00% of the students strongly disagree with the statement “I can learn with my own speed.”

Experimental Group B : Responses of the students in percentage

Table 4.248 Responses of Exp Gp B students in percentage for statement 5 for Final Try-out

Points	Exp Gp B
5	40.63
4	21.88
3	15.63
2	21.88
1	3.13

40.63% of the students strongly agree with the statement “I can learn with my own speed.”

21.88% of the students agree with the statement “I can learn with my own speed.”

15.63% of the students not decided with the statement “I can learn with my own speed.”

21.88% of the students disagree with the statement “I can learn with my own speed.”

3.13% of the students strongly disagree with the statement “I can learn with my own speed.”

Graphical Representation of analysis of statement 5 in Percentage

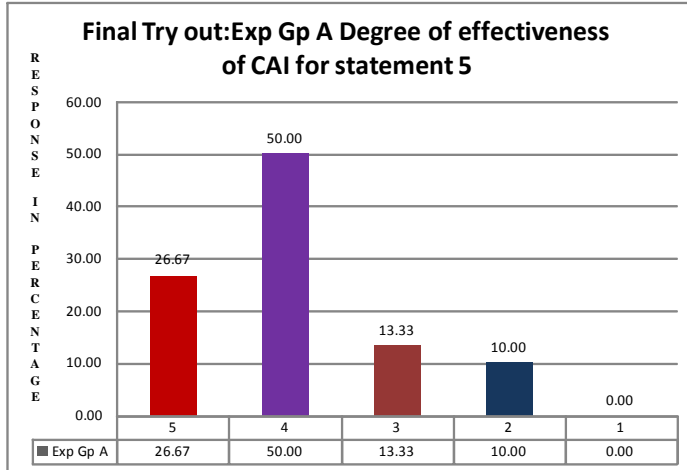


Figure 4.119 Graphical Representation of analysis of statement 5 in Percentage for Exp Gp A for Final Try-out

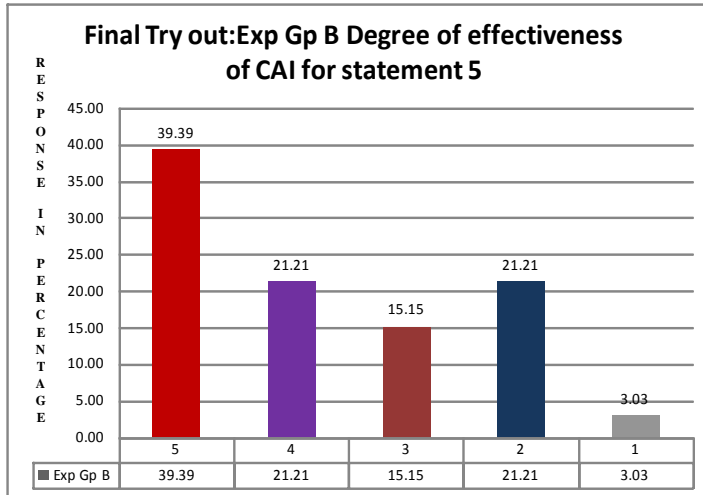


Figure 4.120 Graphical Representation of analysis of statement 5 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.249 Chi Square Table for Exp Gp A for Statement 5 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6
4	15	6
3	4	6
2	3	6
1	0	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 22.3333

degrees of freedom = 4

probability = 0.00017

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I can learn with my own speed.”

Experimental Group B

Table 4.250 Chi Square Table for Exp Gp B for Statement 5 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	13	6.6
4	7	6.6
3	5	6.6
2	7	6.6
1	1	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.3939

degrees of freedom = 4

probability = 0.02248

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “I can learn with my own speed”.

Statement 6: I can immediately test myself because there is lot of practice exercise.

Polarity: Positive

Experimental Group A : Responses of the students in percentage**Table 4.251 Responses of Exp Gp A students in percentage for statement 6 for Final Try-out**

Points	Exp Gp A
5	22.58
4	48.39
3	16.13
2	0.00
1	6.45

22.58% of the students strongly agree with the statement “I can immediately test myself because there is lot of practice exercise.”

48.39% of the students agree with the statement “I can immediately test myself because there is lot of practice exercise.”

16.13% of the students not decided with the statement “I can immediately test myself because there is lot of practice exercise.”

0.00% of the students disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

6.45% of the students strongly disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

Experimental Group B : Responses of the students in percentage**Table 4.252 Responses of Exp Gp B students in percentage for statement 6 for Final Try-out**

Points	Exp Gp B
5	25.00
4	46.88
3	9.38
2	15.63
1	6.25

25.00% of the students strongly agree with the statement “I can immediately test myself because there is lot of practice exercise.”

46.88% of the students agree with the statement “I can immediately test myself because there is lot of practice exercise.”

9.38% of the students not decided with the statement “I can immediately test myself because there is lot of practice exercise.”

15.63% of the students disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

6.25% of the students strongly disagree with the statement “I can immediately test myself because there is lot of practice exercise.”

Graphical Representation of analysis of statement 6 in Percentage

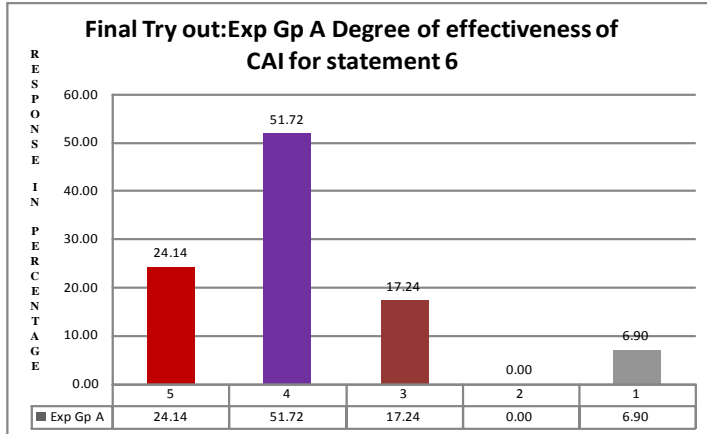


Figure 4.121 Graphical Representation of analysis of statement 6 in Percentage for Exp Gp A for Final Try-out

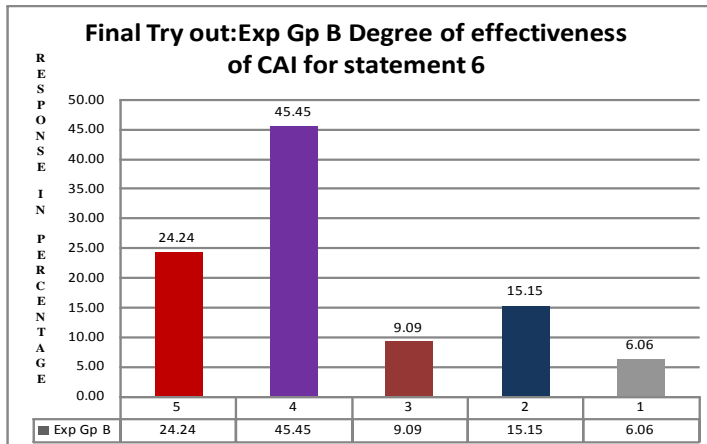


Figure 4.122 Graphical Representation of analysis of statement 6 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.253 Chi Square Table for Exp Gp A for Statement 6 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	15	5.8
3	5	5.8
2	0	5.8
1	2	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 23.2414

degrees of freedom = 4

probability = 0.00011

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “I can immediately test myself because there is lot of practice exercise.”

Experimental Group B

Table 4.254 Chi Square Table for Exp Gp B for Statement 6 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	15	6.6
3	3	6.6
2	5	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 16.5455

degrees of freedom = 4

probability = 0.00237

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on **agree** therefore most of the students agree with the statement “I can immediately test myself because there is lot of practice exercise”.

Statement 7: This method is having more freedom to learn.

Polarity: Positive

Experimental Group A : Responses of the students in percentage**Table 4.255 Responses of Exp Gp A students in percentage for statement 7 for Final Try-out**

Points	Exp Gp A
5	35.48
4	41.94
3	12.90
2	6.45
1	0.00

35.48% of the students strongly agree with the statement “This method is having more freedom to learn.”

41.94% of the students agree with the statement “This method is having more freedom to learn.”

12.90% of the students not decided with the statement “This method is having more freedom to learn.”

6.45% of the students disagree with the statement “This method is having more freedom to learn.”

0.00% of the students strongly disagree with the statement “This method is having more freedom to learn.”

Experimental Group B : Responses of the students in percentage**Table 4.256 Responses of Exp Gp B students in percentage for statement 7 for Final Try-out**

Points	Exp Gp B
5	31.25
4	34.38
3	12.50
2	21.88
1	6.25

31.25% of the students strongly agree with the statement “This method is having more freedom to learn.”

34.38% of the students agree with the statement “This method is having more freedom to learn.”

12.50% of the students not decided with the statement “This method is having more freedom to learn.”

21.88% of the students disagree with the statement “This method is having more freedom to learn.”

6.25% of the students strongly disagree with the statement “This method is having more freedom to learn.”

Graphical Representation of analysis of statement 7 in Percentage

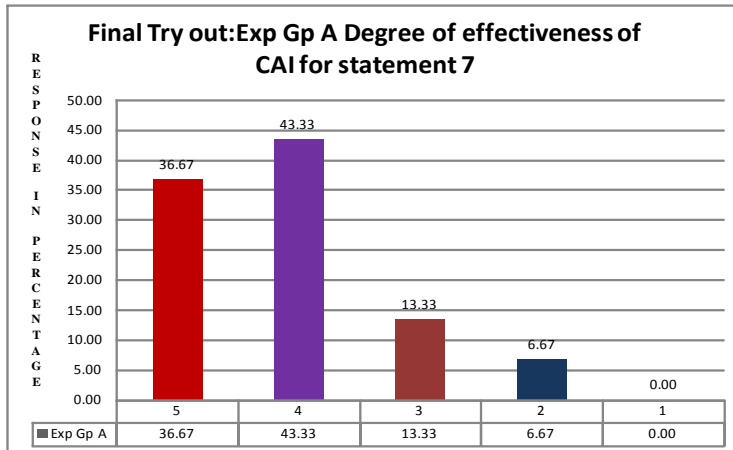


Figure 4.123 Graphical Representation of analysis of statement 7 in Percentage for Exp Gp A for Final Try-out

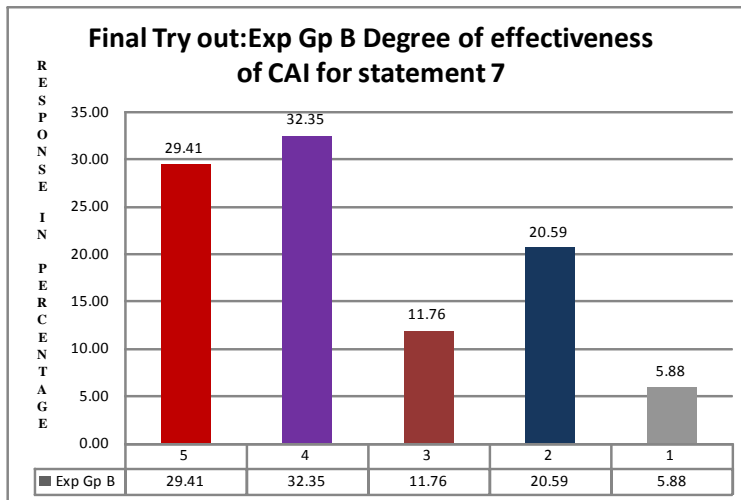


Figure 4.124 Graphical Representation of analysis of statement 7 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.257 Chi Square Table for Exp Gp A for Statement 7 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	11	6
4	13	6
3	4	6
2	2	6
1	0	6

chi-square = 21.6667

degrees of freedom = 4

probability = 0.000237

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “This method is having more freedom to learn.”

Experimental Group B

Table 4.258 Chi Square Table for Exp Gp B for Statement 7 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	10	6.8
4	11	6.8
3	4	6.8
2	7	6.8
1	2	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.64706

degrees of freedom = 4

probability = 0.07055

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “I can immediately test myself because there is lot of practice exercise”.

Statement 8: CAI didn't focus on more freedom situation.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.259 Responses of Exp Gp A students in percentage for statement 8 for Final Try-out

Points	Exp Gp A
5	22.58
4	22.58
3	29.03
2	12.90
1	6.45

22.58% of the students strongly disagree with the statement “CAI didn’t focus on more freedom situation.”

22.58% of the students disagree with the statement “CAI didn’t focus on more freedom situation.”

29.03% of the students not decided with the statement “CAI didn’t focus on more freedom situation.”

12.90% of the students agree with the statement “CAI didn’t focus on more freedom situation.”

6.45% of the students strongly agree with the statement “CAI didn’t focus on more freedom situation.”

Experimental Group B : Responses of the students in percentage

Table 4.260 Responses of Exp Gp B students in percentage for statement 8 for Final Try-out

Points	Exp Gp B
5	6.25
4	40.63
3	34.38
2	9.38
1	12.50

6.25% of the students strongly disagree with the statement “CAI didn’t focus on more freedom situation.”

40.63% of the students disagree with the statement “CAI didn’t focus on more freedom situation.”

34.38% of the students not decided with the statement “CAI didn’t focus on more freedom situation.”

9.38% of the students agree with the statement “CAI didn’t focus on more freedom situation.”

12.50% of the students strongly agree with the statement “CAI didn’t focus on more freedom situation.”

Graphical Representation of analysis of statement 8 in Percentage

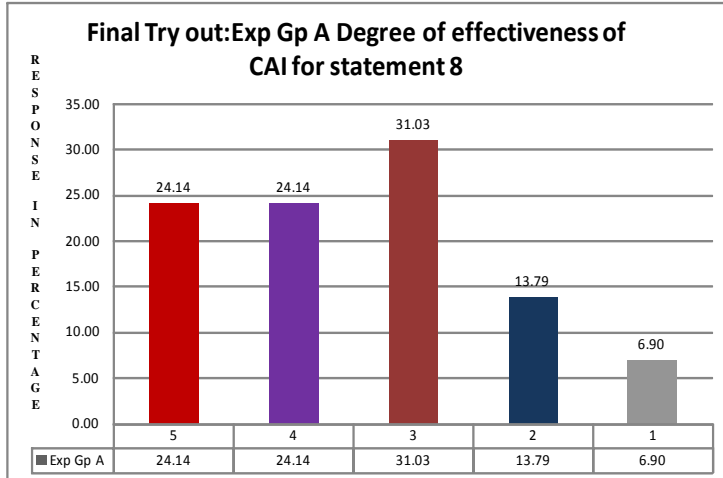


Figure 4.125 Graphical Representation of analysis of statement 8 in Percentage for Exp Gp A for Final Try-out

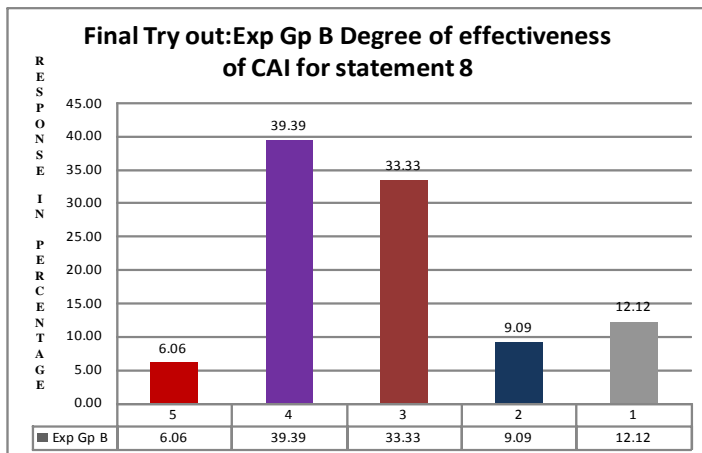


Figure 4.126 Graphical Representation of analysis of statement 8 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.261 Chi Square Table for Exp Gp A for Statement 8 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	7	5.8
3	9	5.8
2	4	5.8
1	2	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.31034

degrees of freedom = 4

probability = 0.25691

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.262 Chi Square Table for Exp Gp B for Statement 8 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	6.6
4	13	6.6
3	11	6.6
2	3	6.6
1	4	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 15.3333

degrees of freedom = 4

probability = 0.00406

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement "CAI didn't focus on more freedom situation".

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage**Table 4.263 Responses of Exp Gp A students in percentage for statement 9 for Final Try-out**

Points	Exp Gp A
5	22.58
4	45.16
3	22.58
2	0.00
1	3.23

22.58% of the students strongly agree with the statement “Learning mathematics is fun in this CAI method.”

45.16% of the students agree with the statement “Learning mathematics is fun in this CAI method.”

22.58% of the students not decided with the statement “Learning mathematics is fun in this CAI method.”

0.00% of the students disagree with the statement “Learning mathematics is fun in this CAI method.”

3.23% of the students strongly disagree with the statement “Learning mathematics is fun in this CAI method.”

Experimental Group B : Responses of the students in percentage**Table 4.264 Responses of Exp Gp A students in percentage for statement 9 for Final Try-out**

Points	Exp Gp B
5	25.81
4	41.94
3	9.68
2	22.58
1	6.45

22.81% of the students strongly agree with the statement “Learning mathematics is fun in this CAI method.”

41.94% of the students agree with the statement “Learning mathematics is fun in this CAI method.”

9.68% of the students not decided with the statement “Learning mathematics is fun in this CAI method.”

22.58% of the students disagree with the statement “Learning mathematics is fun in this CAI method.”

6.45% of the students strongly disagree with the statement “Learning mathematics is fun in this CAI method.”

Graphical Representation of analysis of statement 9 in Percentage

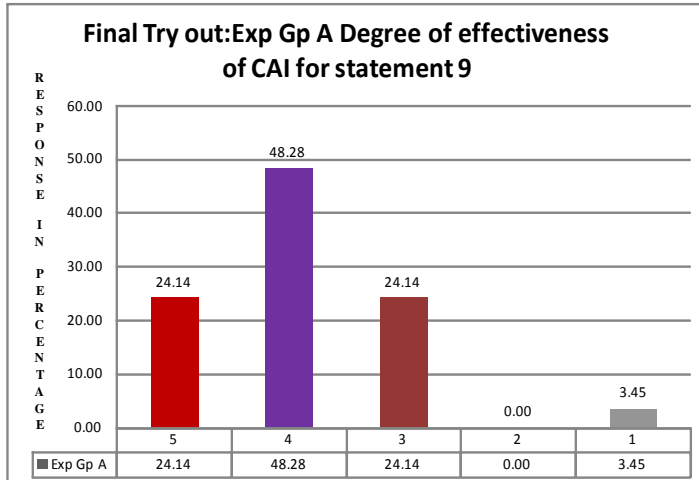


Figure 4.127 Graphical Representation of analysis of statement 9 in Percentage for Exp Gp A for Final Try-out

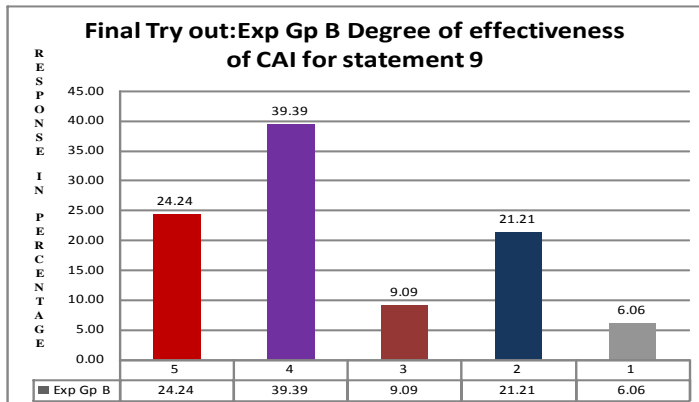


Figure 4.128 Graphical Representation of analysis of statement 9 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.265 Chi Square Table for Exp Gp A for Statement 9 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	14	5.8
3	7	5.8
2	0	5.8
1	1	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 21.8621

degrees of freedom = 4

probability = 0.00021

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Learning mathematics is fun in this CAI method.”

Experimental Group B

Table 4.266 Chi Square Table for Exp Gp B for Statement 9 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	13	6.6
3	3	6.6
2	7	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.697

degrees of freedom = 4

probability =0.01975

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students strongly agree with the statement “Learning mathematics is fun in this CAI method”.

Statement 10: This method is not good in learning mathematics because my doubts are not cleared.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.267 Responses of Exp Gp A students in percentage for statement 10 for Final Try-out

Points	Exp Gp A
5	22.58
4	19.35
3	22.58
2	25.81
1	6.45

22.58% of the students strongly disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

19.35% of the students disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

22.58% of the students not decided with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

25.81% of the students agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

6.45% of the students strongly agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

Experimental Group B : Responses of the students in percentage

Table 4.268 Responses of Exp Gp B students in percentage for statement 10 for Final Try-out

Points	Exp Gp B
5	6.25
4	28.13
3	12.50
2	34.38
1	21.88

6.25% of the students strongly disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

28.13% of the students disagree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

12.50% of the students not decided with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

34.38% of the students agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

21.88% of the students strongly agree with the statement “This method is not good in learning mathematics because my doubts are not cleared.”

Graphical Representation of analysis of statement 10 in Percentage

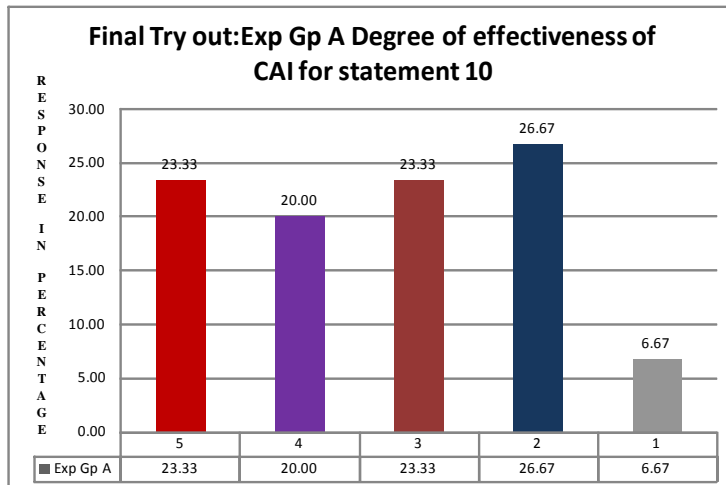


Figure 4.129 Graphical Representation of analysis of statement 10 in Percentage for Exp Gp A for Final Try-out

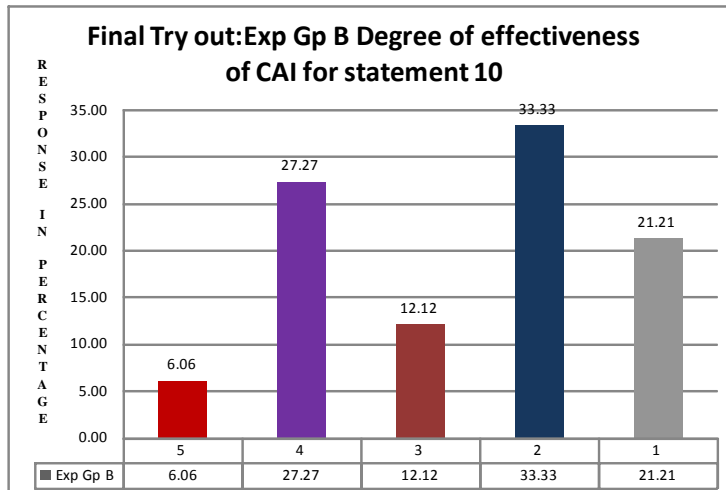


Figure 4.130 Graphical Representation of analysis of statement 10 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.269 Chi Square Table for Exp Gp A for Statement 10 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	6
4	6	6
3	7	6
2	8	6
1	2	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 3.66667

degrees of freedom = 4

probability = 0.45299

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.270 Chi Square Table for Exp Gp B for Statement 10 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	6.6
4	9	6.6
3	4	6.6
2	11	6.6
1	7	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.06061

degrees of freedom = 4

probability = 0.08938

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 11: In CAI I can teach myself (self-study) without the help of others.

Polarity: Positive

Experimental Group A : Responses of the students in percentage**Table 4.271 Responses of Exp Gp A students in percentage for statement 11 for Final Try-out**

Points	Exp Gp A
5	16.13
4	32.26
3	22.58
2	12.90
1	9.68

16.13% of the students strongly agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

32.26% of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

22.58% of the students not decided with the statement “In CAI I can teach myself (self-study) without the help of others.”

12.90% of the students disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

9.68% of the students strongly disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

Experimental Group B : Responses of the students in percentage**Table 4.272 Responses of Exp Gp B students in percentage for statement 11 for Final Try-out**

Points	Exp Gp B
5	28.13
4	43.75
3	15.63
2	6.25
1	9.38

28.13% of the students strongly agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

43.75% of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

15.63% of the students not decided with the statement “In CAI I can teach myself (self-study) without the help of others.”

6.25% of the students disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

9.38% of the students strongly disagree with the statement “In CAI I can teach myself (self-study) without the help of others.”

Graphical Representation of analysis of statement 11 in Percentage

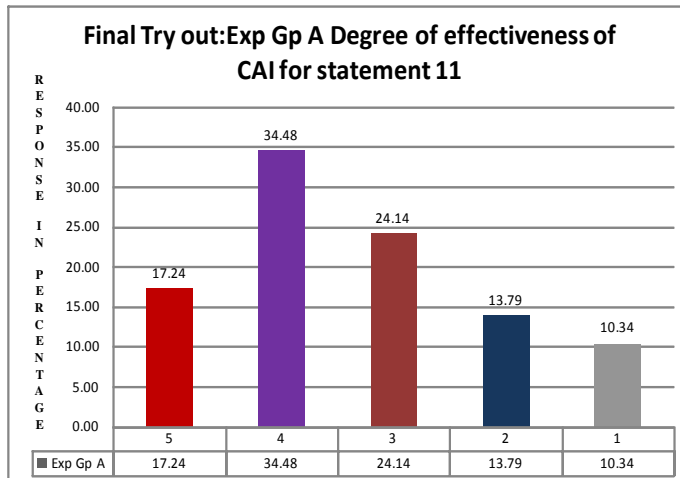


Figure 4.131 Graphical Representation of analysis of statement 11 in Percentage for Exp Gp A for Final Try-out

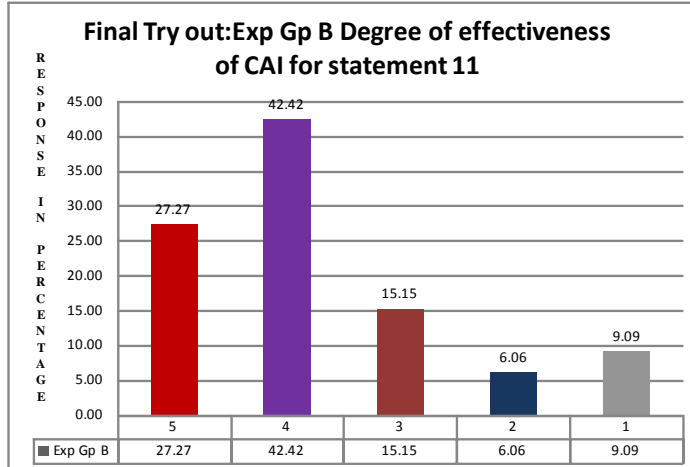


Figure 4.132 Graphical Representation of analysis of statement 11 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.273 Chi Square Table for Exp Gp A for Statement 11 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	5.8
4	10	5.8
3	7	5.8
2	4	5.8
1	3	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.31034

degrees of freedom =4

probability = 0.25691

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others.”

Experimental Group B

Table 4.274 Chi Square Table for Exp Gp B for Statement 11 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	6.6
4	14	6.6
3	5	6.6
2	2	6.6
1	3	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.7273

degrees of freedom =4

probability = 0.0053

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “In CAI I can teach myself (self-study) without the help of others”.

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.275 Responses of Exp Gp A students in percentage for statement 12 for Final Try-out

Points	Exp Gp A
5	9.68
4	35.48
3	29.03
2	19.35
1	3.23

9.68% of the students strongly disagree with the statement “Matter presented in CAI is not very clear.”

35.48% of the students disagree with the statement “Matter presented in CAI is not very clear.”

29.03% of the students not decided with the statement “Matter presented in CAI is not very clear.”

19.35% of the students agree with the statement “Matter presented in CAI is not very clear.”

3.23% of the students strongly agree with the statement “Matter presented in CAI is not very clear.”

Experimental Group B : Responses of the students in percentage

Table 4.276: Responses of Exp Gp B students in percentage for statement 12 for Final Try-out

Points	Exp Gp B
5	18.75
4	34.38
3	21.88
2	21.88
1	6.25

18.75% of the students strongly disagree with the statement.

34.38% of the students disagree with the statement.

21.88% of the students not decided with the statement.

21.88% of the students agree with the statement.

6.25% of the students strongly agree with the statement.

Graphical Representation of analysis of statement 12 in Percentage

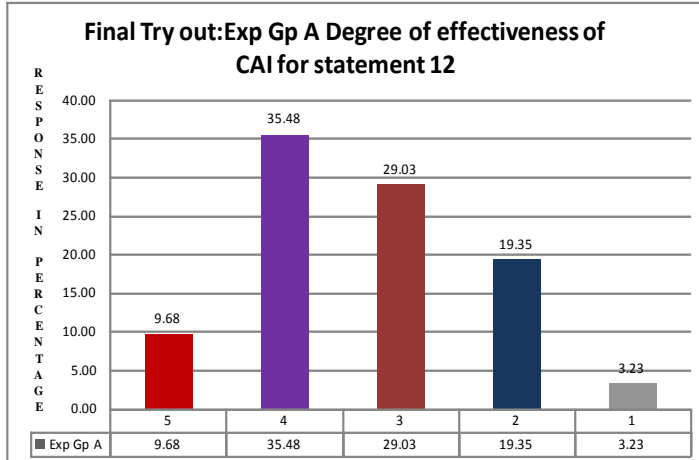


Figure 4.133 Graphical Representation of analysis of statement 12 in Percentage for Exp Gp A for Final Try-out

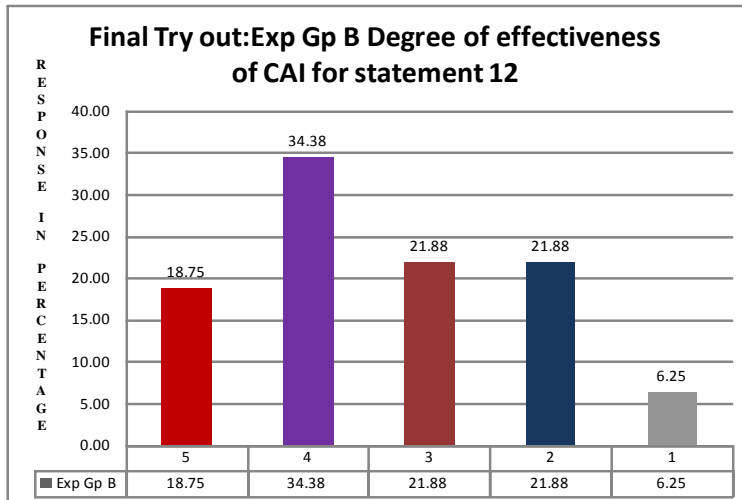


Figure 4.134 Graphical Representation of analysis of statement 12 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.277 Chi Square Table for Exp Gp A for Statement 12 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	3	6
4	11	6
3	9	6
2	6	6
1	1	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.3333

degrees of freedom = 4

probability = 0.02306

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Matter presented in CAI is not very clear.”

Experimental Group B

Table 4.278 Chi Square Table for Exp Gp B for Statement 12 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	11	6.6
3	7	6.6
2	7	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 6.24242

degrees of freedom = 4

probability = 0.18176

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 13: CAI is easy to understand.

Polarity: Positive

Experimental Group A : Responses of the students in percentage**Table 4.279 Responses of Exp Gp A students in percentage for statement 13 for Final Try-out**

Points	Exp Gp A
5	12.90
4	35.48
3	32.26
2	12.90
1	0.00

12.90% of the students strongly agree with the statement “CAI is easy to understand.”

35.48% of the students agree with the statement “CAI is easy to understand.”

32.26% of the students not decided with the statement “CAI is easy to understand.”

12.90% of the students disagree with the statement “CAI is easy to understand.”

0.00% of the students strongly disagree with the statement “CAI is easy to understand.”

Experimental Group B : Responses of the students in percentage**Table 4.280 Responses of Exp Gp B students in percentage for statement 13 for Final Try-out**

Points	Exp Gp B
5	25.00
4	43.75
3	9.38
2	18.75
1	6.25

25.00% of the students strongly agree with the statement “CAI is easy to understand.”

43.75% of the students agree with the statement “CAI is easy to understand.”

9.38% of the students not decided with the statement “CAI is easy to understand.”

18.75% of the students disagree with the statement “CAI is easy to understand.”

6.25% of the students strongly disagree with the statement “CAI is easy to understand.”

Graphical Representation of analysis of statement 13 in Percentage

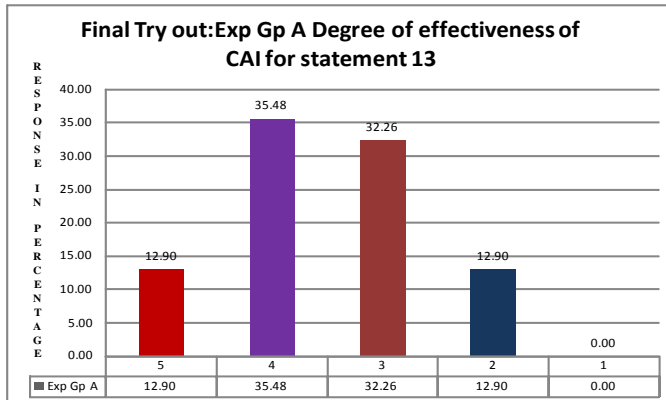


Figure 4.135 Graphical Representation of analysis of statement 13 in Percentage for Exp Gp A for Final Try-out

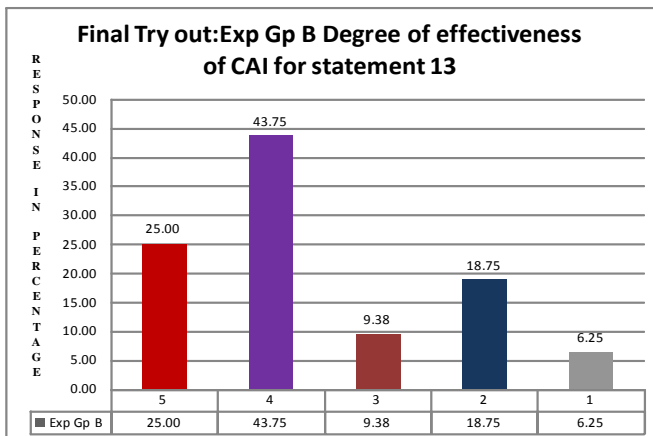


Figure 4.136 Graphical Representation of analysis of statement 13 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.281 Chi Square Table for Exp Gp A for Statement 13 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	5.8
4	11	5.8
3	10	5.8
2	4	5.8
1	0	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.6207

degrees of freedom = 4

probability = 0.00556

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “CAI is easy to understand.”

Experimental Group B

Table 4.282 Chi Square Table for Exp Gp B for Statement 13 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	14	6.6
3	3	6.6
2	6	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 13.8182

degrees of freedom = 4

probability = 0.0079

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “CAI is easy to understand”.

Statement 14: Animations are distracting in understanding the concept.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.283 Responses of Exp Gp A students in percentage for statement 14 for Final Try-out

Points	Exp Gp A
5	19.35
4	25.81
3	12.90
2	22.58
1	3.23

19.35% of the students strongly disagree with the statement “Animations are distracting in understanding the concept.”

25.81% of the students disagree with the statement “Animations are distracting in understanding the concept.”

12.90% of the students not decided with the statement “Animations are distracting in understanding the concept.”

22.58% of the students agree with the statement “Animations are distracting in understanding the concept.”

3.23% of the students strongly agree with the statement “Animations are distracting in understanding the concept.”

Experimental Group B : Responses of the students in percentage

Table 4.284 Responses of Exp Gp B students in percentage for statement 14 for Final Try-out

Points	Exp Gp B
5	37.50
4	50.00
3	3.13
2	15.63
1	3.13

37.50% of the students strongly disagree with the statement “Animations are distracting in understanding the concept.”

50.00% of the students disagree with the statement “Animations are distracting in understanding the concept.”

3.13% of the students not decided with the statement “Animations are distracting in understanding the concept.”

15.63% of the students agree with the statement “Animations are distracting in understanding the concept.”

3.13% of the students strongly agree with the statement “Animations are distracting in understanding the concept.”

Graphical Representation of analysis of statement 14 in Percentage

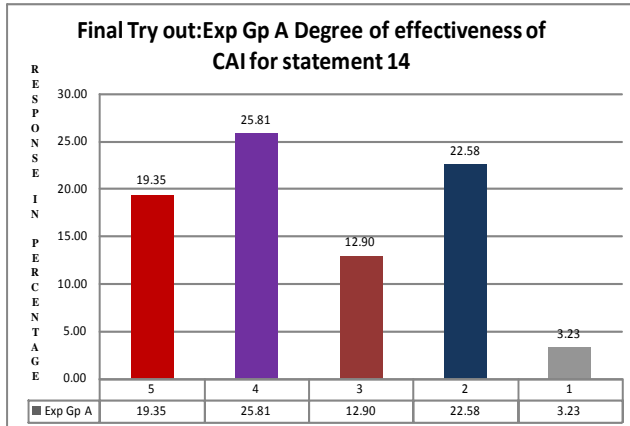


Figure 4.137 Graphical Representation of analysis of statement 14 in Percentage for Exp Gp A for Final Try-out

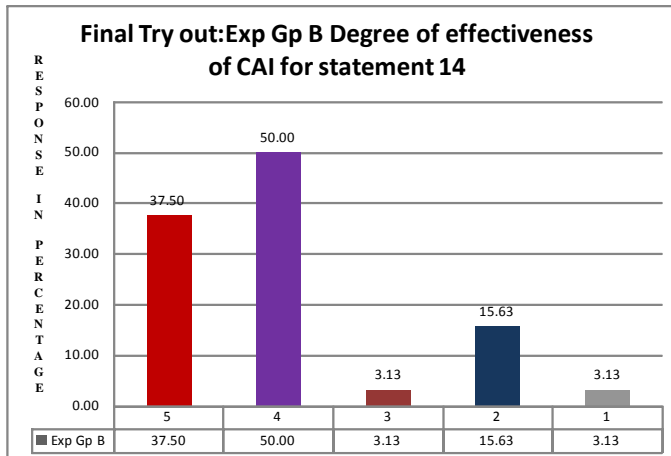


Figure 4.138 Graphical Representation of analysis of statement 14 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.285 Chi Square Table for Exp Gp A for Statement 14 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	5.2
4	8	5.2
3	4	5.2
2	7	5.2
1	1	5.2

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.92308

degrees of freedom = 4

probability = 0.20497

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.286 Chi Square Table for Exp Gp B for Statement 14 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	12	7
4	16	7
3	1	7
2	5	7
1	1	7

Expected Frequency = Sum of observed frequencies/5

chi-square = 26

degrees of freedom = 4

probability = 0.00

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Animations are distracting in understanding the concept”.

Statement 15: CAI took more time to understand the concept than usual classroom teaching.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.287 Responses of Exp Gp A students in percentage for statement 15 for Final Try-out

Points	Exp Gp
5	19.35
4	29.03
3	16.13
2	29.03
1	3.23

19.35% of the students strongly disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

29.03% of the students disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

16.13% of the students not decided with the statement “CAI took more time to understand the concept than usual classroom teaching.”

29.03% of the students agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

3.23% of the students strongly agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

Experimental Group B : Responses of the students in percentage

Table 4.288 Responses of Exp Gp B students in percentage for statement 15 for Final Try-out

Points	Exp Gp B
5	21.88
4	15.63
3	3.13
2	40.63
1	21.88

21.88% of the students strongly disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

15.63% of the students disagree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

3.13% of the students not decided with the statement “CAI took more time to understand the concept than usual classroom teaching.”

40.63% of the students agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

21.88% of the students strongly agree with the statement “CAI took more time to understand the concept than usual classroom teaching.”

Graphical Representation of analysis of statement 15 in Percentage

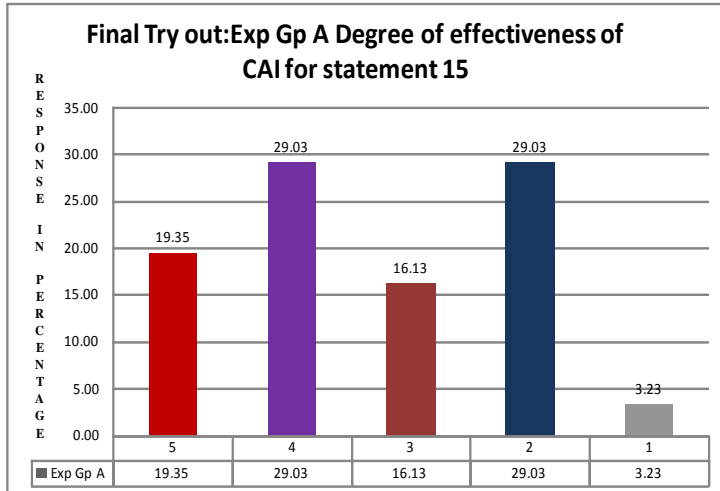


Figure 4.139 Graphical Representation of analysis of statement 15 in Percentage for Exp Gp A for Final Try-out

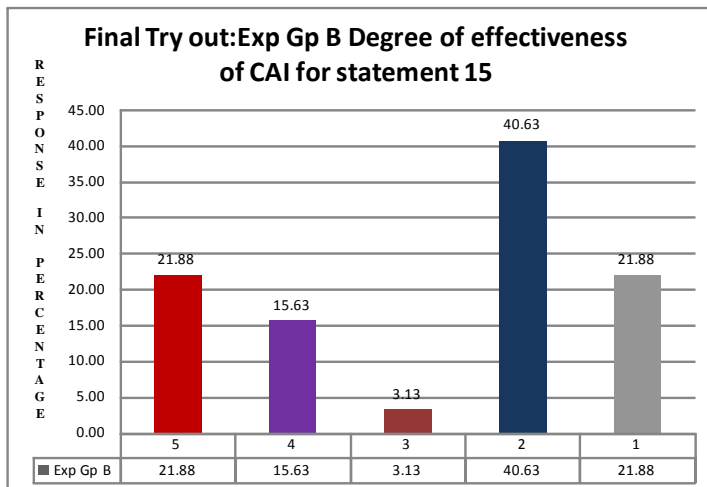


Figure 4.140 Graphical Representation of analysis of statement 15 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.289 Chi Square Table for Exp Gp A for Statement 15 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6
4	9	6
3	5	6
2	9	6
1	1	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 7.33333

degrees of freedom = 4

probability = 0.11929

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.290 Chi Square Table for Exp Gp B for Statement 15 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	6.6
4	5	6.6
3	1	6.6
2	13	6.6
1	7	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.3939

degrees of freedom = 4

probability = 0.02248

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “CAI took more time to understand the concept than usual classroom teaching”.

Statement 16 Illustrations given in CAI are enough to understand the concept clearly.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.291 Responses of Exp Gp A students in percentage for statement 16 for Final Try-out

Points	Exp Gp A
5	16.13
4	41.94
3	12.90
2	16.13
1	9.68

16.13% of the students strongly agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

41.94% of the students agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

12.90% of the students not decided with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

16.13% of the students disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

9.68% of the students strongly disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

Experimental Group B : Responses of the students in percentage

Table 4.292 Responses of Exp Gp B students in percentage for statement 16 for Final Try-out

Points	Exp Gp B
5	15.63
4	34.38
3	12.50
2	31.25
1	9.38

15.63% of the students strongly agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

34.38% of the students agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

12.50% of the students not decided with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

31.25% of the students disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

9.38% of the students strongly disagree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

Graphical Representation of analysis of statement 16 in Percentage

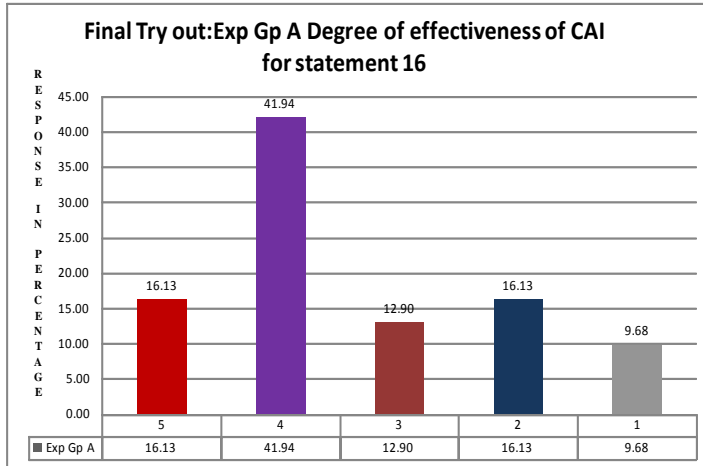


Figure 4.141 Graphical Representation of analysis of statement 16 in Percentage for Exp Gp A for Final Try-out

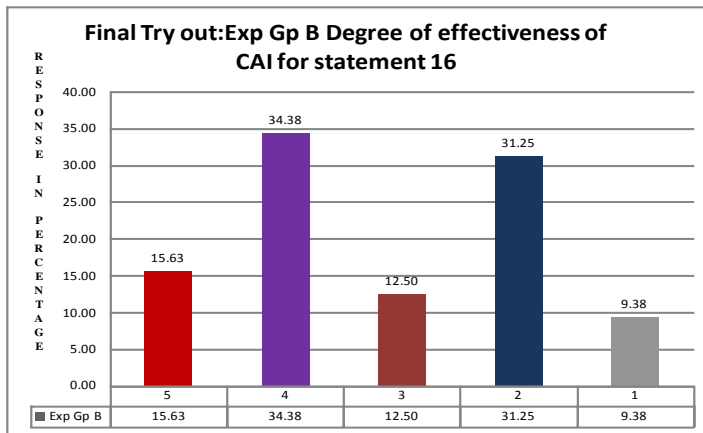


Figure 4.142 Graphical Representation of analysis of statement 16 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.293 Chi Square Table for Exp Gp A for Statement 16 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6
4	13	6
3	4	6
2	5	6
1	3	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 10.6667

degrees of freedom = 4

probability = 0.03058

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Illustrations given in CAI are enough to understand the concept clearly.”

Experimental Group B

Table 4.294 Chi Square Table for Exp Gp B for Statement 16 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	11	6.6
3	4	6.6
2	10	6.6
1	3	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.06061

degrees of freedom = 4

probability = 0.08938

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 17: Matter presented in CAI was logically arranged.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.295 Responses of Exp Gp A students in percentage for statement 17 for Final Try-out

Points	Exp Gp A
5	19.35
4	48.39
3	19.35
2	0.00
1	9.68

19.35% of the students strongly agree with the statement “Matter presented in CAI was logically arranged.”

48.39% of the students agree with the statement “Matter presented in CAI was logically arranged.”

19.35% of the students not decided with the statement “Matter presented in CAI was logically arranged.”

0.00% of the students disagree with the statement “Matter presented in CAI was logically arranged.”

9.68% of the students strongly disagree with the statement “Matter presented in CAI was logically arranged.”

Experimental Group B : Responses of the students in percentage

Table 4.296 Responses of Exp Gp B students in percentage for statement 17 for Final Try-out

Points	Exp Gp B
5	25.00
4	43.75
3	18.75
2	15.63
1	0.00

25.00% of the students strongly agree with the statement “Matter presented in CAI was logically arranged.”

43.75% of the students agree with the statement “Matter presented in CAI was logically arranged.”

18.75% of the students not decided with the statement “Matter presented in CAI was logically arranged.”

15.63% of the students disagree with the statement “Matter presented in CAI was logically arranged.”

0.00% of the students strongly disagree with the statement “Matter presented in CAI was logically arranged.”

Graphical Representation of analysis of statement 17 in Percentage

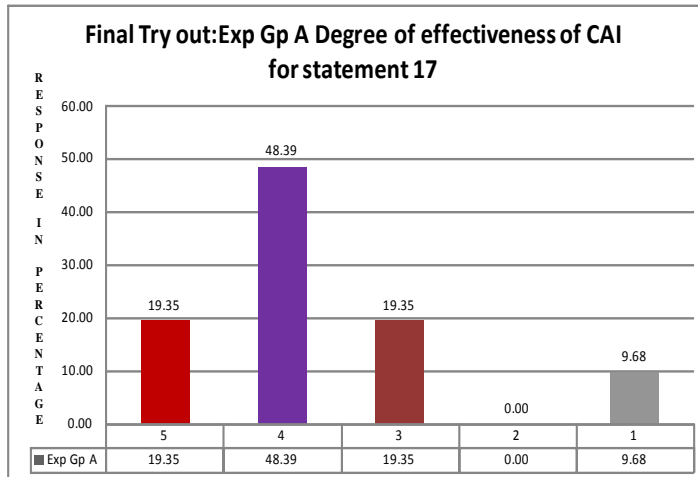


Figure 4.143 Graphical Representation of analysis of statement 17 in Percentage for Exp Gp A for Final Try-out

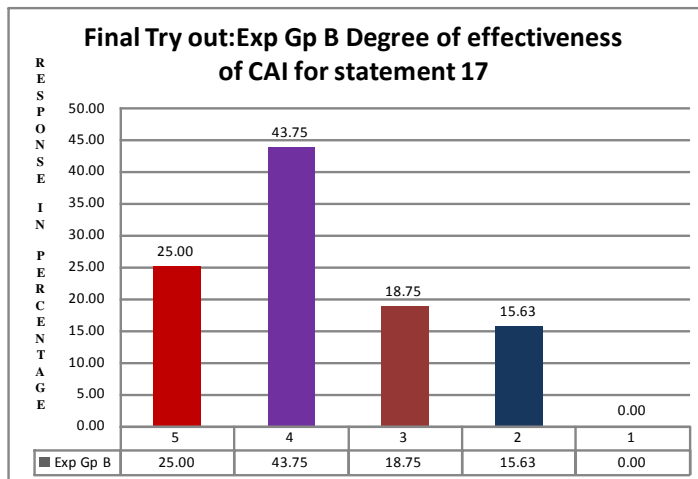


Figure 4.144 Graphical Representation of analysis of statement 17 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.297 Chi Square Table for Exp Gp A for Statement 17 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6
4	15	6
3	6	6
2	0	6
1	3	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 21

degrees of freedom = 4

probability = 0.00032

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Matter presented in CAI was logically arranged.”

Experimental Group B

Table 4.298 Chi Square Table for Exp Gp B for Statement 17 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	14	6.6
3	6	6.6
2	5	6.6
1	0	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 15.6364

degrees of freedom = 4

probability = 0.00355

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Matter presented in CAI was logically arranged”.

Statement 18: Learning through CAI was waste of time.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.299 Responses of Exp Gp A students in percentage for statement 18 for Final Try-out

Points	Exp Gp A
5	58.33
4	12.50
3	33.33
2	0.00
1	20.83

58.33% of the students strongly disagree with the statement “Learning through CAI was waste of time.”

12.50% of the students disagree with the statement “Learning through CAI was waste of time.”

33.33% of the students not decided with the statement “Learning through CAI was waste of time.”

0.00% of the students agree with the statement “Learning through CAI was waste of time.”

20.83% of the students strongly agree with the statement “Learning through CAI was waste of time.”

Experimental Group B : Responses of the students in percentage

Table 4.300 Responses of Exp Gp B students in percentage for statement 18 for Final Try-out

Points	Exp Gp B
5	32.14
4	42.86
3	21.43
2	3.57
1	21.43

32.14% of the students strongly disagree with the statement “Learning through CAI was waste of time.”

42.86% of the students disagree with the statement “Learning through CAI was waste of time.”

21.43% of the students not decided with the statement “Learning through CAI was waste of time.”

3.57% of the students agree with the statement “Learning through CAI was waste of time.”

21.43% of the students strongly agree with the statement “Learning through CAI was waste of time.”

Graphical Representation of analysis of statement 18 in Percentage

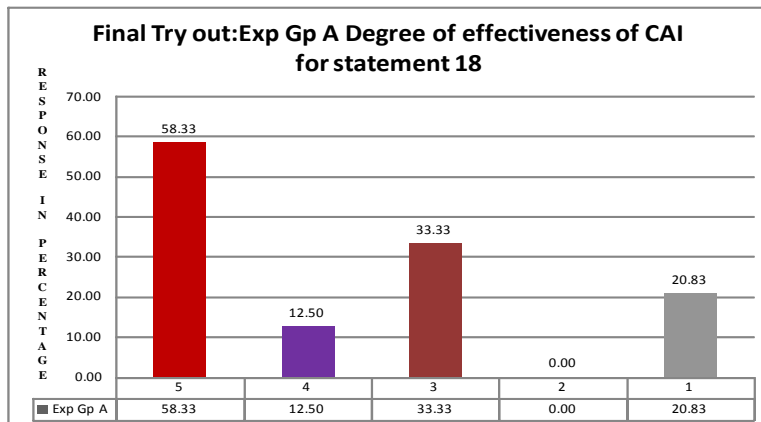


Figure 4.145 Graphical Representation of analysis of statement 18 in Percentage for Exp Gp A for Final Try-out

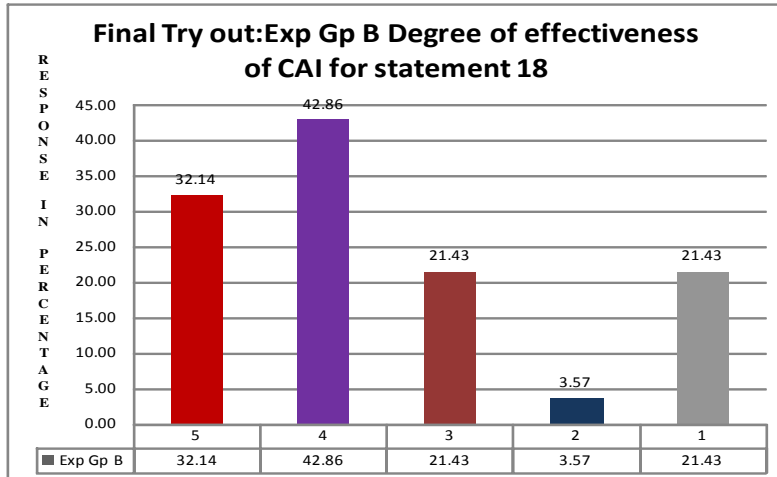


Figure 4.146 Graphical Representation of analysis of statement 18 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.301 Chi Square Table for Exp Gp A for Statement 18 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	14	6
4	3	6
3	8	6
2	0	6
1	5	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 19

degrees of freedom = 4

probability = 0.00079

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly disagree therefore most of the students strongly disagree with the statement “Learning through CAI was waste of time.”

Experimental Group B

Table 4.302 Chi Square Table for Exp Gp A for Statement 18 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	14	6.6
3	6	6.6
2	5	6.6
1	0	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 15.6364

degrees of freedom = 4

probability = 0.00355

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Learning through CAI was waste of time”.

Statement 19: Illustrations given in CAI are related to day today life experiences.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.303 Responses of Exp Gp A students in percentage for statement 19 for Final Try-out

Points	Exp Gp A
5	19.35
4	51.61
3	12.90
2	12.90
1	0.00

19.35% of the students strongly agree with the statement “Illustrations given in CAI are related to day today life experiences.”

51.61% of the students agree with the statement “Illustrations given in CAI are related to day today life experiences.”

12.90% of the students not decided with the statement “Illustrations given in CAI are related to day today life experiences.”

12.90% of the students disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

0.00% of the students strongly disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

Experimental Group B : Responses of the students in percentage

Table 4.304 Responses of Exp Gp B students in percentage for statement 19 for Final Try-out

Points	Exp Gp B
5	15.63
4	43.75
3	25.00
2	15.63
1	0.00

15.63% of the students strongly agree with the statement “Illustrations given in CAI are related to day today life experiences.”

43.75% of the students agree with the statement “Illustrations given in CAI are related to day today life experiences.”

25.00% of the students not decided with the statement “Illustrations given in CAI are related to day today life experiences.”

15.63% of the students disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

0.00% of the students strongly disagree with the statement “Illustrations given in CAI are related to day today life experiences.”

Graphical Representation of analysis of statement 19 in Percentage

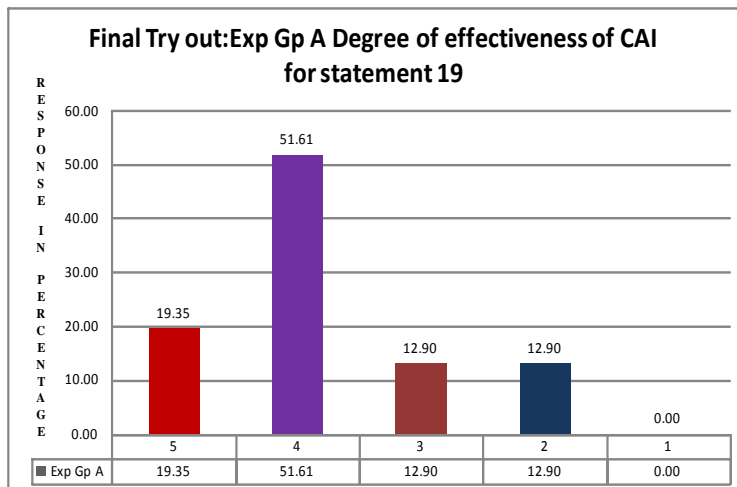


Figure 4.147 Graphical Representation of analysis of statement 19 in Percentage for Exp Gp A for Final Try-out

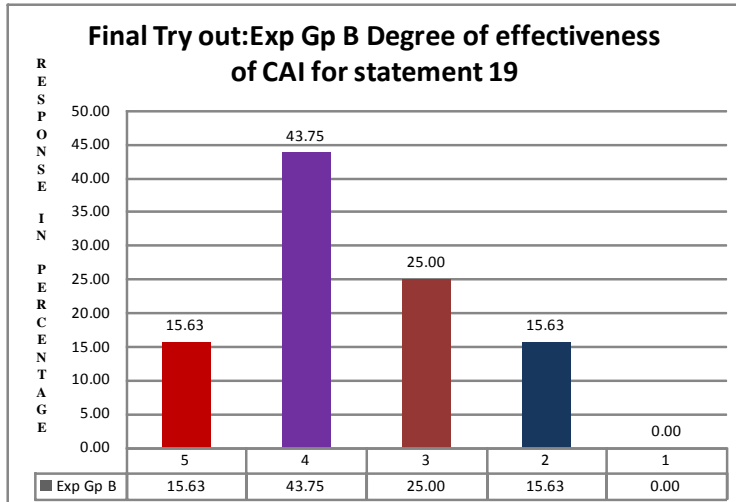


Figure 4.148 Graphical Representation of analysis of statement 19 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.305 Chi Square Table for Exp Gp A for Statement 19 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6
4	16	6
3	4	6
2	4	6
1	0	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 24

degrees of freedom = 4

probability = 0.00

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Illustrations given in CAI are related to day today life experiences.”

Experimental Group B

Table 4.306 Chi Square Table for Exp Gp B for Statement 19 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.4
4	14	6.4
3	8	6.4
2	5	6.4
1	0	6.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 16.4375

degrees of freedom = 4

probability = 0.00248

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Illustrations given in CAI are related to day today life experiences”.

Statement 20: Classroom teaching is more enjoyable.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.307 Responses of Exp Gp A students in percentage for statement 20 for Final Try-out

Points	Exp Gp A
5	6.45
4	6.45
3	9.68
2	38.71
1	35.48

6.45% of the students strongly disagree with the statement “Classroom teaching is more enjoyable.”

6.45% of the students disagree with the statement “Classroom teaching is more enjoyable.”

9.68% of the students not decided with the statement “Classroom teaching is more enjoyable.”

38.71% of the students agree with the statement “Classroom teaching is more enjoyable.”

35.48% of the students strongly agree with the statement “Classroom teaching is more enjoyable.”

Experimental Group B : Responses of the students in percentage

Table 4.308 Responses of Exp Gp B students in percentage for statement 20 for Final Try-out

Points	Exp Gp B
5	15.63
4	18.75
3	25.00
2	12.50
1	31.25

15.63% of the students strongly disagree with the statement “Classroom teaching is more enjoyable.”

18.75% of the students disagree with the statement “Classroom teaching is more enjoyable.”

25.00% of the students not decided with the statement “Classroom teaching is more enjoyable.”

12.50% of the students agree with the statement “Classroom teaching is more enjoyable.”

31.25% of the students strongly agree with the statement “Classroom teaching is more enjoyable.”

Graphical Representation of analysis of statement 20 in Percentage

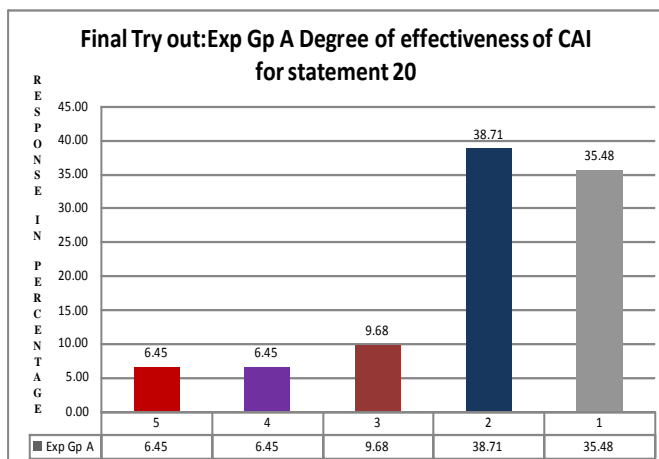


Figure 4.149 Graphical Representation of analysis of statement 20 in Percentage for Exp Gp A for Final Try-out

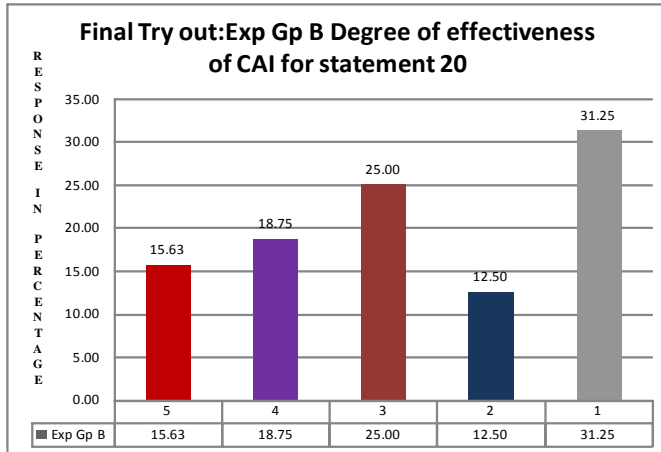


Figure 4.150 Graphical Representation of analysis of statement 20 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.309 Chi Square Table for Exp Gp A for Statement 20 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	6
4	2	6
3	3	6
2	12	6
1	11	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 17

degrees of freedom = 4

probability = 0.00193

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Classroom teaching is more enjoyable.”

Experimental Group B

Table 4.310 Chi Square Table for Exp Gp B for Statement 20 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	6	6.6
3	8	6.6
2	4	6.6
1	10	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 3.51515

degrees of freedom = 4

probability = 0.47558

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 21: The language used in CAI is easy and simple to understand.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.311 Responses of Exp Gp A students in percentage for statement 21 for Final Try-out

Points	Exp Gp A
5	38.71
4	35.48
3	9.68
2	9.68
1	0.00

38.71% of the students strongly agree with the statement “The language used in CAI is easy and simple to understand.”

35.48% of the students agree with the statement “The language used in CAI is easy and simple to understand.”

9.68% of the students not decided with the statement “The language used in CAI is easy and simple to understand.”

9.68% of the students disagree with the statement “The language used in CAI is easy and simple to understand.”

0.00% of the students strongly disagree with the statement “The language used in CAI is easy and simple to understand.”

Experimental Group B : Responses of the students in percentage

Table 4.312 Responses of Exp Gp B students in percentage for statement 21 for Final Try-out

Points	Exp Gp B
5	41.94
4	35.48
3	12.90
2	16.13
1	0.00

41.94% of the students strongly agree with the statement “The language used in CAI is easy and simple to understand.”

35.48% of the students agree with the statement “The language used in CAI is easy and simple to understand.”

12.90% of the students not decided with the statement “The language used in CAI is easy and simple to understand.”

16.13% of the students disagree with the statement “The language used in CAI is easy and simple to understand.”

0.00% of the students strongly disagree with the statement “The language used in CAI is easy and simple to understand.”

Graphical Representation of analysis of statement 21 in Percentage

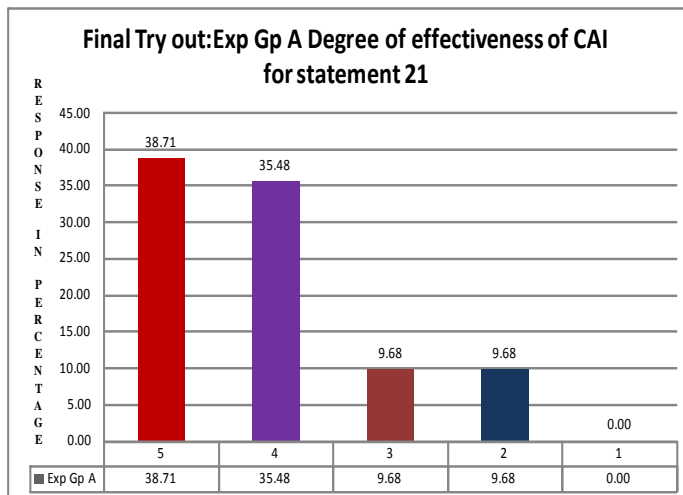


Figure 4.151 Graphical Representation of analysis of statement 21 in Percentage for Exp Gp A for Final Try-out

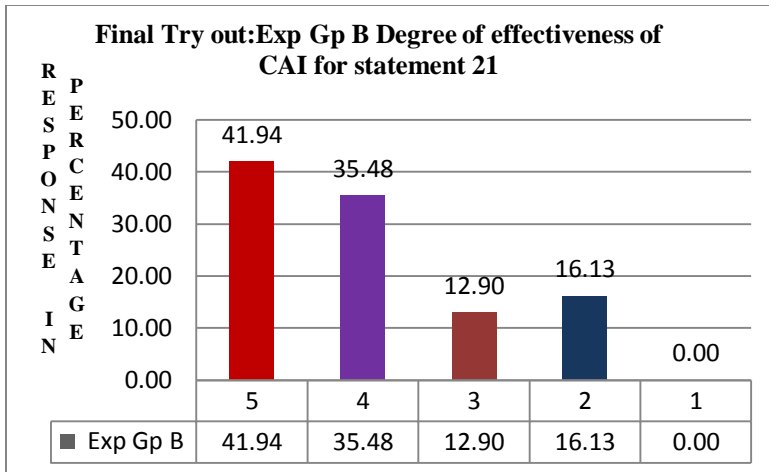


Figure 4.152 Graphical Representation of analysis of statement 21 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.313 Chi Square Table for Exp Gp A for Statement 21 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	12	5.8
4	11	5.8
3	3	5.8
2	3	5.8
1	0	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 19.7931

degrees of freedom = 4

probability = 0.00055

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “The language used in CAI is easy and simple to understand.”

Experimental Group B

Table 4.314 Chi Square Table for Exp Gp B for Statement 21 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	13	6.6
4	11	6.6
3	4	6.6
2	5	6.6
1	0	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 17.1515

degrees of freedom = 4

probability = 0.00181

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “The language used in CAI is easy and simple to understand”.

Statement 22: The exercises given in each chapter is adequate.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.315 Responses of Exp Gp A students in percentage for statement 22 for Final Try-out

Points	Exp Gp A
5	19.35
4	51.61
3	12.90
2	3.23
1	16.13

19.35% of the students strongly agree with the statement “The exercises given in each chapter is adequate.”

51.61% of the students agree with the statement “The exercises given in each chapter is adequate.”

12.90% of the students not decided with the statement “The exercises given in each chapter is adequate.”

3.23% of the students disagree with the statement “The exercises given in each chapter is adequate.”

16.13% of the students strongly disagree with the statement “The exercises given in each chapter is adequate.”

Experimental Group B : Responses of the students in percentage

Table 4.316 Responses of Exp Gp B students in percentage for statement 22 for Final Try-out

Points	Exp Gp B
5	25.00
4	37.50
3	9.38
2	25.00
1	6.25

25.00% of the students strongly agree with the statement “The exercises given in each chapter is adequate.”

37.50% of the students agree with the statement “The exercises given in each chapter is adequate.”

9.38% of the students not decided with the statement “The exercises given in each chapter is adequate.”

25.00% of the students disagree with the statement “The exercises given in each chapter is adequate.”

6.25% of the students strongly disagree with the statement “The exercises given in each chapter is adequate.”

Graphical Representation of analysis of statement 22 in Percentage

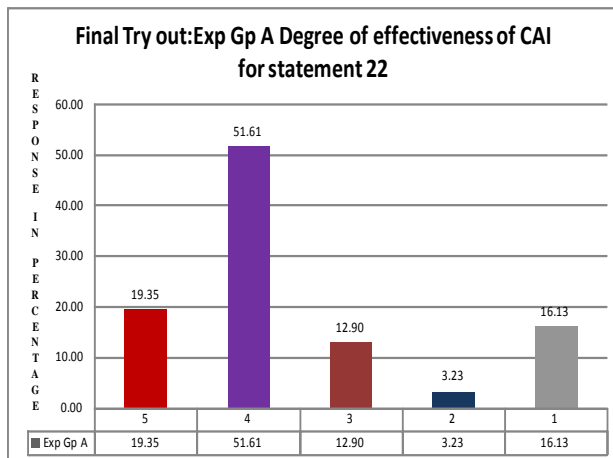


Figure 4.153 Graphical Representation of analysis of statement 22 in Percentage for Exp Gp A for Final Try-out

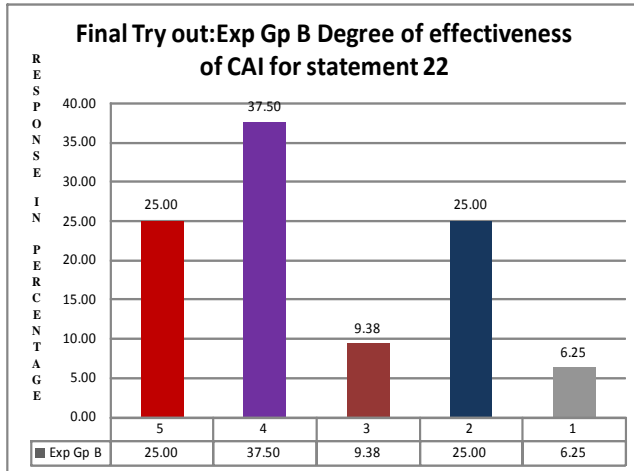


Figure 4.154 Graphical Representation of analysis of statement 22 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.317 Chi Square Table for Exp Gp A for Statement 22 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.4
4	16	6.4
3	4	6.4
2	1	6.4
1	5	6.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 20.1875

degrees of freedom = 4

probability = 0.00046

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “The exercises given in each chapter is adequate”

Experimental Group B

Table 4.318 Chi Square Table for Exp Gp B for Statement 22 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	12	6.6
3	3	6.6
2	8	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 10.1818

degrees of freedom = 4

probability = 0.03747

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “The exercises given in each chapter is adequate”.

Statement 23: CAI takes care of previous knowledge in the subject.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.319 Responses of Exp Gp A students in percentage for statement 23 for Final Try-out

Points	Exp Gp A
5	22.58
4	38.71
3	16.13
2	0.00
1	19.35

22.58% of the students strongly agree with the statement “CAI takes care of previous knowledge in the subject.”

38.71% of the students agree with the statement “CAI takes care of previous knowledge in the subject.”

16.13% of the students not decided with the statement “CAI takes care of previous knowledge in the subject.”

0.00% of the students disagree with the statement “CAI takes care of previous knowledge in the subject.”

19.35% of the students strongly disagree with the statement “CAI takes care of previous knowledge in the subject.”

Experimental Group B : Responses of the students in percentage

Table 4.320 Responses of Exp Gp A students in percentage for statement 23 for Final Try-out

Points	Exp Gp B
5	25.00
4	46.88
3	15.63
2	12.50
1	3.13

25.00% of the students strongly agree with the statement “CAI takes care of previous knowledge in the subject.”

46.88% of the students agree with the statement “CAI takes care of previous knowledge in the subject.”

15.63% of the students not decided with the statement “CAI takes care of previous knowledge in the subject.”

12.50% of the students disagree with the statement “CAI takes care of previous knowledge in the subject.”

3.13% of the students strongly disagree with the statement “CAI takes care of previous knowledge in the subject.”

Graphical Representation of analysis of statement 23 in Percentage

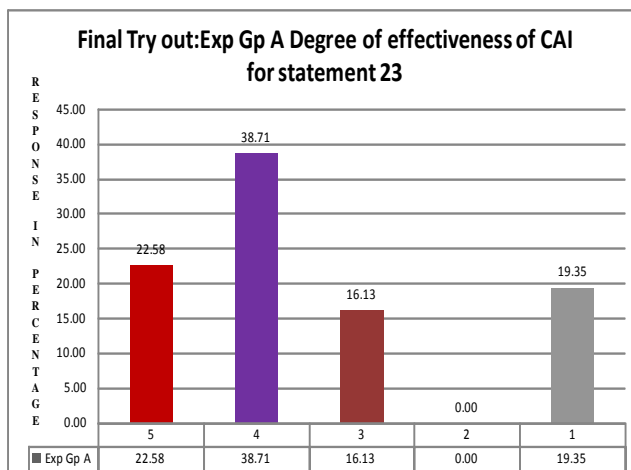


Figure 4.155 Graphical Representation of analysis of statement 23 in Percentage for Exp Gp A for Final Try-out

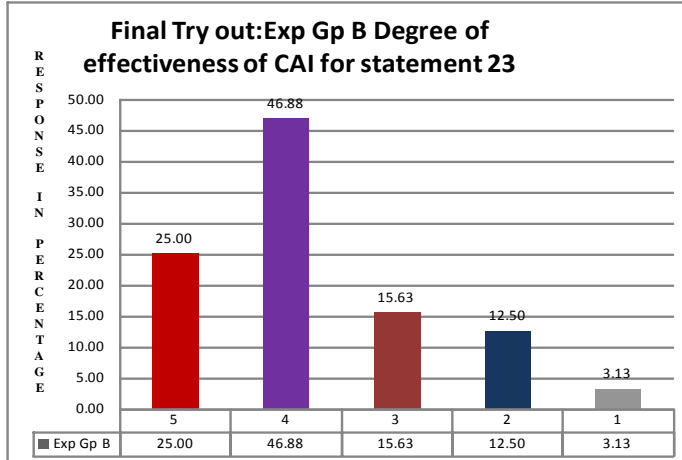


Figure 4.156 Graphical Representation of analysis of statement 23 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.321 Chi Square Table for Exp Gp A for Statement 23 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	6
4	12	6
3	5	6
1	0	6
1	6	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 12.3333

degrees of freedom = 4

probability = 0.01504

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “CAI takes care of previous knowledge in the subject.”

Experimental Group B

Table 4.322 Chi Square Table for Exp Gp B for Statement 23 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	15	6.6
3	5	6.6
4	4	6.6
1	1	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 17.1515

degrees of freedom = 4

probability = 0.00181

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “CAI takes care of previous knowledge in the subject”.

Statement 24: The solution to the problem is not easy to understand.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.323 Responses of Exp Gp A students in percentage for statement 24 for Final Try-out

Points	Exp Gp A
5	16.13
4	29.03
3	16.13
2	25.81
1	12.90

16.13% of the students strongly disagree with the statement “The solution to the problem is not easy to understand.”

29.03% of the students disagree with the statement “The solution to the problem is not easy to understand.”

16.13% of the students not decided with the statement “The solution to the problem is not easy to understand.”

25.81% of the students agree with the statement “The solution to the problem is not easy to understand.”

12.90% of the students strongly agree with the statement “The solution to the problem is not easy to understand.”

Experimental Group B : Responses of the students in percentage

Table 4.324 Responses of Exp Gp B students in percentage for statement 24 for Final Try-out

Points	Exp Gp B
5	21.88
4	50.00
3	6.25
2	21.88
1	9.38

21.88% of the students strongly disagree with the statement “The solution to the problem is not easy to understand.”

50.00% of the students disagree with the statement “The solution to the problem is not easy to understand.”

6.25% of the students not decided with the statement “The solution to the problem is not easy to understand.”

21.88% of the students agree with the statement “The solution to the problem is not easy to understand.”

9.38% of the students strongly agree with the statement “The solution to the problem is not easy to understand.”

Graphical Representation of analysis of statement 24 in Percentage

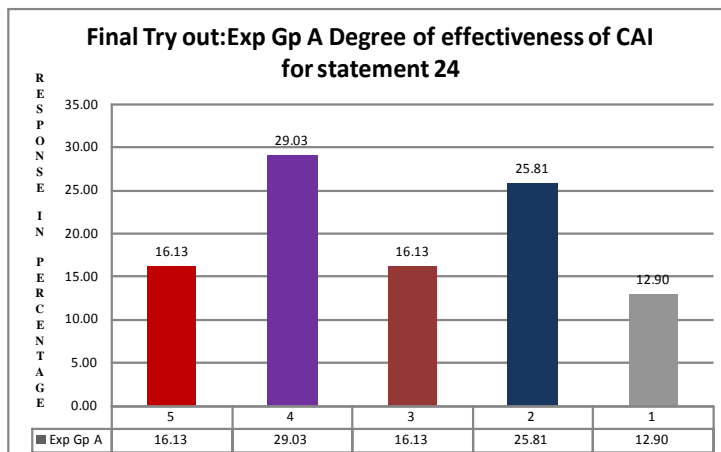


Figure 4.157 Graphical Representation of analysis of statement 24 in Percentage for Exp Gp A for Final Try-out

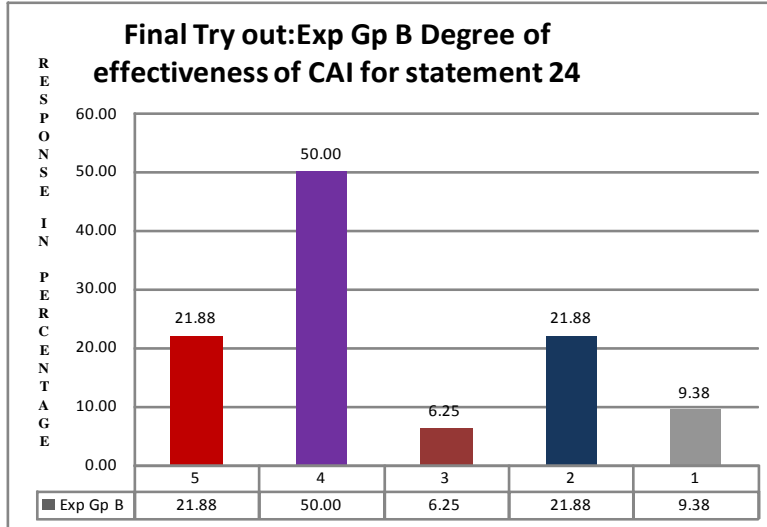


Figure 4.158 Graphical Representation of analysis of statement 24 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.325 Chi Square Table for Exp Gp A for Statement 24 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.2
4	9	6.2
3	5	6.2
2	8	6.2
1	4	6.2

Expected Frequency = Sum of observed frequencies/5

chi-square = 3.03226

degrees of freedom = 4

probability = 0.55244

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.326 Chi Square Table for Exp Gp B for Statement 24 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	7
4	16	7
3	2	7
2	7	7
1	3	7

Expected Frequency = Sum of observed frequencies/5

chi-square = 17.4286

degrees of freedom = 4

probability = 0.0016

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “The solution to the problem is not easy to understand”.

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.327 Responses of Exp Gp A students in percentage for statement 25 for Final Try-out

Points	Exp Gp A
5	19.35
4	41.94
3	22.58
2	16.13
1	0.00

19.35% of the students strongly agree with the statement “The exercises helped in understanding the chapter in depth.”

41.94% of the students agree with the statement “The exercises helped in understanding the chapter in depth.”

22.58% of the students not decided with the statement “The exercises helped in understanding the chapter in depth.”

16.13% of the students disagree with the statement “The exercises helped in understanding the chapter in depth.”

0.00% of the students strongly disagree with the statement “The exercises helped in understanding the chapter in depth.”

Experimental Group B : Responses of the students in percentage

Table 4.328 Responses of Exp Gp B students in percentage for statement 25 for Final Try-out

Points	Exp Gp B
5	28.13
4	37.50
3	25.00
2	15.63
1	6.25

28.13% of the students strongly agree with the statement “The exercises helped in understanding the chapter in depth.”

37.50% of the students agree with the statement “The exercises helped in understanding the chapter in depth.”

25.00% of the students not decided with the statement “The exercises helped in understanding the chapter in depth.”

15.63% of the students disagree with the statement “The exercises helped in understanding the chapter in depth.”

6.25% of the students strongly disagree with the statement “The exercises helped in understanding the chapter in depth.”

Graphical Representation of analysis of statement 25 in Percentage

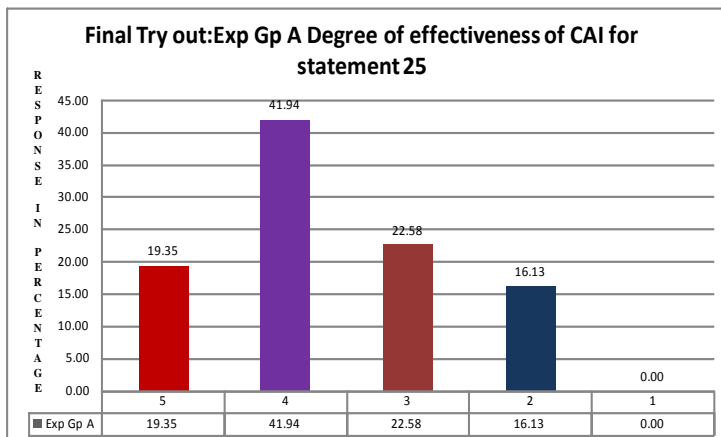


Figure 4.159 Graphical Representation of analysis of statement 25 in Percentage for Exp Gp A for Final Try-out

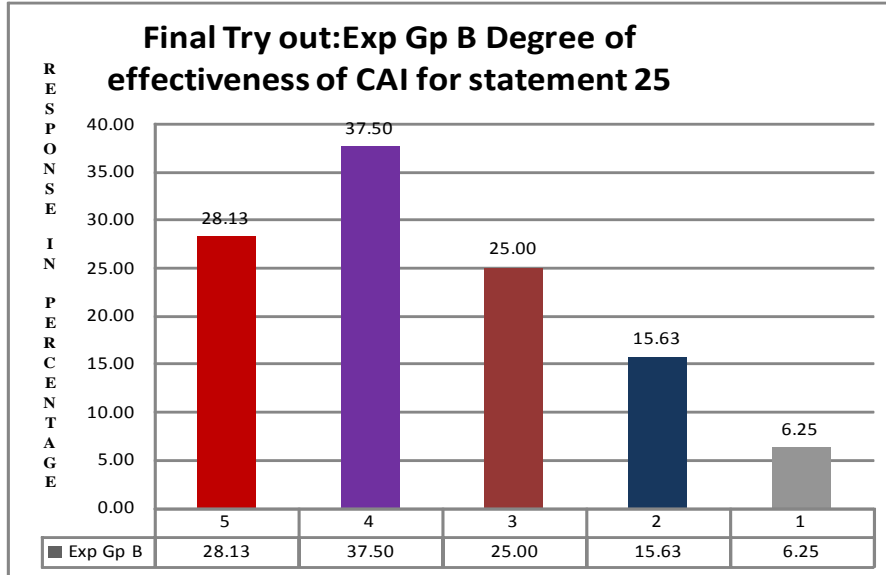


Figure 4.160 Graphical Representation of analysis of statement 25 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.329 Chi Square Table for Exp Gp A for Statement 25 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.2
4	13	6.2
3	7	6.2
2	5	6.2
1	0	6.2

Expected Frequency = Sum of observed frequencies/5

chi-square = 14

degrees of freedom = 4

probability = 0.0073

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “The exercises helped in understanding the chapter in depth.”

Experimental Group B

Table 4.330 Chi Square Table for Exp Gp B for Statement 25 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	7.2
4	12	7.2
3	8	7.2
2	5	7.2
1	2	7.2

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.16667

degrees of freedom = 4

probability = 0.08566

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 26: Solutions did not help me whenever I was not able to solve the problem.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.331 Responses of Exp Gp A students in percentage for statement 26 for Final Try-out

Points	Exp Gp A
5	29.03
4	6.45
3	29.03
2	22.58
1	6.45

29.03% of the students strongly disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

6.45% of the students disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

29.03% of the students not decided with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

22.58% of the students agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

6.45% of the students strongly agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

Experimental Group B : Responses of the students in percentage

Table 4.332 Responses of Exp Gp B students in percentage for statement 26 for Final Try-out

Points	Exp Gp B
5	40.63
4	18.75
3	6.25
2	31.25
1	12.50

40.63% of the students strongly disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

18.75% of the students disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

6.25% of the students not decided with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

31.25% of the students agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

12.50% of the students strongly agree with the statement “Solutions didn’t help me whenever I was not able to solve the problem.”

Graphical Representation of analysis of statement 26 in Percentage

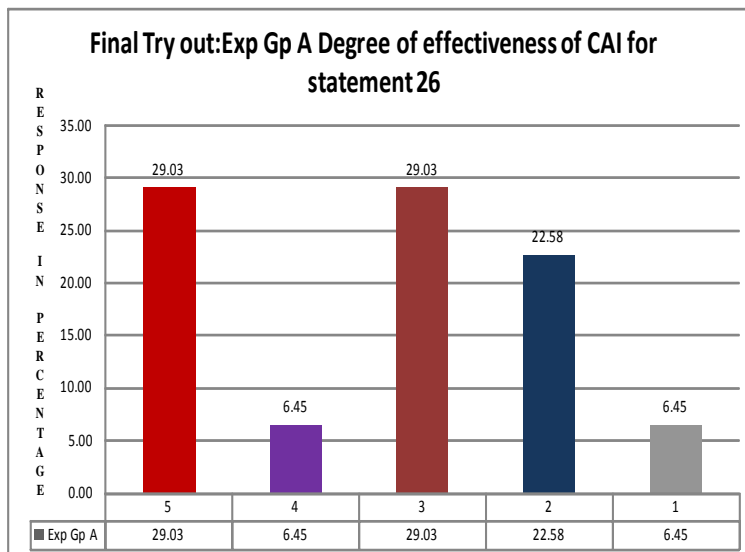


Figure 4.161 Graphical Representation of analysis of statement 26 in Percentage for Exp Gp A for Final Try-out

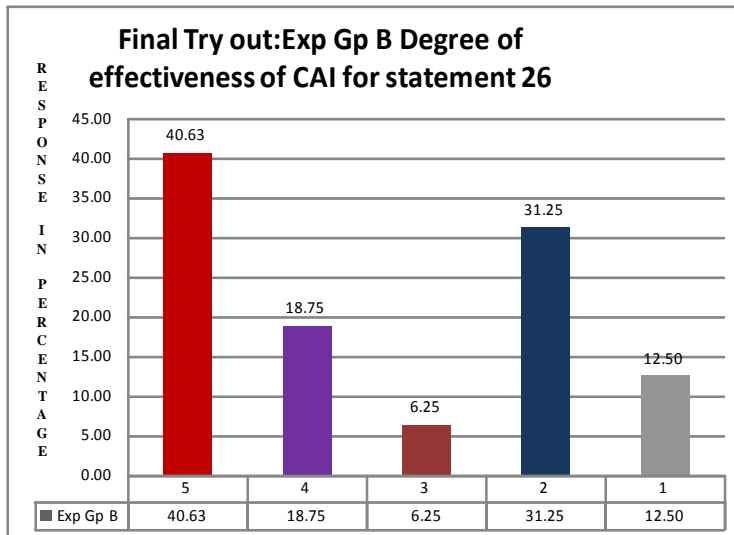


Figure 4.162 Graphical Representation of analysis of statement 26 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.333 Chi Square Table for Exp Gp A for Statement 26 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	5.8
4	2	5.8
3	9	5.8
2	7	5.8
1	2	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.75862

degrees of freedom = 4

probability = 0.06742

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.334 Chi Square Table for Exp Gp B for Statement 26 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	13	7
4	6	7
3	2	7
2	10	7
1	4	7

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.4286

degrees of freedom = 4

probability = 0.02215

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly disagree therefore most of the students strongly disagree with the statement “Solutions didn’t help me whenever I was not able to solve the problem”.

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.335 Responses of Exp Gp A students in percentage for statement 27 for Final Try-out

Points	Exp Gp A
5	12.90
4	32.26
3	12.90
2	9.68
1	25.81

12.90% of the students strongly agree with the statement “Break given in CAI helped me to refresh my mind.”

32.26% of the students agree with the statement “Break given in CAI helped me to refresh my mind.”

12.90% of the students not decided with the statement “Break given in CAI helped me to refresh my mind.”

9.68% of the students disagree with the statement “Break given in CAI helped me to refresh my mind.”

25.81% of the students strongly disagree with the statement “Break given in CAI helped me to refresh my mind.”

Experimental Group B : Responses of the students in percentage

Table 4.336 Responses of Exp Gp B students in percentage for statement 27 for Final Try-out

Points	Exp Gp B
5	31.25
4	31.25
3	12.50
2	15.63
1	12.50

31.25% of the students strongly agree with the statement “Break given in CAI helped me to refresh my mind.”

31.25% of the students agree with the statement “Break given in CAI helped me to refresh my mind.”

12.50% of the students not decided with the statement “Break given in CAI helped me to refresh my mind.”

15.63% of the students disagree with the statement “Break given in CAI helped me to refresh my mind.”

12.50% of the students strongly disagree with the statement “Break given in CAI helped me to refresh my mind.”

Graphical Representation of analysis of statement 27 in Percentage

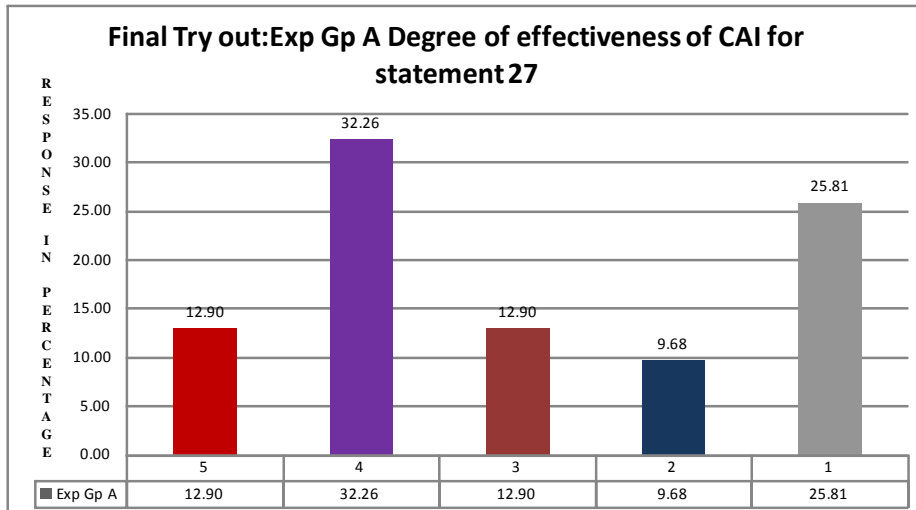


Figure 4.163 Graphical Representation of analysis of statement 27 in Percentage for Exp Gp A for Final Try-out

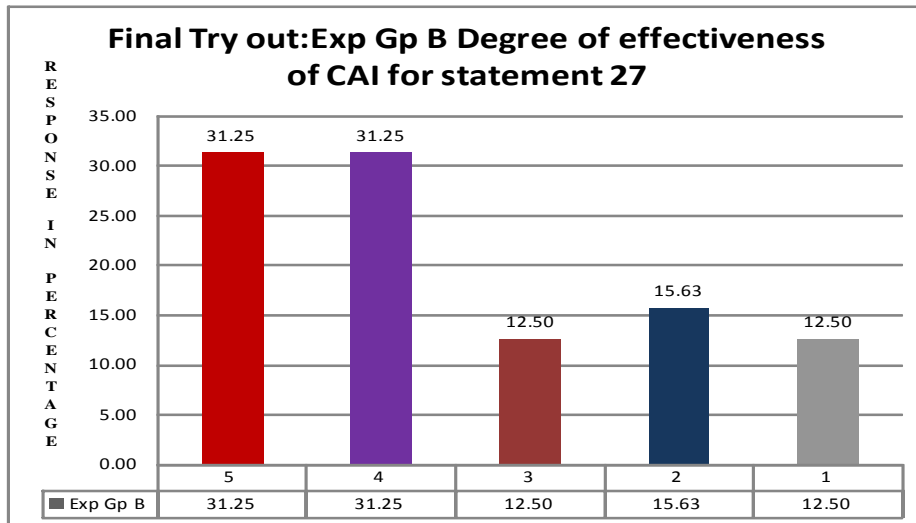


Figure 4.164 Graphical Representation of analysis of statement 27 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.337 Chi Square Table for Exp Gp A for Statement 27 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	5.8
4	10	5.8
3	4	5.8
2	3	5.8
1	8	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 6.34483

degrees of freedom = 4

probability = 0.17483

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.338 Chi Square Table for Exp Gp B for Statement 27 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	10	6.6
4	10	6.6
3	4	6.6
2	5	6.6
1	4	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.93939

degrees of freedom = 4

probability = 0.20372

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 28 I am feeling tired while going through the slide.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.339 Responses of Exp Gp A students in percentage for statement 28 for Final Try-out

Points	Exp Gp A
5	16.13
4	19.35
3	22.58
2	22.58
1	12.90

16.13% of the students strongly disagree with the statement “I am feeling tired while going through the slide.”

19.35% of the students disagree with the statement “I am feeling tired while going through the slide.”

22.58% of the students not decided with the statement “I am feeling tired while going through the slide.”

22.58% of the students agree with the statement “I am feeling tired while going through the slide.”

12.90% of the students strongly agree with the statement “I am feeling tired while going through the slide.”

Experimental Group B : Responses of the students in percentage

Table 4.340 Responses of Exp Gp B students in percentage for statement 28 for Final Try-out

Points	Exp Gp B
5	18.75
4	46.88
3	15.63
2	9.38
1	12.50

18.75% of the students strongly disagree with the statement “I am feeling tired while going through the slide.”

46.88% of the students disagree with the statement “I am feeling tired while going through the slide.”

15.63% of the students not decided with the statement “I am feeling tired while going through the slide.”

9.38% of the students agree with the statement “I am feeling tired while going through the slide.”

12.50% of the students strongly agree with the statement “I am feeling tired while going through the slide.”

Graphical Representation of analysis of statement 28 in Percentage

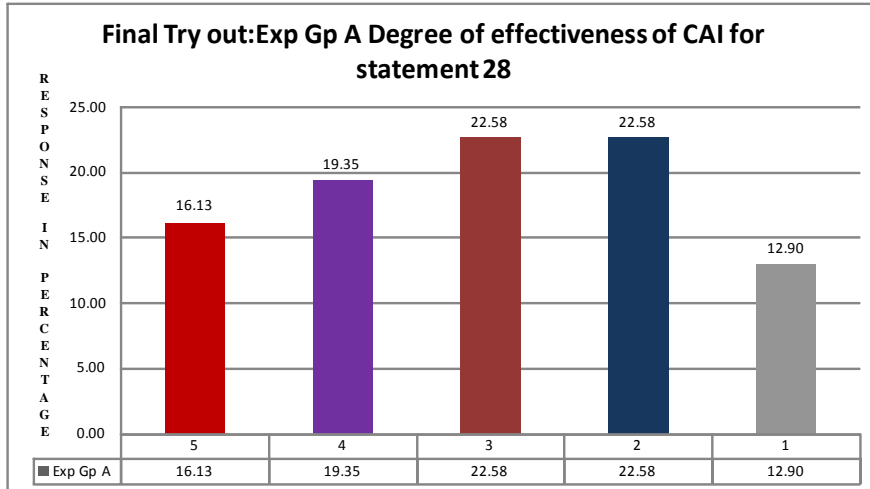


Figure 4.165 Graphical Representation of analysis of statement 28 in Percentage for Exp Gp A for Final Try-out

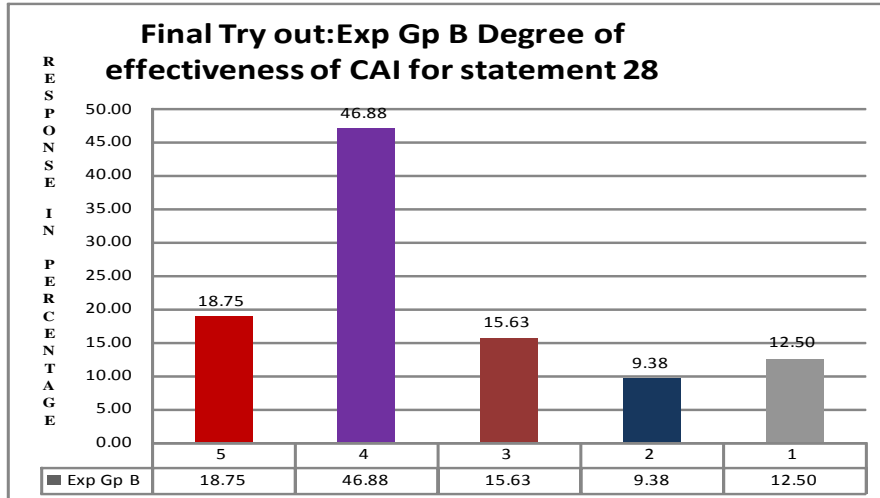


Figure 4.166 Graphical Representation of analysis of statement 28 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.341 Chi Square Table for Exp Gp A for Statement 28 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	5.8
4	6	5.8
3	7	5.8
2	7	5.8
1	4	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 1.17241

degrees of freedom = 4

probability = 0.88262

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.342 Chi Square Table for Exp Gp B for Statement 28 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	15	6.6
3	5	6.6
2	3	6.6
1	4	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.1212

degrees of freedom = 4

probability = 0.00692

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement "I am feeling tired while going through the slide".

Statement 29: Animation shown in CAI is appropriate to help me in understanding the concept.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.343 Responses of Exp Gp A students in percentage for statement 29 for Final Try-out

Points	Exp Gp A
5	38.71
4	25.81
3	19.35
2	9.68
1	0.00

38.71% of the students strongly agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

25.81% of the students agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

19.35% of the students not decided with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

9.68% of the students disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

0.00% of the students strongly disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

Experimental Group B : Responses of the students in percentage

Table 4.344: Responses of Exp Gp B students in percentage for statement 29 for Final Try-out

Points	Exp Gp B
5	25.00
4	21.88
3	12.50
2	15.63
1	28.13

25.00% of the students strongly agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

21.88% of the students agree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

12.50% of the students not decided with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

15.63% of the students disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

28.13% of the students strongly disagree with the statement “Animation shown in CAI is appropriate to help me in understanding the concept.”

Graphical Representation of analysis of statement 29 in Percentage

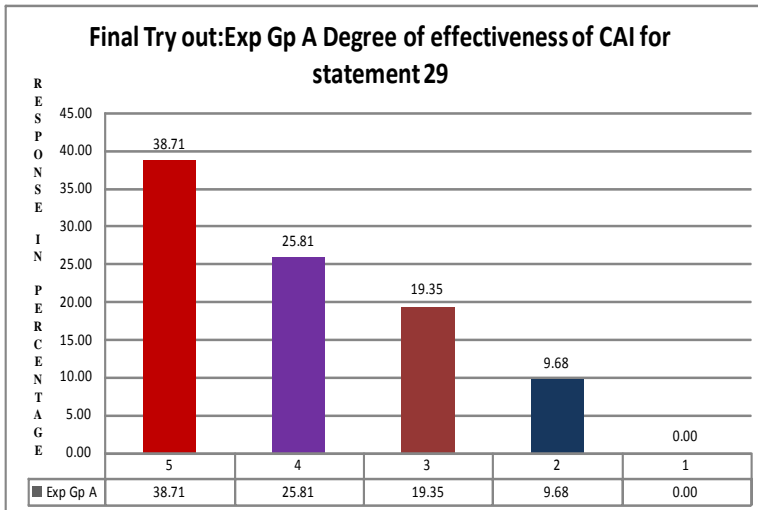


Figure 4.167 Graphical Representation of analysis of statement 29 in Percentage for Exp Gp A for Final Try-out

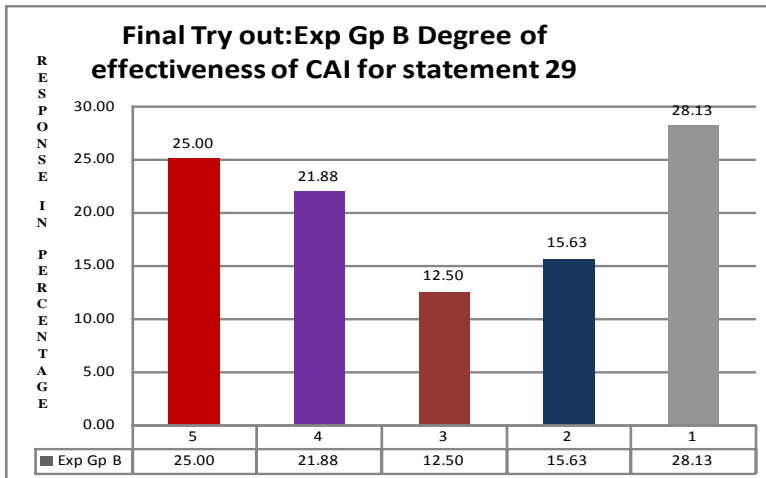


Figure 4.168 Graphical Representation of analysis of statement 29 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.345 Chi Square Table for Exp Gp A for Statement 29 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	12	5.8
4	8	5.8
3	6	5.8
2	3	5.8
1	0	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.6207

degrees of freedom = 4

probability = 0.00556

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement "Animation shown in CAI is appropriate to help me in understanding the concept"

Experimental Group B

Table 4.346 Chi Square Table for Exp Gp B for Statement 29 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.6
4	7	6.6
3	4	6.6
2	5	6.6
1	9	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 2.60606

degrees of freedom = 4

probability = 0.62575

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 30 Topic is not introduced properly.

Polarity: Negative

Experimental Group A : Responses of the students in percentage**Table 4.347 Responses of Exp Gp A students in percentage for statement 30 for Final Try-out**

Points	Exp Gp A
5	38.71
4	29.03
3	16.13
2	6.45
1	3.23

38.71% of the students strongly disagree with the statement “Topic is not introduced properly.”

29.03% of the students disagree with the statement “Topic is not introduced properly.”

16.13% of the students not decided with the statement “Topic is not introduced properly.”

6.45% of the students agree with the statement “Topic is not introduced properly.”

3.23% of the students strongly agree with the statement “Topic is not introduced properly.”

Experimental Group B : Responses of the students in percentage**Table 4.348 Responses of Exp Gp B students in percentage for statement 30 for Final Try-out**

Points	Exp Gp B
5	28.13
4	34.38
3	6.25
2	28.13
1	6.25

28.13% of the students strongly disagree with the statement “Topic is not introduced properly.”

34.38% of the students disagree with the statement “Topic is not introduced properly.”

6.25% of the students not decided with the statement “Topic is not introduced properly.”

28.13% of the students agree with the statement “Topic is not introduced properly.”

6.25% of the students strongly agree with the statement “Topic is not introduced properly.”

Graphical Representation of analysis of statement 30 in Percentage

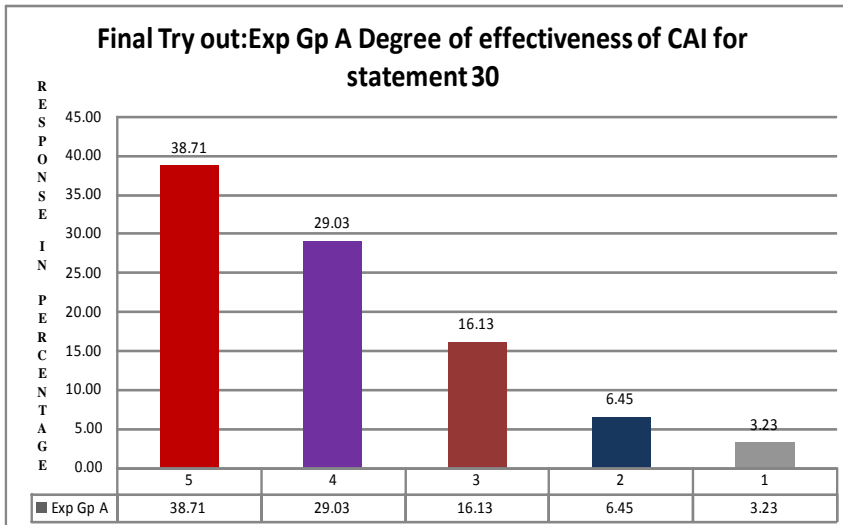


Figure 4.169 Graphical Representation of analysis of statement 30 in Percentage for Exp Gp A for Final Try-out

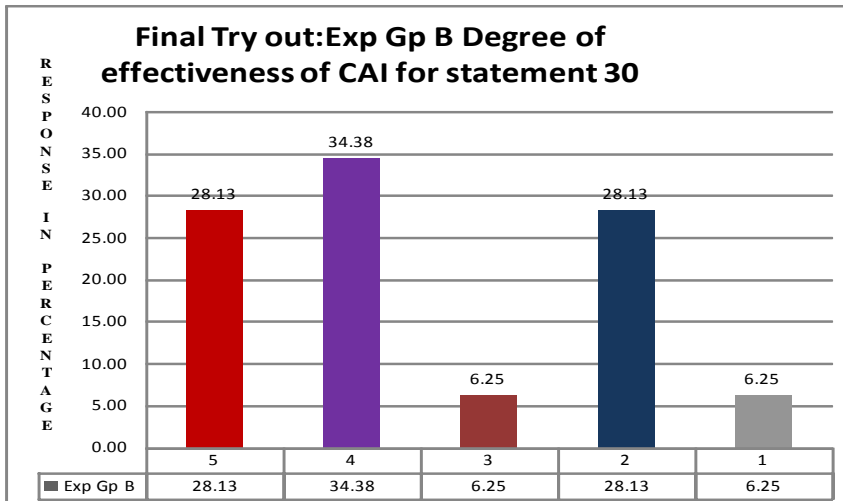


Figure 4.170 Graphical Representation of analysis of statement 30 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.349 Chi Square Table for Exp Gp A for Statement 30 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	12	5.8
4	9	5.8
3	5	5.8
2	2	5.8
1	1	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.9655

degrees of freedom = 4

probability = 0.00477

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly disagree therefore most of the students strongly disagree with the statement “Topic is not introduced properly.”

Experimental Group B

Table 4.350 Chi Square Table for Exp Gp B for Statement 30 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	6.6
4	11	6.6
3	2	6.6
2	9	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.0909

degrees of freedom = 4

probability = 0.02556

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “Topic is not introduced properly”.

Statement 31 CAI does not take care of previous knowledge (percentage) needed to understand the present concept.

Polarity Negative

Experimental Group A : Responses of the students in percentage

Table 4.351 Responses of Exp Gp A students in percentage for statement 31 for Final Try-out

Points	Exp Gp A
5	16.13
4	35.48
3	22.58
2	19.35
1	0.00

16.13% of the students strongly disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

35.48% of the students disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

22.58% of the students not decided with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

19.35% of the students agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

0.00% of the students strongly agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

Experimental Group B : Responses of the students in percentage

Table 4.352 Responses of Exp Gp B students in percentage for statement 31 for Final Try-out

Points	Exp Gp B
5	18.75
4	37.50
3	28.13
2	9.38
1	9.38

18.75% of the students strongly disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

37.50% of the students disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

28.13% of the students not decided with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

9.38% of the students agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

9.38% of the students strongly agree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

Graphical Representation of analysis of statement 31 in Percentage

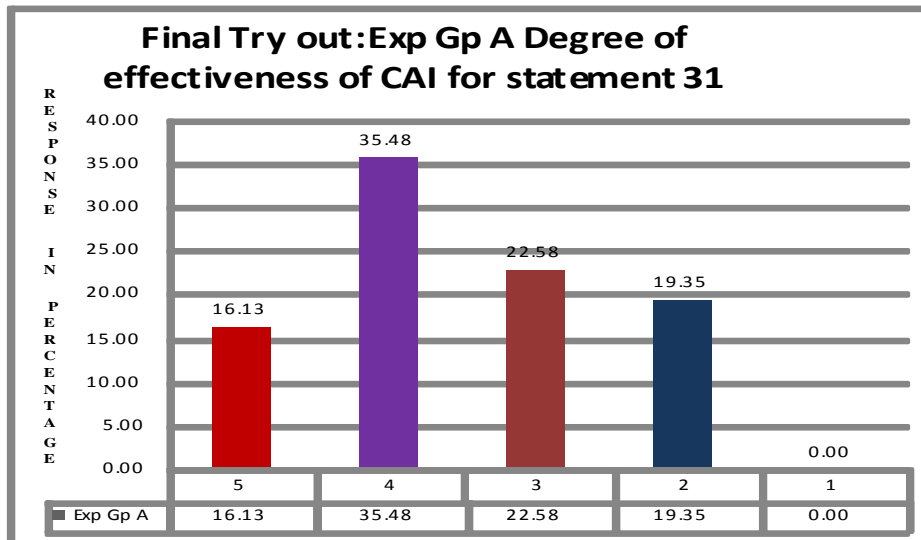


Figure 4.171 Graphical Representation of analysis of statement 31 in Percentage for Exp Gp A for Final Try-out

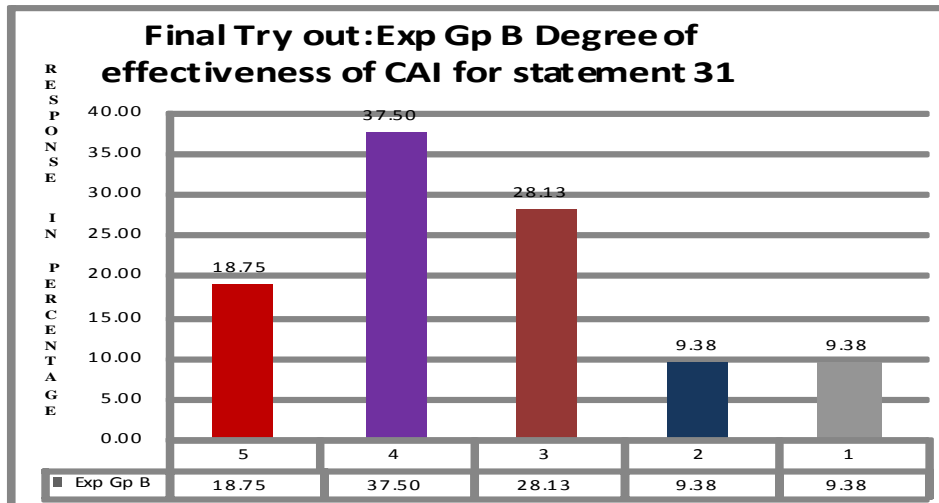


Figure 4.172 Graphical Representation of analysis of statement 31 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.353 Chi Square Table for Exp Gp A for Statement 31 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	5.8
4	11	5.8
3	7	5.8
2	6	5.8
1	0	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 10.8276

degrees of freedom = 4

probability = 0.02857

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “CAI does not take care of previous knowledge (percentage) needed to understand the present concept.”

Experimental Group B

Table 4.354 Chi Square Table for Exp Gp B for Statement 31 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	12	6.6
3	9	6.6
2	3	6.6
1	3	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 9.27273

degrees of freedom = 4

probability = 0.05463

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 32 Enough revision is not done in CAI after the topic simple interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.355 Responses of Exp Gp A students in percentage for statement 32 for Final Try-out

Points	Exp Gp A
5	9.68
4	32.26
3	32.26
2	25.81
1	3.23

9.68% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

32.26% of the students disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

32.26% of the students not decided with the statement “Enough revision is not done in CAI after the topic simple interest.”

25.81% of the students agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

3.23% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

Experimental Group B : Responses of the students in percentage

Table 4.356 Responses of Exp Gp B students in percentage for statement 32 for Final Try-out

Points	Exp Gp B
5	12.50
4	40.63
3	9.38
2	31.25
1	12.50

12.50% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

40.63% of the students disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

9.38% of the students not decided with the statement “Enough revision is not done in CAI after the

topic simple interest.”

31.25% of the students agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

12.50% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic simple interest.”

Graphical Representation of analysis of statement 32 in Percentage

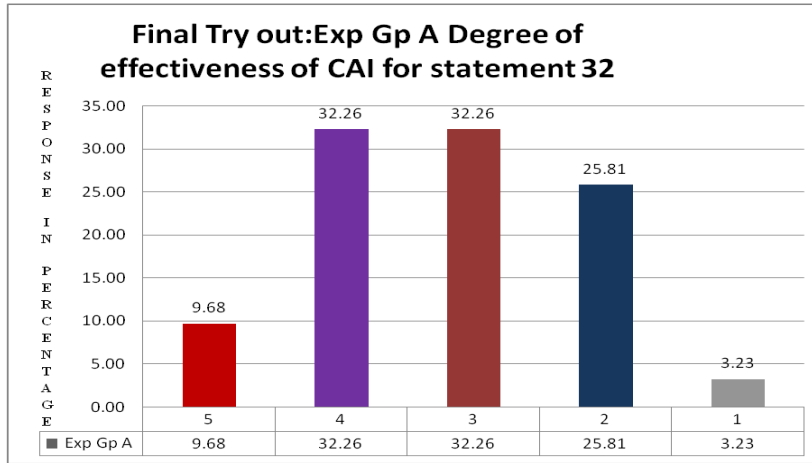


Figure 4.173 Graphical Representation of analysis of statement 32 in Percentage for Exp Gp A for Final Try-out

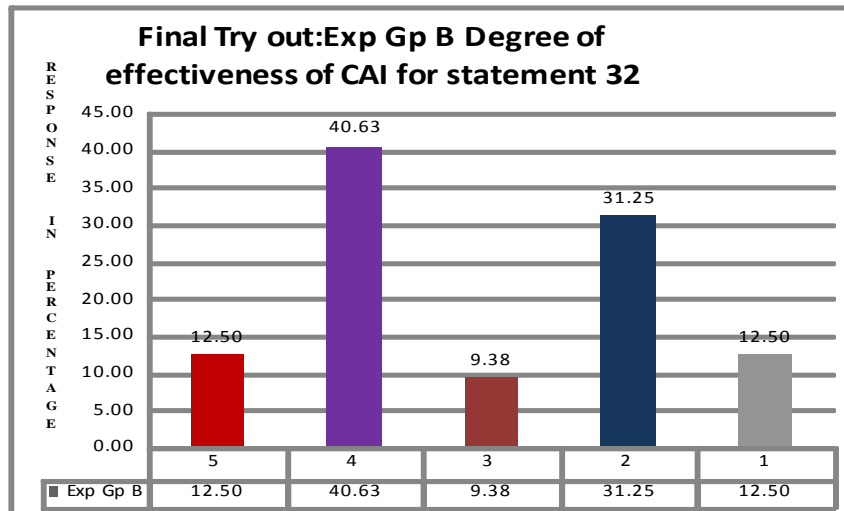


Figure 4.174 Graphical Representation of analysis of statement 32 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.357 Chi Square Table for Exp Gp A for Statement 32 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	3	6.4
4	10	6.4
3	10	6.4
2	8	6.4
1	1	6.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 10.8125

degrees of freedom = 4

probability = 0.02875

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. Equal load is on disagree and not decided therefore equal number of students who disagree and equal number of students who are not decided with the statement “Enough revision is not done in CAI after the topic simple interest.”

Experimental Group B

Table 4.358 Chi Square Table for Exp Gp B for Statement 32 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	6.8
4	13	6.8
3	3	6.8
2	10	6.8
1	4	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.5882

degrees of freedom = 4

probability = 0.02069

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “Enough revision is not done in CAI after the topic simple interest.”

Statement 33: Enough revision is not done in CAI after the topic compound interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.359 Responses of Exp Gp A students in percentage for statement 33 for Final Try-out

Points	Exp Gp A
5	19.35
4	32.26
3	6.45
2	22.58
1	25.81

19.35% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

32.26% of the students disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

6.45% of the students not decided with the statement “Enough revision is not done in CAI after the topic compound interest.”

22.58% of the students agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

25.81% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

Experimental Group B : Responses of the students in percentage

Table 4.360 Responses of Exp Gp B students in percentage for statement 33 for Final Try-out

Points	Exp Gp B
5	12.50
4	31.25
3	21.88
2	15.63
1	9.38

12.50% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

31.25% of the students disagree with the statement “Enough revision is not done in CAI after the topic compound interest.”

21.88% of the students not decided with the statement “Enough revision is not done in CAI after the

topic compound interest.”

15.63% of the students agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

9.38% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic compound interest.”

Graphical Representation of analysis of statement 33 in Percentage

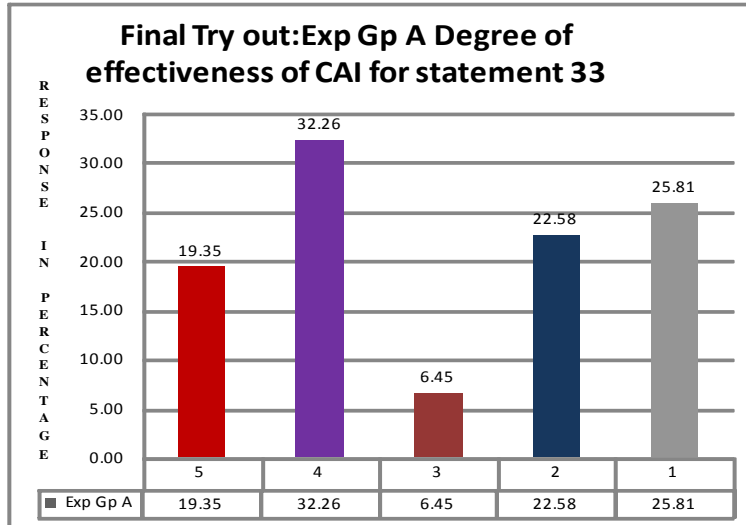


Figure 4.175 Graphical Representation of analysis of statement 33 in Percentage for Exp Gp A for Final Try-out

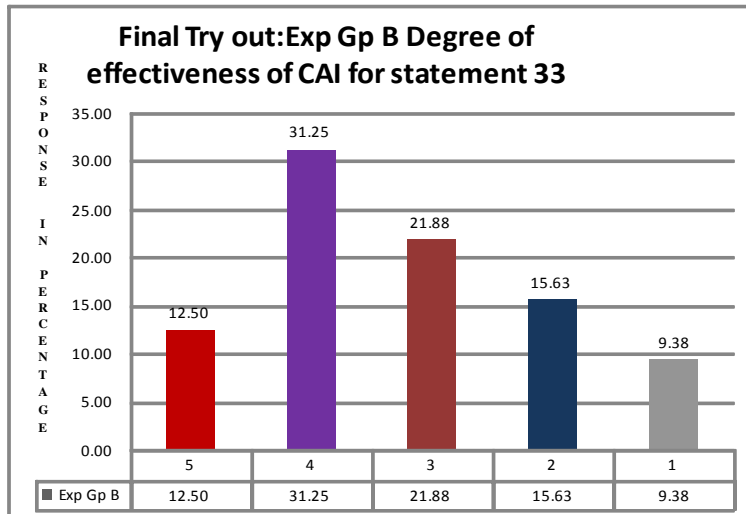


Figure 4.176 Graphical Representation of analysis of statement 33 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.361 Chi Square Table for Exp Gp A for Statement 33 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	10	6.6
3	2	6.6
2	7	6.6
1	8	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.33333

degrees of freedom = 4

probability = 0.25477

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.362 Chi Square Table for Exp Gp B for Statement 33 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	5.8
4	10	5.8
3	7	5.8
2	5	5.8
1	3	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.31034

degrees of freedom = 4

probability = 0.25691

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 34: Enough revision is not done in CAI after the topic profit and loss.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.363 Responses of Exp Gp A students in percentage for statement 34 for Final Try-out

Points	Exp Gp A
5	6.45
4	25.81
3	32.26
2	19.35
1	12.90

6.45% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

25.81% of the students disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

32.26% of the students not decided with the statement “Enough revision is not done in CAI after the topic profit and loss.”

19.35% of the students agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

12.90% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

Experimental Group B : Responses of the students in percentage

Table 4.364 Responses of Exp Gp B students in percentage for statement 34 for Final Try-out

Points	Exp Gp B
5	18.75
4	37.50
3	12.50
2	15.63
1	18.75

18.75% of the students strongly disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

37.50% of the students disagree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

12.50% of the students not decided with the statement “Enough revision is not done in CAI after the

topic profit and loss.”

15.63% of the students agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

18.75% of the students strongly agree with the statement “Enough revision is not done in CAI after the topic profit and loss.”

Graphical Representation of analysis of statement 34 in Percentage

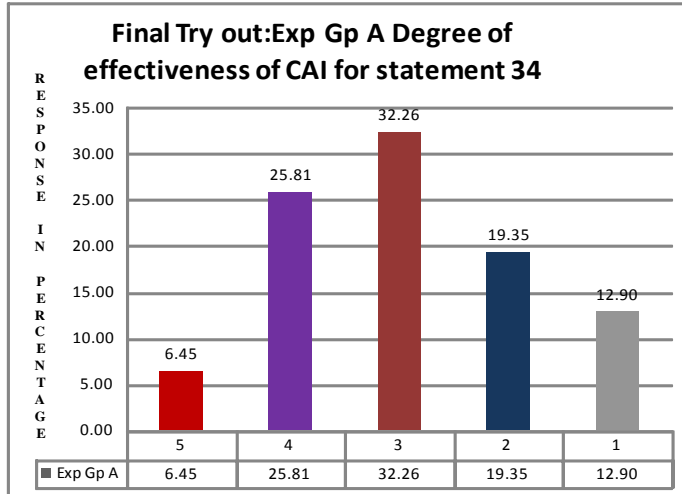


Figure 4.177 Graphical Representation of analysis of statement 34 in Percentage for Exp Gp A for Final Try-out

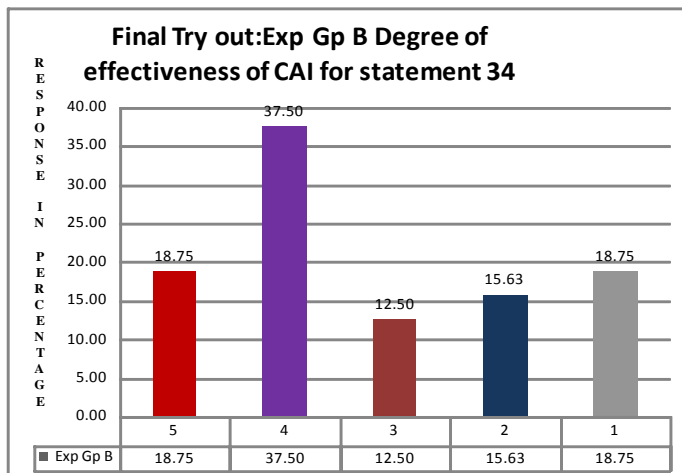


Figure 4.178 Graphical Representation of analysis of statement 34 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.365 Chi Square Table for Exp Gp A for Statement 34 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	6
4	8	6
3	10	6
2	6	6
1	4	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 6.66667

degrees of freedom = 4

probability = 0.15459

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.366 Chi Square Table for Exp Gp B for Statement 34 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	12	6.6
3	4	6.6
2	5	6.6
1	6	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.93939

degrees of freedom = 4

probability = 0.20372

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 35: Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.

Polarity: Negative**Experimental Group A : Responses of the students in percentage****Table 4.367 Responses of Exp Gp A students in percentage for statement 35 for Final Try-out**

Points	Exp Gp A
5	16.13
4	32.26
3	16.13
2	16.13
1	12.90

16.13% of the students strongly disagree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

32.26% of the students disagree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

16.13% of the students not decided with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

16.13% of the students agree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

12.90% of the students strongly agree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

Experimental Group B : Responses of the students in percentage**Table 4.368 Responses of Exp Gp B students in percentage for statement 35 for Final Try-out**

Points	Exp Gp B
5	18.75
4	31.25
3	6.25
2	40.63
1	3.13

18.75% of the students strongly disagree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

31.25% of the students disagree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

6.25% of the students not decided with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

40.63% of the students agree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

3.13% of the students strongly agree with the statement “Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.”

Graphical Representation of analysis of statement 35

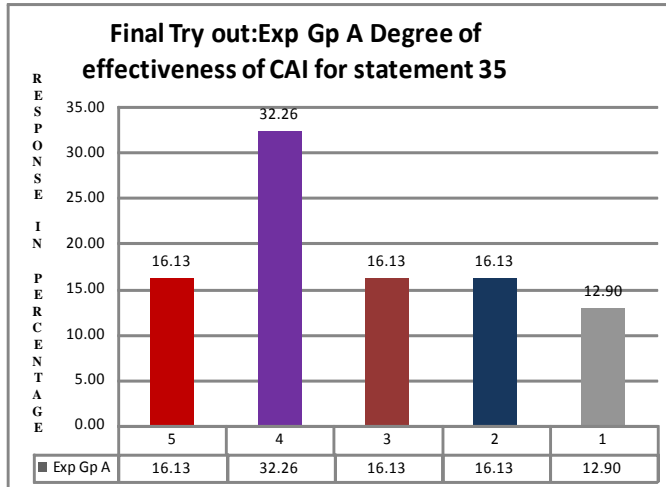


Figure 4.179 Graphical Representation of analysis of statement 35 in Percentage for Exp Gp A for Final Try-out

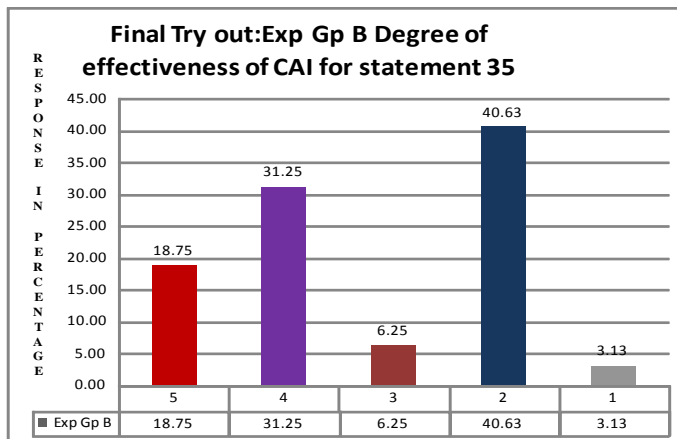


Figure 4.180 Graphical Representation of analysis of statement 35 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.369 Chi Square Table for Exp Gp A for Statement 35 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	5.8
4	10	5.8
3	5	5.8
2	5	5.8
1	4	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 3.93103

degrees of freedom = 4

probability = 0.41542

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.370 Chi Square Table for Exp Gp A for Statement 35 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.4
4	10	6.4
3	2	6.4
2	13	6.4
1	1	6.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 16.4375

degrees of freedom = 4

probability = 0.00248

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement "Remedial (re teaching the difficult concept which is not understood by you) teaching is not done."

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.371 Responses of Exp Gp A students in percentage for statement 36 for Final Try-out

Points	Exp Gp A
5	12.90
4	29.03
3	12.90
2	19.35
1	19.35

12.90% of the students strongly disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

29.03% of the students disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

12.90% of the students not decided with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

19.35% of the students agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

19.35% of the students strongly agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

Experimental Group B : Responses of the students in percentage

Table 4.372 Responses of Exp Gp B students in percentage for statement 36 for Final Try-out

Points	Exp Gp B
5	15.63
4	46.88
3	12.50
2	21.88
1	9.38

15.63% of the students strongly disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

46.88% of the students disagree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

12.50% of the students not decided with the statement “I have to read the slide many times to

understand what is being said as there was no clarity.”

21.88% of the students agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

9.38% of the students strongly agree with the statement “I have to read the slide many times to understand what is being said as there was no clarity.”

Graphical Representation of analysis of statement 36

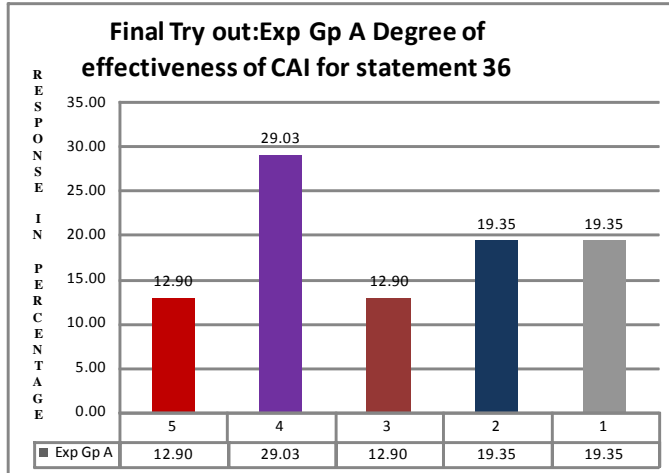


Figure 4.181 Graphical Representation of analysis of statement 36 in Percentage for Exp Gp A for Final Try-out

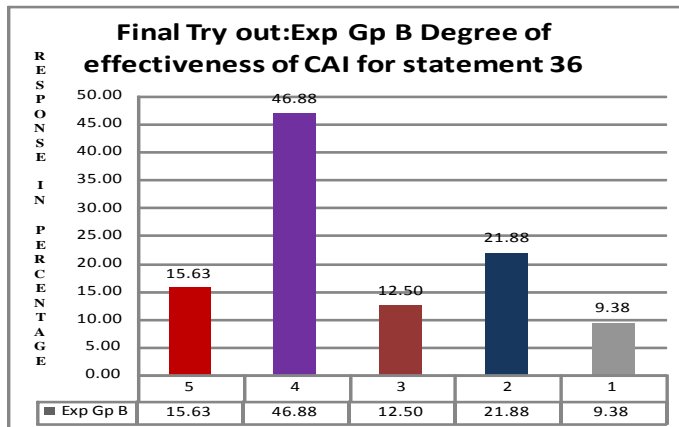


Figure 4.182 Graphical Representation of analysis of statement 36 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.373 Chi Square Table for Exp Gp A for Statement 36 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	5.8
4	9	5.8
3	4	5.8
2	6	5.8
1	6	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 2.89655

degrees of freedom = 4

probability = 0.57528

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.374 Chi Square Table for Exp Gp B for Statement 36 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.8
4	15	6.8
3	4	6.8
2	7	6.8
1	3	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 13.6471

degrees of freedom = 4

probability = 0.00851

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement "I have to read the slide many times to understand what is being said as there was no clarity".

Statement 37: Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.375 Responses of Exp Gp A students in percentage for statement 37 for Final Try-out

Points	Exp Gp A
5	16.13
4	35.48
3	16.13
2	9.68
1	19.35

16.13% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

35.48% of the students agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

16.13% of the students not decided with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

9.68% of the students disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

19.35% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Experimental Group B : Responses of the students in percentage

Table 4.376 Responses of Exp Gp B students in percentage for statement 37 for Final Try-out

Points	Exp Gp B
5	15.63
4	46.88
3	9.38
2	18.75
1	9.38

15.63% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

46.88% of the students agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

9.38% of the students not decided with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

18.75% of the students disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

9.38% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Graphical Representation of analysis of statement 37

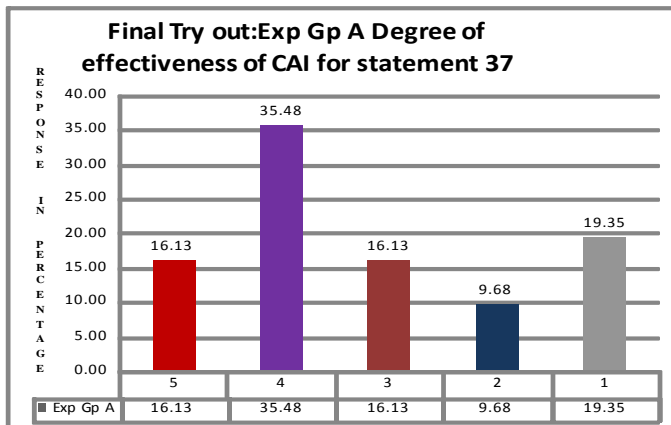


Figure 4.183 Graphical Representation of analysis of statement 37 in Percentage for Exp Gp A for Final Try-out

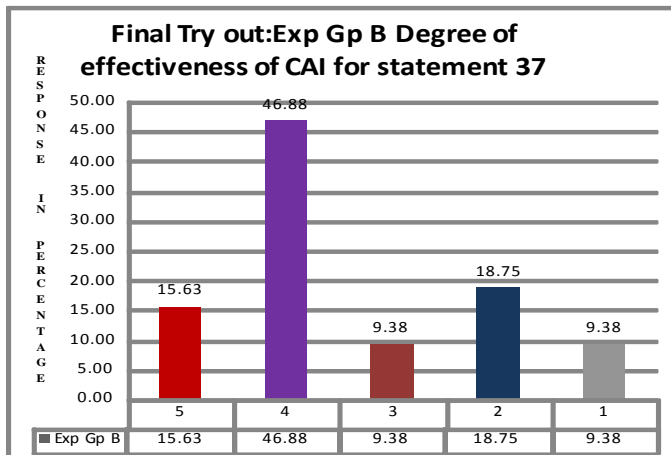


Figure 4.184 Graphical Representation of analysis of statement 37 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.377 Chi Square Table for Exp Gp A for Statement 37 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6
4	11	6
3	5	6
2	3	6
1	6	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 6

degrees of freedom = 4

probability = 0.19915

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.378 Chi Square Table for Exp Gp B for Statement 37 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.4
4	15	6.4
3	3	6.4
2	6	6.4
1	3	6.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 15.5

degrees of freedom = 4

probability = 0.00377

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.”

Statement 38: Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.379 Responses of Exp Gp A students in percentage for statement 38 for Final Try-out

Points	Exp Gp A
5	25.81
4	38.71
3	16.13
2	9.68
1	6.45

25.81% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

38.71% of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

16.13% of the students not decided with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

9.68% of the students disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

6.45% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Experimental Group B : Responses of the students in percentage

Table 4.380 Responses of Exp Gp B students in percentage for statement 38 for Final Try-out

Points	Exp Gp B
5	15.63
4	40.63
3	9.38
2	31.25
1	6.25

15.63% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

40.63% of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

9.38% of the students not decided with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

31.25% of the students disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

6.25% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Graphical Representation of analysis of statement 38 in Percentage

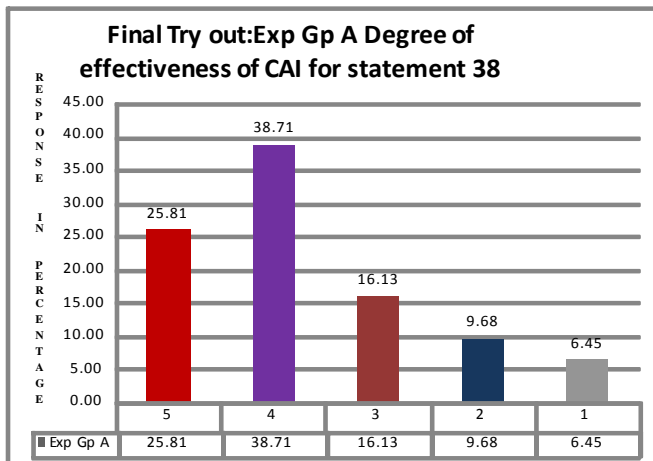


Figure 4.185 Graphical Representation of analysis of statement 38 in Percentage for Exp Gp A for Final Try-out

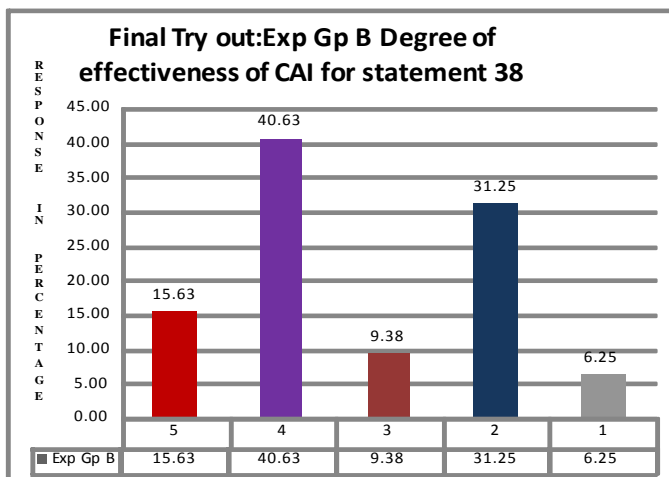


Figure 4.186 Graphical Representation of analysis of statement 38 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.381 Chi Square Table for Exp Gp A for Statement 38 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6
4	12	6
3	5	6
2	3	6
1	2	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11

degrees of freedom = 4

probability = 0.02656

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.”

Experimental Group B

Table 4.382 Chi Square Table for Exp Gp B for Statement 38 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	13	6.6
3	3	6.6
2	10	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 13.5152

degrees of freedom = 4

probability = 0.00901

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Number of questions at the end of the slides for the topic simple interest is

adequate for providing practice.”

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.383 Responses of Exp Gp A students in percentage for statement 39 for Final Try-out

Points	Exp Gp A
5	16.13
4	38.71
3	6.45
2	38.71
1	9.68

16.13% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

38.71% of the students agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

6.45% of the students not decided with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

38.71% of the students disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

9.68% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

Experimental Group B : Responses of the students in percentage

Table 4.384 Responses of Exp Gp B students in percentage for statement 39 for Final Try-out

Points	Exp Gp B
5	28.13
4	28.13
3	15.63
2	12.50
1	9.38

28.13% of the students strongly agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

28.13% of the students agree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

15.63% of the students not decided with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

12.50% of the students disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

9.38% of the students strongly disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

Graphical Representation of analysis of statement 39 in Percentage

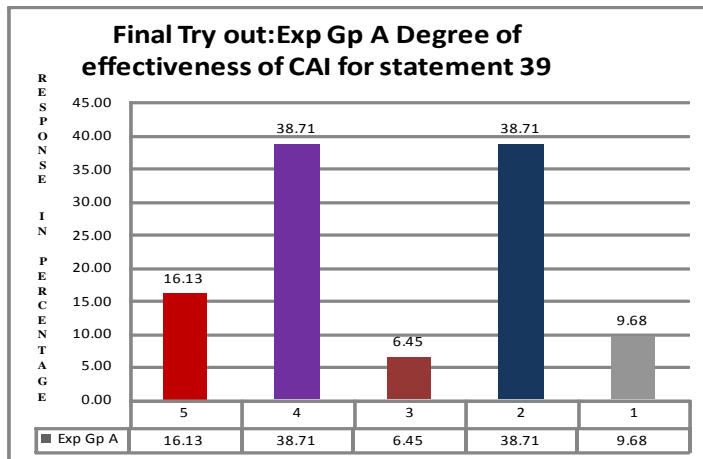


Figure 4.187 Graphical Representation of analysis of statement 39 in Percentage for Exp Gp A for Final Try-out

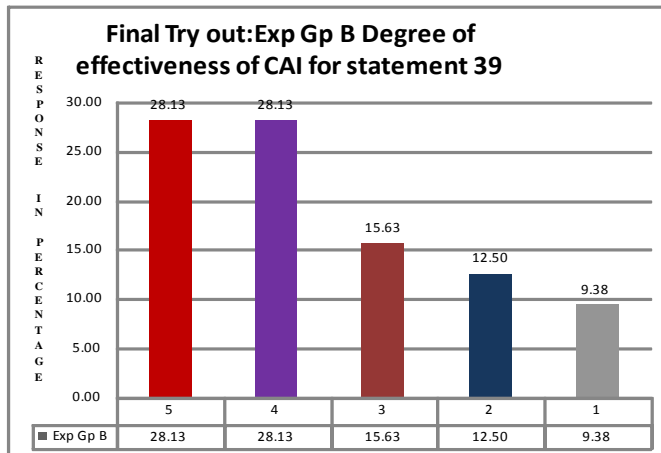


Figure 4.188 Graphical Representation of analysis of statement 39 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.385 Chi Square Table for Exp Gp A for Statement 39 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.8
4	12	6.8
3	2	6.8
2	12	6.8
1	3	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 13.9412

degrees of freedom = 4

probability = 0.00749

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. Equal load is on agree and disagree therefore equal number of students who agree and equal number of students who disagree with the statement “Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.”

Experimental Group B

Table 4.386 Chi Square Table for Exp Gp B for Statement 39 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	6
4	9	6
3	5	6
2	4	6
1	3	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.33333

degrees of freedom = 4

probability = 0.25477

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 40: CAI is not enough in understanding the concept very clearly.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.387 Responses of Exp Gp A students in percentage for statement 40 for Final Try-out

Points	Exp Gp A
5	19.35
4	32.26
3	29.03
2	12.90
1	3.23

19.35% of the students strongly disagree with the statement “CAI is not enough in understanding the concept very clearly.”

32.26% of the students disagree with the statement “CAI is not enough in understanding the concept very clearly.”

29.03% of the students not decided with the statement “CAI is not enough in understanding the concept very clearly.”

12.90% of the students agree with the statement “CAI is not enough in understanding the concept very clearly.”

3.23% of the students strongly agree with the statement “CAI is not enough in understanding the concept very clearly.”

Experimental Group B : Responses of the students in percentage

Table 4.388 Responses of Exp Gp B students in percentage for statement 40 for Final Try-out

Points	Exp Gp B
5	15.63
4	34.38
3	18.75
2	15.63
1	18.75

15.63% of the students strongly disagree with the statement “CAI is not enough in understanding the concept very clearly.”

34.38% of the students disagree with the statement “CAI is not enough in understanding the concept very clearly.”

18.75% of the students not decided with the statement “CAI is not enough in understanding the concept very clearly.”

15.63% of the students agree with the statement “CAI is not enough in understanding the concept very clearly.”

18.75% of the students strongly agree with the statement “CAI is not enough in understanding the concept very clearly.”

Graphical Representation of analysis of statement 40 in Percentage

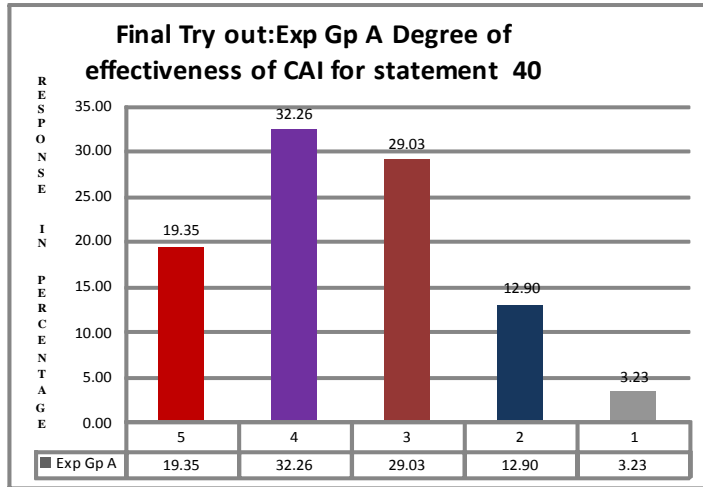


Figure 4.189 Graphical Representation of analysis of statement 40 in Percentage for Exp Gp A for Final Try-out

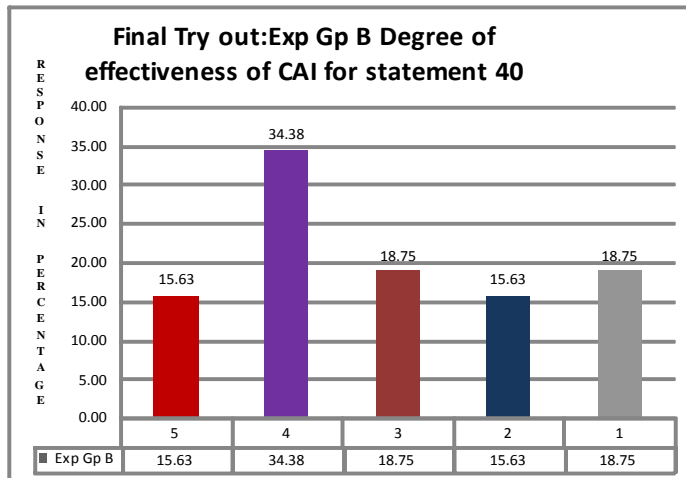


Figure 4.190 Graphical Representation of analysis of statement 40 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.389 Chi Square Table for Exp Gp A for Statement 40 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6
4	10	6
3	9	6
2	4	6
1	1	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 9

degrees of freedom = 4

probability = 0.0611

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “CAI is not enough in understanding the concept very clearly”

Experimental Group B

Table 4.390 Chi Square Table for Exp Gp B for Statement 40 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	11	6.6
3	6	6.6
2	5	6.6
1	6	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 3.81818

degrees of freedom = 4

probability = 0.43117

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 41: Independent learning is not possible through CAI.

Polarity: Negative

Experimental Group A : Responses of the students in percentage**Table 4.391 Responses of Exp Gp A students in percentage for statement 41 for Final Try-out**

Points	Exp Gp A
5	22.58
4	16.13
3	32.26
2	9.68
1	12.90

22.58% of the students strongly disagree with the statement “Independent learning is not possible through CAI.”

16.13% of the students disagree with the statement “Independent learning is not possible through CAI.”

32.26% of the students not decided with the statement “Independent learning is not possible through CAI.”

9.68% of the students agree with the statement “Independent learning is not possible through CAI.”

12.90% of the students strongly agree with the statement “Independent learning is not possible through CAI.”

Experimental Group B : Responses of the students in percentage**Table 4.392 Responses of Exp Gp B students in percentage for statement 41 for Final Try-out**

Points	Exp Gp B
5	31.25
4	53.13
3	6.25
2	12.50
1	0.00

31.25% of the students strongly disagree with the statement “Independent learning is not possible through CAI.”

53.13% of the students disagree with the statement “Independent learning is not possible through CAI.”

6.25% of the students not decided with the statement “Independent learning is not possible through CAI.”

12.50% of the students agree with the statement “Independent learning is not possible through CAI.”

0.00% of the students strongly agree with the statement “Independent learning is not possible through CAI.”

Graphical Representation of analysis of statement 41 in Percentage

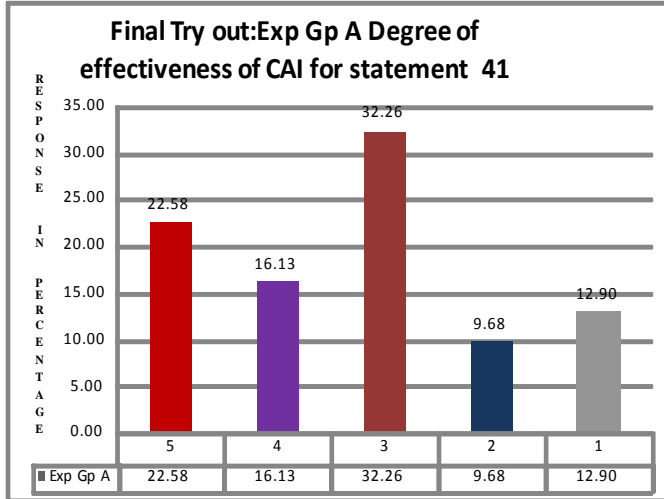


Figure 4.191 Graphical Representation of analysis of statement 41 in Percentage for Exp Gp A for Final Try-out

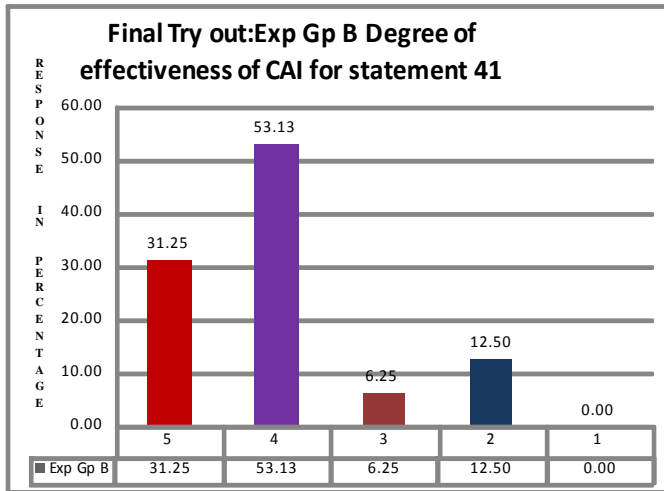


Figure 4.192 Graphical Representation of analysis of statement 41 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.393 Chi Square Table for Exp Gp A for Statement 41 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	5	5.8
3	10	5.8
2	3	5.8
1	4	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 5.31034

degrees of freedom = 4

probability = 0.25691

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.394 Chi Square Table for Exp Gp B for Statement 41 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	10	6.6
4	17	6.6
3	2	6.6
2	4	6.6
1	0	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 28.9697

degrees of freedom = 4

probability = 0.00

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement "Independent learning is not possible through CAI".

Statement 42: Evaluation is done objectively (objective questions) so no partiality is involved in scoring.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.395 Responses of Exp Gp A students in percentage for statement 42 for Final Try-out

Points	Exp Gp A
5	29.03
4	25.81
3	22.58
2	12.90
1	3.23

29.03% of the students strongly agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

25.81% of the students agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

22.58% of the students not decided with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

12.90% of the students disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

3.23% of the students strongly disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

Experimental Group B : Responses of the students in percentage

Table 4.396 Responses of Exp Gp B students in percentage for statement 42 for Final Try-out

Points	Exp Gp B
5	28.13
4	43.75
3	15.63
2	9.38
1	6.25

28.13% of the students strongly agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

43.75% of the students agree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

15.63% of the students not decided with the statement “Evaluation is done objectively (objective

questions) so no partiality is involved in scoring.”

9.38% of the students disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

6.25% of the students strongly disagree with the statement “Evaluation is done objectively (objective questions) so no partiality is involved in scoring.”

Graphical Representation of analysis of statement 42 in Percentage

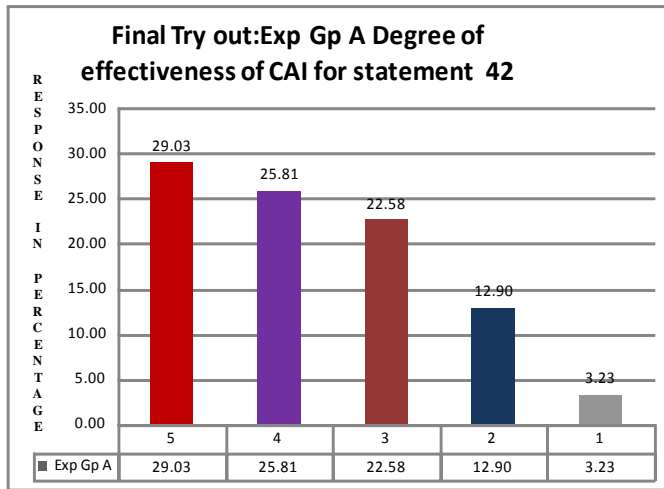


Figure 4.193 Graphical Representation of analysis of statement 42 in Percentage for Exp Gp A for Final Try-out

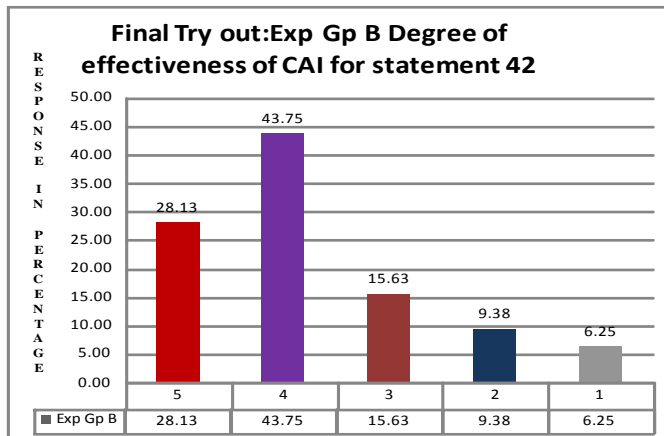


Figure 4.194 Graphical Representation of analysis of statement 42 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.397 Chi Square Table for Exp Gp A for Statement 42 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	5.8
4	8	5.8
3	7	5.8
2	4	5.8
1	1	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 7.37931

degrees of freedom = 4

probability = 0.11715

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.398 Chi Square Table for Exp Gp B for Statement 42 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	6.6
4	14	6.6
3	5	6.6
2	3	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 14.7273

degrees of freedom = 4

probability = 0.0053

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement "Evaluation is done objectively (objective questions) so no partiality is involved in scoring."

Statement 43: Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.399 Responses of Exp Gp A students in percentage for statement 43 for Final Try-out

Points	Exp Gp A
5	16.13
4	25.81
3	38.71
2	12.90
1	6.45

16.13% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

25.81% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

38.71% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

12.90% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

6.45% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.400 Responses of Exp Gp B students in percentage for statement 43 for Final Try-out

Points	Exp Gp B
5	12.50
4	28.13
3	28.13
2	28.13
1	6.25

12.50% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

28.13% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

28.13% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

28.13% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

6.25% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 43 in Percentage

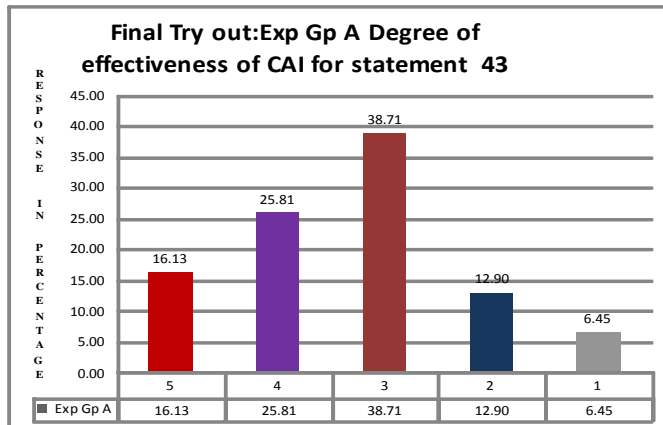


Figure 4.195 Graphical Representation of analysis of statement 43 in Percentage for Exp Gp A for Final Try-out

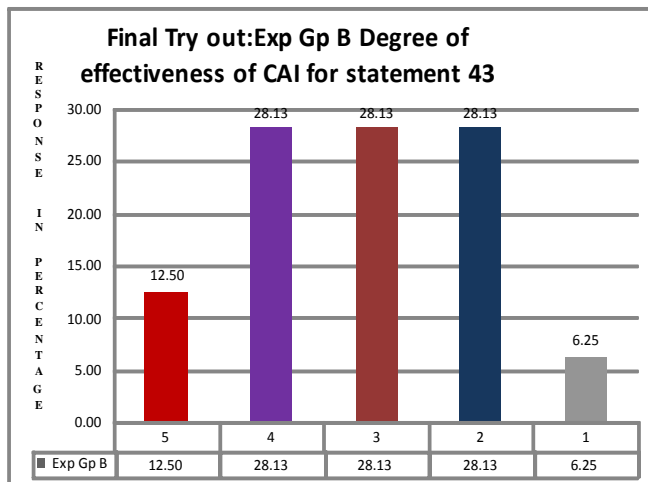


Figure 4.196 Graphical Representation of analysis of statement 43 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.401 Chi Square Table for Exp Gp A for Statement 43 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.2
4	8	6.2
3	12	6.2
2	4	6.2
1	2	6.2

Expected Frequency = Sum of observed frequencies/5

chi-square = 9.80645

degrees of freedom = 4

probability = 0.04382

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on not decided therefore most of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.”

Experimental Group B

Table 4.402 Chi Square Table for Exp Gp B for Statement 43 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	4	6.6
4	9	6.6
3	9	6.6
2	9	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 6.84848

degrees of freedom = 4

probability = 0.14412

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 44: Instruction given in each slide of CAI is easy and clear to follow.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.403 Responses of Exp Gp A students in percentage for statement 44 for Final Try-out

Points	Exp Gp A
5	41.94
4	29.03
3	16.13
2	0.00
1	6.45

41.94% of the students strongly agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

29.03% of the students agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

16.13% of the students not decided with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

0.00% of the students disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

6.45% of the students strongly disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

Experimental Group B : Responses of the students in percentage

Table 4.404 Responses of Exp Gp B students in percentage for statement 44 for Final Try-out

Points	Exp Gp B
5	31.25
4	34.38
3	25.00
2	12.50
1	0.00

31.25% of the students strongly agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

34.38% of the students agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

25.00% of the students not decided with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

12.50% of the students disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

0.00% of the students strongly disagree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

Graphical Representation of analysis of statement 44 in Percentage

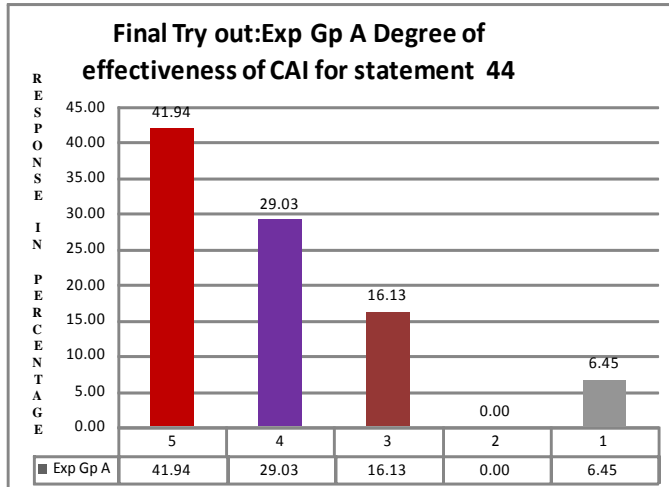


Figure 4.197 Graphical Representation of analysis of statement 44 in Percentage for Exp Gp A for Final Try-out

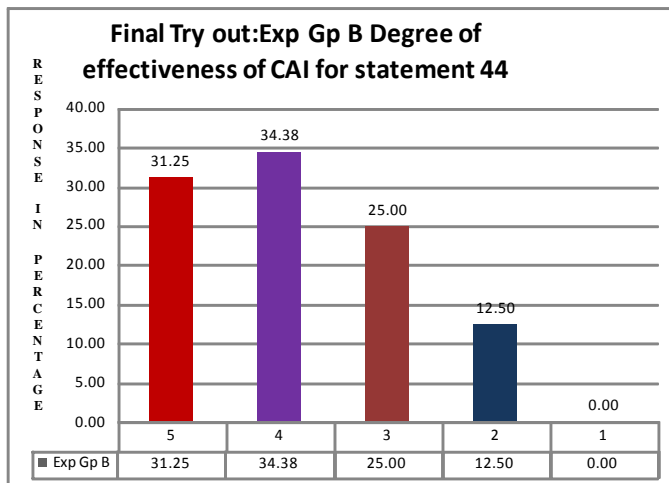


Figure 4.198 Graphical Representation of analysis of statement 44 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.405 Chi Square Table for Exp Gp A for Statement 44 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	13	5.8
4	9	5.8
3	5	5.8
2	0	5.8
1	2	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 19.1034

degrees of freedom = 4

probability = 0.00075

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

Experimental Group B

Table 4.406 Chi Square Table for Exp Gp B for Statement 44 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	10	6.6
4	11	6.6
3	8	6.6
2	4	6.6
1	0	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 12.6061

degrees of freedom = 4

probability = 0.01337

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Instruction given in each slide of CAI is easy and clear to follow.”

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

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.407 Responses of Exp Gp A students in percentage for statement 45 for Final Try-out

Points	Exp Gp A
5	9.68
4	9.68
3	35.48
2	22.58
1	16.13

9.68% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

9.68% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

35.48% of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

22.58% of the students agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

16.13% of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.408 Responses of Exp Gp B students in percentage for statement 45 for Final Try-out

Points	Exp Gp B
5	18.75
4	28.13
3	25.00
2	21.88
1	9.38

18.75% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

28.13% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

25.00% of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

21.88% of the students agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

9.38% of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.”

Graphical Representation of analysis of statement 45 in Percentage

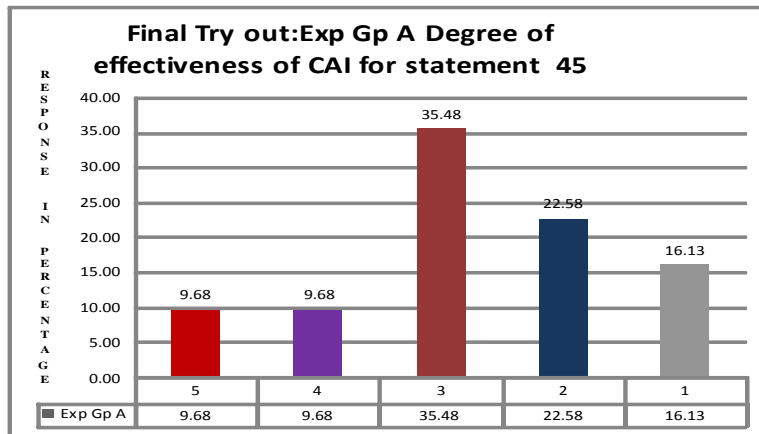


Figure 4.199 Graphical Representation of analysis of statement 45 in Percentage for Exp Gp A for Final Try-out

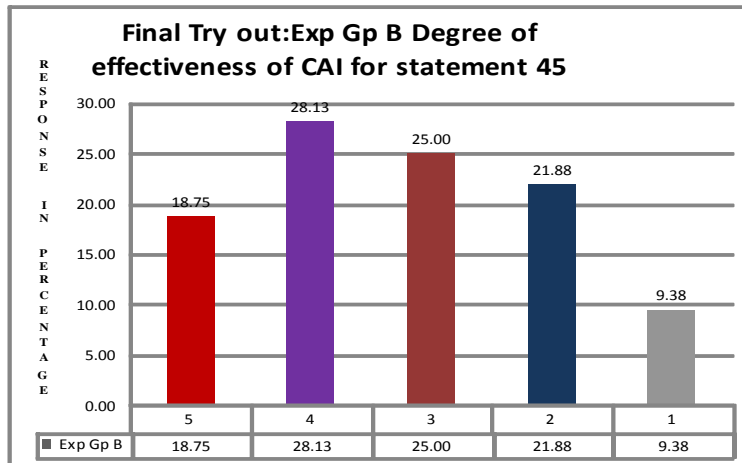


Figure 4.200 Graphical Representation of analysis of statement 45 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.409 Chi Square Table for Exp Gp A for Statement 45 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	3	5.8
4	3	5.8
3	11	5.8
2	7	5.8
1	5	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 7.72414

degrees of freedom = 4

probability = 0.10222

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.410 Chi Square Table for Exp Gp B for Statement 45 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	9	6.6
3	8	6.6
2	7	6.6
1	3	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 3.21212

degrees of freedom = 4

probability = 0.52298

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

Statement 46: Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).

Polarity: Negative**Experimental Group A : Responses of the students in percentage****Table 4.411 Responses of Exp Gp A students in percentage for statement 46 for Final Try-out**

Points	Exp Gp A
5	9.68
4	16.13
3	25.81
2	32.26
1	9.68

9.68% of the students strongly disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

16.13% of the students disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

25.81% of the students not decided with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

32.26% of the students agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

9.68% of the students strongly agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

Experimental Group B : Responses of the students in percentage**Table 4.412 Responses of Exp Gp B students in percentage for statement 46 for Final Try-out**

Points	Exp Gp B
5	15.63
4	34.38
3	6.25
2	37.50
1	9.38

15.63% of the students strongly disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

34.38% of the students disagree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

6.25% of the students not decided with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

37.50% of the students agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

possible while using this CAI(no face to face interaction).”

9.38% of the students strongly agree with the statement “Interaction with mathematics teacher is not possible while using this CAI(no face to face interaction).”

Graphical Representation of analysis of statement 46 in Percentage

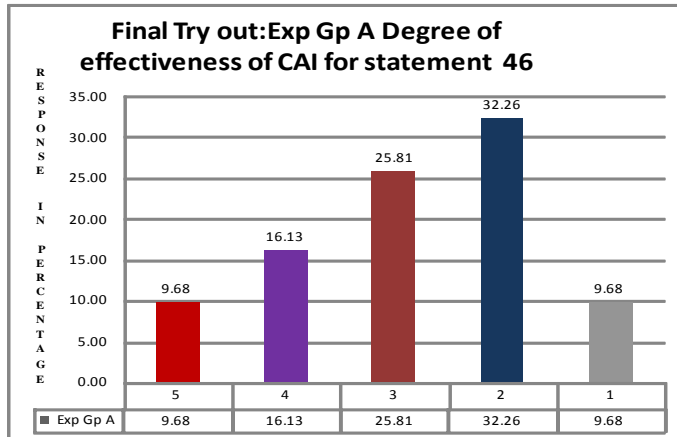


Figure 4.201 Graphical Representation of analysis of statement 46 in Percentage for Exp Gp A for Final Try-out

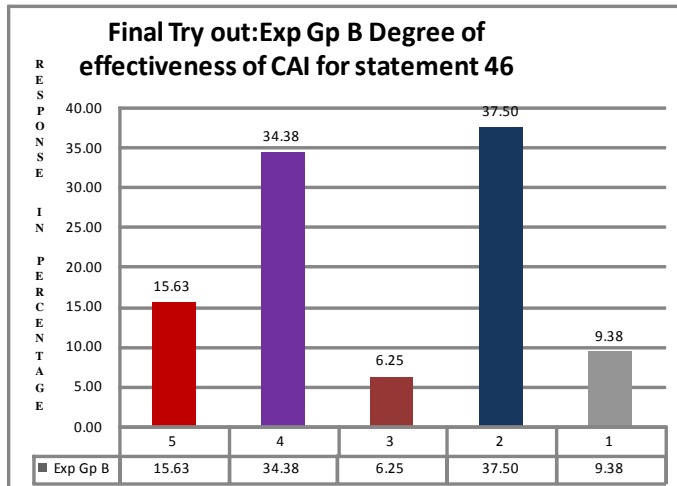


Figure 4.202 Graphical Representation of analysis of statement 46 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.413 Chi Square Table for Exp Gp A for Statement 46 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	3	5.8
4	5	5.8
3	8	5.8
2	10	5.8
1	3	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 6.68966

degrees of freedom = 4

probability = 0.15323

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.414 Chi Square Table for Exp Gp B for Statement 46 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	11	6.6
3	2	6.6
2	12	6.6
1	3	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 12.9091

degrees of freedom = 4

probability = 0.01173

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction)”.

Statement 47: To get the correct answer I had to go back to the slide/s many times for topic simple interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.415 Responses of Exp Gp A students in percentage for statement 47 for Final Try-out

Points	Exp Gp A
5	6.45
4	35.48
3	12.90
2	16.13
1	22.58

6.45% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

35.48% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

12.90% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

16.13% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

22.58% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

Experimental Group B : Responses of the students in percentage

Table 4.416 Responses of Exp Gp B students in percentage for statement 47 for Final Try-out

Points	Exp Gp B
5	18.75
4	46.88
3	9.38
2	21.88
1	6.25

18.75% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

46.88% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

9.38% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

21.88% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

6.25 % of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic simple interest.”

Graphical Representation of analysis of statement 47 in Percentage

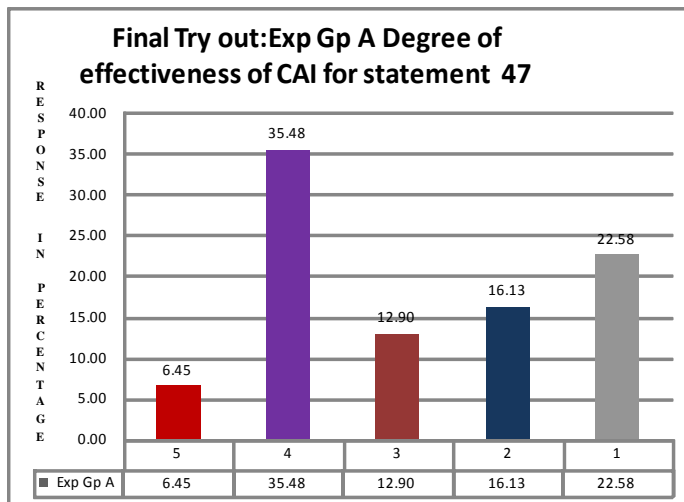


Figure 4.203 Graphical Representation of analysis of statement 47 in Percentage for Exp Gp A for Final Try-out

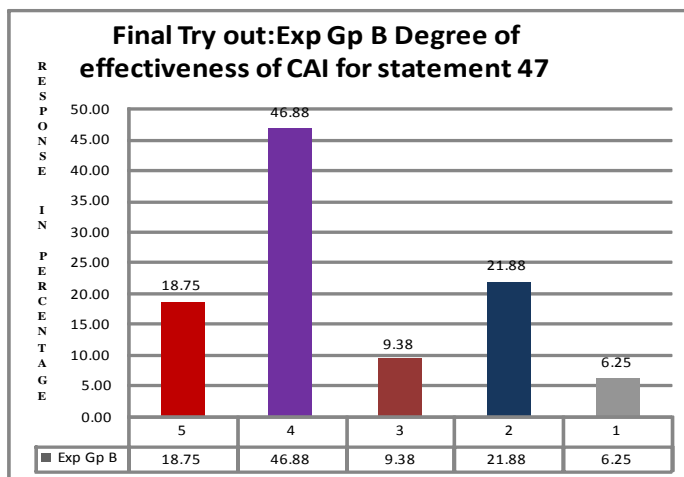


Figure 4.204 Graphical Representation of analysis of statement 47 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.417 Chi Square Table for Exp Gp A for Statement 47 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	5.8
4	11	5.8
3	4	5.8
2	5	5.8
1	7	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.06897

degrees of freedom = 4

probability = 0.08908

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.418 Chi Square Table for Exp Gp B for Statement 47 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	15	6.6
3	3	6.6
2	7	6.6
1	2	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 15.9394

degrees of freedom = 4

probability = 0.0031

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement "To get the correct answer I had to go back to the slide/s many times for topic simple interest."

Statement 48: To get the correct answer I had to go back to the slide/s many times for topic Compound interest.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.419 Responses of Exp Gp A students in percentage for statement 48 for Final Try-out

Points	Exp Gp A
5	6.45
4	29.03
3	22.58
2	16.13
1	19.35

22.58% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

35.48% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

29.03% of the students 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.”

3.23% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

3.23% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

Experimental Group B : Responses of the students in percentage

Table 4.420 Responses of Exp Gp B students in percentage for statement 48 for Final Try-out

Points	Exp Gp B
5	21.88
4	37.50
3	3.13
2	21.88
1	21.88

21.88% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

37.50% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

3.13% of the students 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.”

21.88% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

21.88% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic Compound interest.”

Graphical Representation of analysis of statement 48 in Percentage

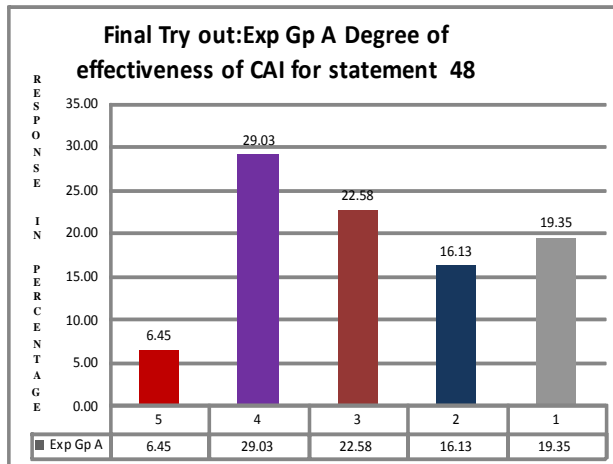


Figure 4.205 Graphical Representation of analysis of statement 48 in Percentage for Exp Gp A for Final Try-out

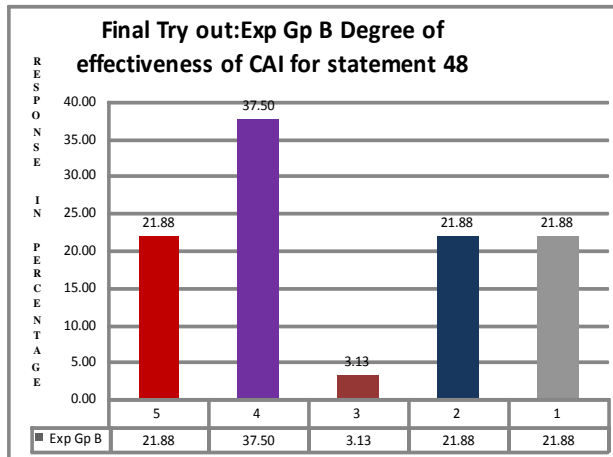


Figure 4.206 Graphical Representation of analysis of statement 48 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H_0 : Response is uniformly distributed in the 5 point scale

H_1 : Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.421 Chi Square Table for Exp Gp A for Statement 48 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	5.8
4	9	5.8
3	7	5.8
2	5	5.8
1	6	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 4.62069

degrees of freedom = 4

probability = 0.32848

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.422 Chi Square Table for Exp Gp B for Statement 48 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	6.8
4	12	6.8
3	1	6.8
2	7	6.8
1	7	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 8.94118

degrees of freedom = 4

probability = 0.06259

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that response is uniformly distributed in the 5-point scale.

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

Polarity: Negative**Experimental Group A : Responses of the students in percentage****Table 4.423 Responses of Exp Gp A students in percentage for statement 49 for Final Try-out**

Points	Exp Gp A
5	6.45
4	38.71
3	16.13
2	9.68
1	22.58

6.45% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

38.71% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

16.13% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

9.68% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

22.58% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

Experimental Group B : Responses of the students in percentage**Table 4.424 Responses of Exp Gp B students in percentage for statement 49 for Final Try-out**

Points	Exp Gp B
5	25.00
4	43.75
3	9.38
2	15.63
1	12.50

25.00% of the students strongly disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

43.75% of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

9.38% of the students not decided with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

15.63% of the students agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

12.50% of the students strongly agree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

Graphical Representation of analysis of statement 49 in Percentage

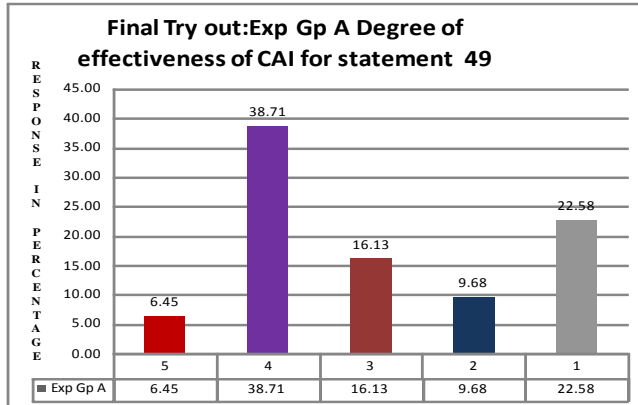


Figure 4.207 Graphical Representation of analysis of statement 49 in Percentage for Exp Gp A for Final Try-out

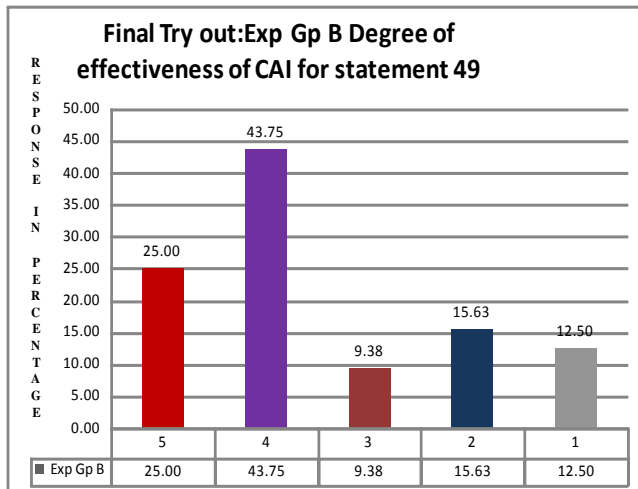


Figure 4.208 Graphical Representation of analysis of statement 49 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.425 Chi Square Table for Exp Gp A for Statement 49 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	2	5.8
4	12	5.8
3	5	5.8
2	3	5.8
1	7	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 10.8276

degrees of freedom = 4

probability = 0.02857

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for topic profit and loss.”

Experimental Group B

Table 4.426 Chi Square Table for Exp Gp B for Statement 49 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	8	6.8
4	14	6.8
3	3	6.8
2	5	6.8
1	4	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.5882

degrees of freedom = 4

probability = 0.02069

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on disagree therefore most of the students disagree with the statement “To get the correct answer I had to go back to the slide/s many times for

topic profit and loss.”

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.427 Responses of Exp Gp A students in percentage for statement 50 for Final Try-out

Points	Exp Gp A
5	35.48
4	29.03
3	12.90
2	12.90
1	6.45

35.48% of the students strongly agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

29.03% of the students agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

12.90% of the students not decided with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

12.90% of the students disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

6.45% of the students strongly disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Experimental Group B : Responses of the students in percentage

Table 4.428 Responses of Exp Gp B students in percentage for statement 50 for Final Try-out

Points	Exp Gp B
5	31.25
4	53.13
3	9.38
2	6.25
1	6.25

31.25% of the students strongly agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

53.13% of the students agree with the statement “Scores obtained by me at the end of each exercise

gives me feedback about my learning in each topic through CAI.”

9.38% of the students not decided with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

6.25% of the students disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

6.25% of the students strongly disagree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Graphical Representation of analysis of statement 50 in Percentage

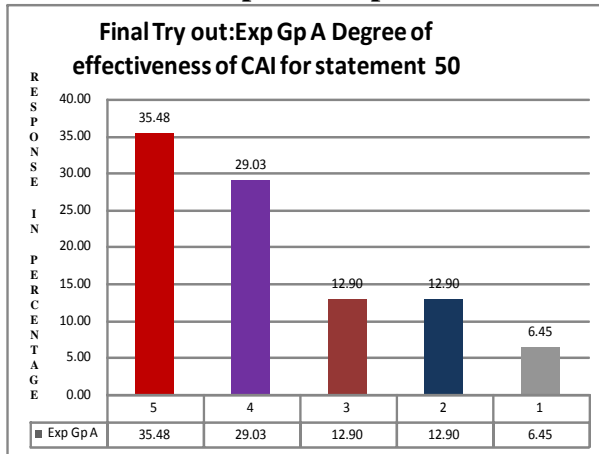


Figure 4.209 Graphical Representation of analysis of statement 50 in Percentage for Exp Gp A for Final Try-out

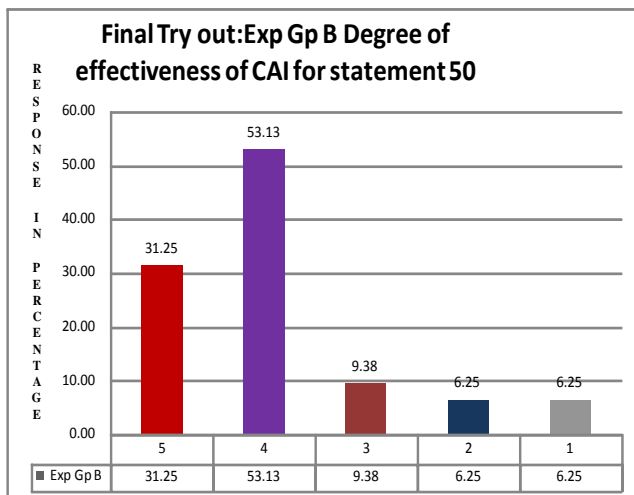


Figure 4.210 Graphical Representation of analysis of statement 50 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.429 Chi Square Table for Exp Gp A for Statement 50 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	11	6
4	9	6
3	4	6
2	4	6
1	2	6

Expected Frequency = Sum of observed frequencies/5

chi-square = 9.66667

degrees of freedom = 4

probability = 0.04643

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.”

Experimental Group B

Table 4.430 Chi Square Table for Exp Gp B for Statement 50 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	10	6.8
4	17	6.8
3	3	6.8
2	2	6.8
1	2	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 25.7059

degrees of freedom = 4

probability = 0.00

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Scores obtained by me at the end of each exercise gives me feedback about my

learning in each topic through CAI.”

Statement 51: Discussion with mathematics teacher is needed along with CAI.

Polarity: Negative

Experimental Group A : Responses of the students in percentage

Table 4.431 Responses of Exp Gp A students in percentage for statement 51 for Final Try-out

Points	Exp Gp A
5	3.23
4	12.90
3	19.35
2	22.58
1	35.48

3.23% of the students strongly disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

12.90% of the students disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

19.35% of the students not decided with the statement “Discussion with mathematics teacher is needed along with CAI.”

22.58% of the students agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

35.48% of the students strongly agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

Experimental Group B : Responses of the students in percentage

Table 4.432 Responses of Exp Gp B students in percentage for statement 51 for Final Try-out

Points	Exp Gp B
5	3.13
4	15.63
3	6.25
2	21.88
1	53.13

3.13% of the students strongly disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

15.63% of the students disagree with the statement “Discussion with mathematics teacher is needed along with CAI.”

6.25% of the students not decided with the statement “Discussion with mathematics teacher is needed along with CAI.”

21.88% of the students agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

53.13% of the students strongly agree with the statement “Discussion with mathematics teacher is needed along with CAI.”

Graphical Representation of analysis of statement 51 in Percentage

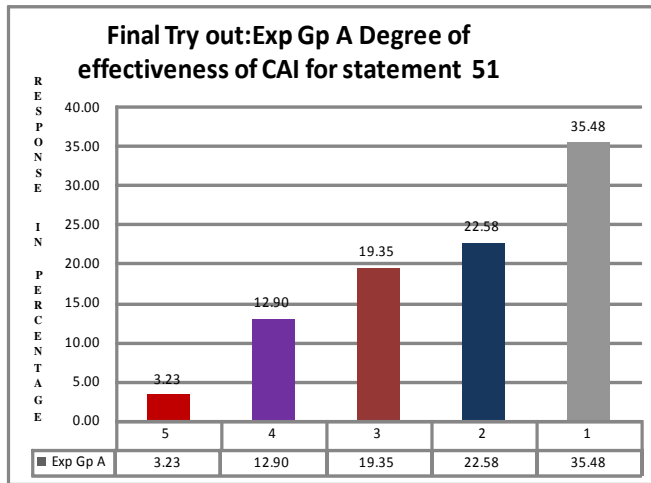


Figure 4.211 Graphical Representation of analysis of statement 51 in Percentage for Exp Gp A for Final Try-out

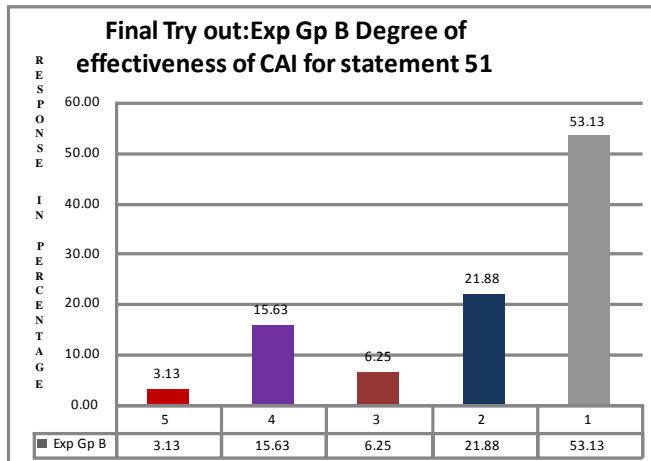


Figure 4.212 Graphical Representation of analysis of statement 51 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.433 Chi Square Table for Exp Gp A for Statement 51 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	1	5.8
4	4	5.8
3	6	5.8
2	7	5.8
1	11	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 9.44828

degrees of freedom = 4

probability = 0.05082

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is less than the table value therefore, Null hypothesis is not rejected. This revealed that reaction is uniformly distributed in the 5-point scale.

Experimental Group B

Table 4.434 Chi Square Table for Exp Gp B for Statement 51 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	1	6.4
4	5	6.4
3	2	6.4
2	7	6.4
1	17	6.4

Expected Frequency = Sum of observed frequencies/5

chi-square = 25.5

degrees of freedom = 4

probability = 0.00

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on strongly agree therefore most of the students strongly agree with the statement "Discussion with mathematics teacher is needed along with CAI."

Statement 52: Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.435 Responses of Exp Gp A students in percentage for statement 52 for Final Try-out

Points	Exp Gp A
5	29.03
4	38.71
3	22.58
2	3.23
1	6.45

29.03% of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

38.71% of the students agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

22.58% of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

3.23% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

6.45% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.436 Responses of Exp Gp B students in percentage for statement 52 for Final Try-out

Points	Exp Gp B
5	28.13
4	46.88
3	12.50
2	3.13
1	15.63

28.13% of the students strongly agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

46.88% of the students agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

12.50% of the students not decided with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

3.13% of the students disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

15.63% of the students strongly disagree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 52 in Percentage

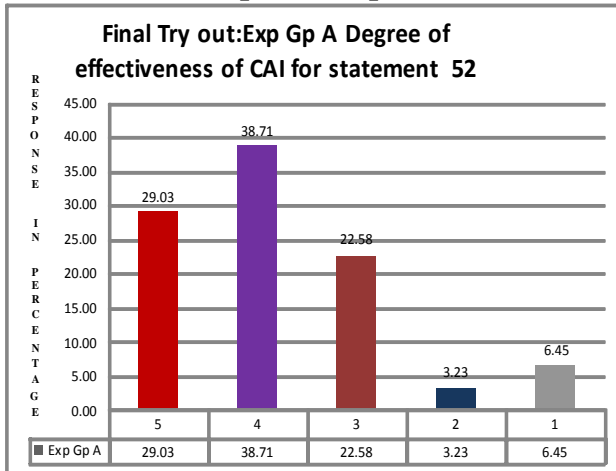


Figure 4.213 Graphical Representation of analysis of statement 52 in Percentage for Exp Gp A for Final Try-out

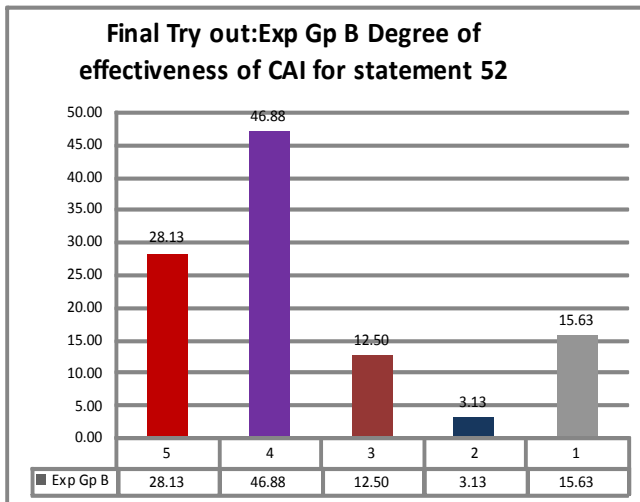


Figure 4.214 Graphical Representation of analysis of statement 52 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.437 Chi Square Table for Exp Gp A for Statement 52 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	6.2
4	12	6.2
3	7	6.2
2	1	6.2
1	2	6.2

Expected Frequency = Sum of observed frequencies/5

chi-square = 14

degrees of freedom = 4

probability = 0.0073

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.”

Experimental Group B

Table 4.438 Chi Square Table for Exp Gp B for Statement 52 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	9	6.8
4	15	6.8
3	4	6.8
2	1	6.8
5	5	6.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 17.1765

degrees of freedom = 4

probability = 0.00179

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the most of the students agree with the statement “Evaluation done at the end of the topic profit and loss is suitable

measure to know my understanding about that topic.”

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.439 Responses of Exp Gp A students in percentage for statement 53 for Final Try-out

Points	Exp Gp A
5	22.58
4	38.71
3	25.81
2	3.23
1	3.23

22.58% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

38.71% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

25.81% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

3.23% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

3.23% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.440 Responses of Exp Gp B students in percentage for statement 53 for Final Try-out

Points	Exp Gp B
5	18.75
4	50.00
3	12.50
2	3.13
1	18.75

18.75% of the students strongly agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

50.00% of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

12.50% of the students not decided with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

3.13% of the students disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

18.75% of the students strongly disagree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 53 in Percentage

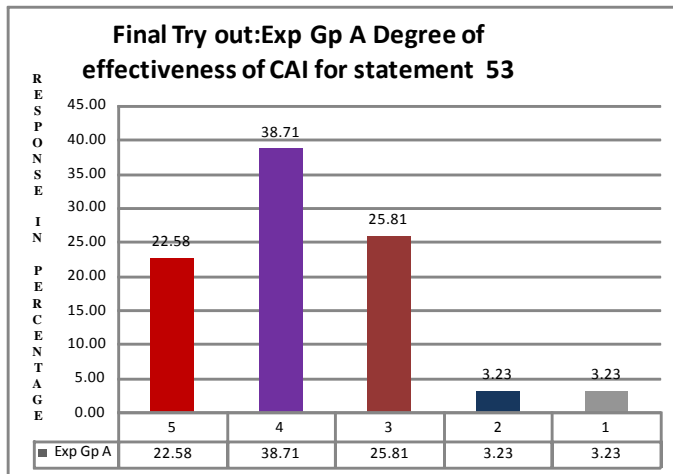


Figure 4.215 Graphical Representation of analysis of statement 53 in Percentage for Exp Gp A for Final Try-out

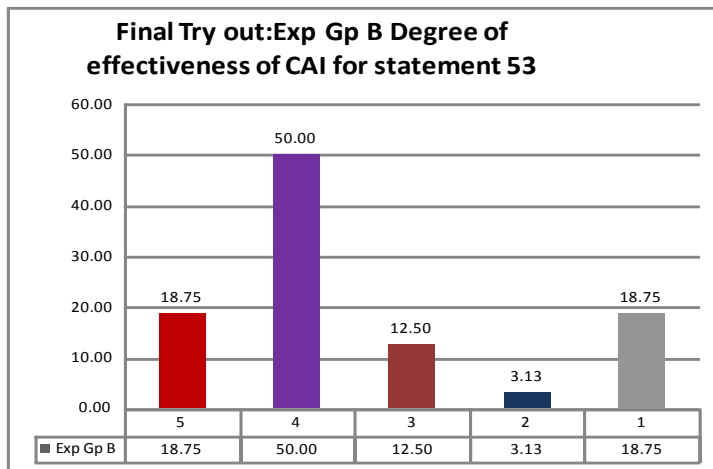


Figure 4.216 Graphical Representation of analysis of statement 53 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.441 Chi Square Table for Exp Gp A for Statement 53 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	12	5.8
3	8	5.8
2	1	5.8
1	1	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 15.6552

degrees of freedom = 4

probability = 0.00352

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to know my understanding about that topic.”

Experimental Group B

Table 4.442 Chi Square Table for Exp Gp B for Statement 53 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	6	6.6
4	16	6.6
3	4	6.6
2	1	6.6
1	6	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 19.2727

degrees of freedom = 4

probability = 0.00069

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation done at the end of the topic “simple interest” is suitable measure to

know my understanding about that topic.”

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

Polarity: Positive

Experimental Group A : Responses of the students in percentage

Table 4.443 Responses of Exp Gp A students in percentage for statement 54 for Final Try-out

Points	Exp Gp A
5	22.58
4	45.16
3	16.13
2	3.23
1	6.45

22.58% of the students strongly agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

45.16% of the students agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

16.13% of the students not decided with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

3.23% of the students disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

6.45% of the students strongly disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

Experimental Group B : Responses of the students in percentage

Table 4.444 Responses of Exp Gp B students in percentage for statement 54 for Final Try-out

Points	Exp Gp B
5	15.63
4	37.50
3	15.63
2	3.13
1	31.25

15.63% of the students strongly agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

37.50% of the students agree with the statement “Evaluation done at the end of the topic compound

interest is suitable measure to know my understanding about that topic.”

15.63% of the students not decided with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

3.13% of the students disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

31.25% of the students strongly disagree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

Graphical Representation of analysis of statement 54 in Percentage

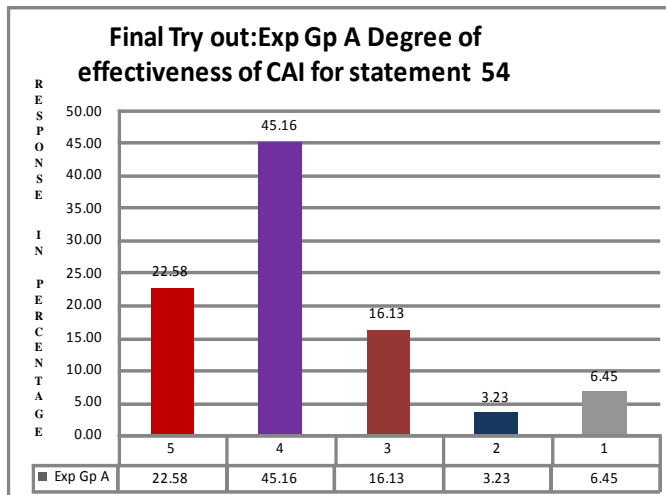


Figure 4.217 Graphical Representation of analysis of statement 54 in Percentage for Exp Gp A for Final Try-out

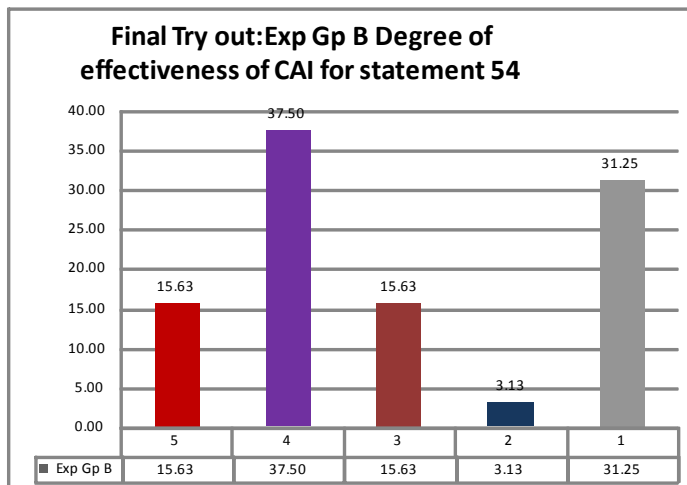


Figure 4.218 Graphical Representation of analysis of statement 54 in Percentage for Exp Gp B for Final Try-out

Data Analysis using Chi Square

H₀: Response is uniformly distributed in the 5 point scale

H₁: Response is not uniformly distributed in the 5 point scale

Experimental Group A

Table 4.445 Chi Square Table for Exp Gp A for Statement 54 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	7	5.8
4	14	5.8
3	5	5.8
2	1	5.8
1	2	5.8

Expected Frequency = Sum of observed frequencies/5

chi-square = 18.4138

degrees of freedom = 4

probability = 0.00102

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that reaction is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.”

Experimental Group B

Table 4.446 Chi Square Table for Exp Gp B for Statement 54 for Final Try-out

Points	Observed Frequency	Expected Frequency
5	5	6.6
4	12	6.6
3	5	6.6
2	1	6.6
1	10	6.6

Expected Frequency = Sum of observed frequencies/5

chi-square = 11.697

degrees of freedom = 4

probability = 0.01975

Table value of Chi Square at 4df at .05 significance level is 9.49. Calculated value of Chi Square is more than the table value therefore, Null hypothesis is rejected. This revealed that response is not uniformly distributed in the 5-point scale. More load is on agree therefore most of the students agree with the statement “Evaluation done at the end of the topic compound interest is suitable measure to

know my understanding about that topic.”

4.12 Comprehensive Analysis of Reaction Scale for Final Try-out

Data analysis of responses of Group A is presented through table 4.447 while that of Group B is presented through table 4.448.

Tabulated Value of χ^2 at 4 df at .05 level is 9.49.

Table 4.447 Analysis of responses on Reaction Scale given by the Experimental Group A for Final Try-out

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	14.62	Yes	Positive Side
2	I like illustrations given in the slides, which actually made me learn the lesson.	51.52	Yes	Positive Side
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	8.07	No	-
4	CAI is effective way of presentation because there is little stress in learning situation.	13.93	Yes	Neutral
5	I can learn with my own speed.	22.33	Yes	Positive
6	I can immediately test myself because there is lot of practice exercise.	23.24	Yes	Positive
7	This method is having more freedom to learn.	21.67	Yes	Positive
8	CAI didn't focus on more freedom situation.	5.31	No	
9	Learning mathematics is fun in this CAI method.	21.86	Yes	Positive
10	This method is not good in learning mathematics because my doubts are not cleared.	3.67	No	
11	In CAI I can teach myself (self-study) without the help of others.	5.31	No	
12	Matter presented in CAI is not very clear.	11.33	Yes	Positive
13	CAI is easy to understand.	14.62	Yes	Positive
14	Animations are distracting in understanding the concept.	5.92	No	

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
15	CAI took more time to understand the concept than usual classroom teaching.	7.33	No	
16	Illustrations given in CAI are enough to understand the concept clearly.	10.67	Yes	Positive
17	Matter presented in CAI was logically arranged.	21	Yes	Positive
18	Learning through CAI was waste of time.	19.00	Yes	Positive
19	Illustrations given in CAI are related to day today life experiences.	24.00	Yes	Positive
20	Classroom teaching is more enjoyable.	17.00	Yes	Negative
21	The language used in CAI is easy and simple to understand.	19.79	Yes	Positive
22	The exercises given in each chapter is adequate.	20.19	Yes	Positive
23	CAI takes care of previous knowledge in the subject.	12.33	Yes	Positive
24	The solution to the problem is not easy to understand.	3.03	No	
25	The exercises helped in understanding the chapter in depth.	14.00	Yes	Positive
26	Solutions didn't help me whenever I was not able to solve the problem.	8.76	No	
27	Break given in CAI helped me to refresh my mind.	6.34	No	
28	I am feeling tired while going through the slide.	1.17	No	
29	Animation shown in CAI is appropriate to help me in understanding the concept.	14.62	Yes	Positive
30	Topic is not introduced properly.	14.97	Yes	Positive
31	CAI does not take care of previous knowledge (percentage) needed to understand the present concept.	10.83	Yes	Positive
32	Enough revision is not done in CAI after the topic simple interest.	10.81	Yes	Positive
33	Enough revision is not done in CAI after the topic compound interest.	5.33	No	
34	Enough revision is not done in CAI after the topic profit and loss.	6.67	No	
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	3.93	No	

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
36	I have to read the slide many times to understand what is being said as there was no clarity.	2.89	No	
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	6.00	No	
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	11.00	Yes	Positive
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	13.94	Yes	Equal P+ Equal N
40	CAI is not enough in understanding the concept very clearly.	9.00	No	
41	Independent learning is not possible through CAI.	5.31	No	
42	Evaluation is done objectively (objective questions) so no partiality is involved in scoring.	7.38	No	
43	Evaluation done at the end of the topic "simple interest" is not suitable measure to know my understanding about that topic.	9.80	Yes	Neutral
44	Instruction given in each slide of CAI is easy and clear to follow.	19.10	Yes	Positive
45	Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.	7.72	No	
46	Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).	6.69	No	
47	To get the correct answer I had to go back to the slide/s many times for topic simple interest.	8.07	No	
48	To get the correct answer I had to go back to the slide/s many times for topic Compound interest.	4.62	No	
49	To get the correct answer I had to go back to the slide/s many times for topic profit and loss.	10.83	Yes	Positive
50	Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.	9.67	Yes	Positive
51	Discussion with mathematics teacher is needed along with CAI.	9.45	No	
52	Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.	14.00	Yes	Positive
53	Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.	15.6	Yes	Positive

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
54	Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.	18.41	Yes	Positive

Experimental Group B:Data were analysed through the statistical technique χ^2 . Tabulated Value of χ^2 at 4 df at .05 level is 9.49.

Table 4.448 Analysis of responses on Reaction Scale given by the Experimental Group B for Final Try-out

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	16.29	Yes	Positive Side
2	I like illustrations given in the slides, which actually made me learn the lesson.	6.6	No	
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	6.85	No	
4	CAI is effective way of presentation because there is little stress in learning situation.	7.45	No	
5	I can learn with my own speed.	11.39	Yes	Positive
6	I can immediately test myself because there is lot of practice exercise.	16.54	Yes	Positive
7	This method is having more freedom to learn.	8.65		
8	CAI didn't focus on more freedom situation.	15.33	Yes	Positive
9	Learning mathematics is fun in this CAI method.	11.69	Yes	Positive
10	This method is not good in learning mathematics because my doubts are not cleared.	8.06	No	
11	In CAI I can teach myself (self-study) without the help of others.	14.72	Yes	Positive
12	Matter presented in CAI is not very clear.	6.24	No	
13	CAI is easy to understand.	13.82	Yes	Positive
14	Animations are distracting in understanding the concept.	26	Yes	Positive
15	CAI took more time to understand the concept than usual classroom teaching.	11.39	Yes	Negative
16	Illustrations given in CAI are enough to understand the concept clearly.	8.06	No	
17	Matter presented in CAI was logically arranged.	15.63	Yes	Positive
18	Learning through CAI was waste of time.	15.64	Yes	Positive
19	Illustrations given in CAI are related to day today life experiences.	16.44	Yes	Positive
20	Classroom teaching is more enjoyable.	3.52	No	
21	The language used in CAI is easy and simple to understand.	17.15	Yes	Positive
22	The exercises given in each chapter is adequate.	10.18	Yes	Positive
23	CAI takes care of previous knowledge in the subject.	17.15	Yes	Positive
24	The solution to the problem is not easy to understand.	17.43	Yes	Positive
25	The exercises helped in understanding the chapter in depth.	8.17	No	
26	Solutions didn't help me whenever I was not able to solve the problem.	11.43	Yes	Positive
27	Break given in CAI helped me to refresh my mind.	5.94	No	

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
28	I am feeling tired while going through the slide.	14.12	Yes	Positive
29	Animation shown in CAI is appropriate to help me in understanding the concept.	2.60	No	
30	Topic is not introduced properly.	11.09	Yes	Positive
31	CAI does not take care of previous knowledge (percentage) needed to understand the present concept.	9.27	No	
32	Enough revision is not done in CAI after the topic simple interest.	11.59	Yes	Positive
33	Enough revision is not done in CAI after the topic compound interest.	5.31	No	
34	Enough revision is not done in CAI after the topic profit and loss.	5.94	No	
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	16.44	Yes	Negative
36	I have to read the slide many times to understand what is being said as there was no clarity.	13.65	Yes	Positive
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	15.50	Yes	Positive
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	13.52	Yes	Positive
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	5.33	No	
40	CAI is not enough in understanding the concept very clearly.	3.82	No	
41	Independent learning is not possible through CAI.	28.97	Yes	Positive
42	Evaluation is done objectively (objective questions) so no partiality is involved in scoring.	14.73	Yes	Positive
43	Evaluation done at the end of the topic "simple interest" is not suitable measure to know my understanding about that topic.	6.85	No	
44	Instruction given in each slide of CAI is easy and clear to follow.	12.60	Yes	Positive
45	Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.	3.21	No	
46	Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).	12.91	Yes	Negative
47	To get the correct answer I had to go back to the slide/s many times for topic simple interest.	15.94	Yes	Positive
48	To get the correct answer I had to go back to the slide/s many times for topic Compound interest.	8.94	No	
49	To get the correct answer I had to go back to the slide/s many times for topic profit and loss.	11.59	Yes	Positive
50	Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.	25.71	Yes	Positive
51	Discussion with mathematics teacher is needed along with CAI.	25.5	Yes	Negative
52	Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.	17.18	Yes	Positive
53	Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.	19.27	Yes	Positive
54	Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.	11.69	Yes	Positive

4.13 Findings from the Analysis of Reaction Scale for Final Try-out Experimental Group A

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *twenty seven* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was significant difference between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *twenty four* statements were not found to be significant at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *two* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was significant difference between the observed and expected frequencies and the students were found to have neutral attitude towards the statements carrying such higher values.

The computed chi-square values of *one* statement was found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was significant difference between the observed and expected frequencies and equal number of students were found to have positive reaction as well as equal number of negative reaction towards the statement.

Experimental Group B

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *thirty one* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was significant difference between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *nineteen* statements were not found to be significant at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *four* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was significant difference between the observed and expected frequencies and the students were found to have negative attitude towards the statements carrying such higher values.

4.14 Interpretation of Results

4.14.1 Interpretation of ANOVA Result for Initial Try-out

It was found that there was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Control Group (Conventional Method) therefore the hypothesis “There will be no significant difference in the achievement scores of group C students and group A students” is not rejected. We can conclude that students learnt equally well in conventional method and only CAI, CAI is as effective as conventional method. We can also safely say that CAI can be used as a substitution for conventional learning wherever and whenever necessary.

The findings “there was significant difference between the mean achievement score of Experimental Group B (CAI with simultaneous discussion) and the Control Group (Conventional Method)” suggest that the hypothesis “there will be no significant difference in the achievement scores of group C students and group B students” is rejected. Also mean achievement score of students in Experimental Group B (CAI with simultaneous discussion) is found more than the mean achievement score of the Control Group (Conventional Method), therefore it implies that CAI with simultaneous discussion is more effective than the conventional method. Thus, it follows that CAI should be developed in the topics wherever students find it difficult to understand in the conventional classroom teaching and should be supported with discussion wherever and whenever necessary. CAI helps the students in in-depth understanding of the topics and enhances the learning. Thus it can be concluded that CAI along with simultaneous discussion is one of the effective tools in teaching and learning, makes learning interesting and with fewer burdens.

The findings “there was significant difference between the mean achievement score of Experimental Group A (only CAI) and the Experimental Group B (CAI with simultaneous discussion)” suggests that the hypothesis “there will be no significant difference in the achievement scores of group A students and group B students” is rejected. Therefore we can conclude that students need teacher’s help along with CAI for in-depth understanding of the topic through discussion whenever and wherever required by the students while they are using CAI.

4.14.2 Interpretation of ANOVA Result for Final Try-out

It was found that there was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Control Group (Conventional Method) therefore the hypothesis “There will be no significant difference in the achievement scores of group C students and group A students” is not rejected. We can conclude that students learnt equally well in conventional method and only CAI, CAI is as effective as conventional method. We can also safely say that CAI can be used as a substitution for conventional learning.

The findings “there was significant difference between the mean achievement score of Experimental Group B (CAI with simultaneous discussion) and the Control Group (Conventional Method)” suggest that the hypothesis “there will be no significant difference in the achievement scores of group C students and group B students” is rejected. Mean achievement score of students in Experimental Group B (CAI with simultaneous discussion) is more than the mean achievement score of the Control Group (Conventional Method), therefore CAI with simultaneous discussion is more effective than the conventional method. CAI should be developed in the topics wherever students find it difficult to understand in the usual conventional classroom teaching. CAI helps the students in in-depth understanding of the topics and enhances the learning. CAI is one of the effective tools in teaching and learning, makes learning interesting and with fewer burdens.

The findings there was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Experimental Group B (CAI with simultaneous discussion) suggests that the hypothesis “there will be no significant difference in the achievement scores of group A students and group B students” is not rejected. Learning through only CAI is as effective as the CAI with simultaneous discussion. Students of the final try-outs were quite smarter than the initial try-out students so the results were different for both the try-outs. Presence or absence of teacher along with learning through CAI depends upon the entry level of students.

4.14.3 Interpretation of Result of Reaction Scale

Findings from the analysis of reaction scale for initial try-out for experimental group A indicate that out of fifty four statements the computed chi-square values of twenty six statements were found to have statistically significant higher values than the tabulated value and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values. That is, for more than 50% of the statements they responded positively.

Findings from the analysis of reaction scale for initial try-out for experimental group B indicate that out of total fifty four statements the computed chi-square values of twenty five statements were found to have statistically significant higher values than the tabulated value and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values. That is, for exactly 50% of the statements they responded positively.

Findings from the analysis of reaction scale for final try-out for experimental group A indicate that out of fifty four statements the computed chi-square values of twenty seven statements were found to have statistically significant higher values than the tabulated value and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values. That is, for more than 50% of the statements they responded positively.

Findings from the analysis of reaction scale for final try-out for experimental group B indicate that out of fifty four statements the computed chi-square values of thirty one statements were found to have statistically significant higher values than the tabulated value and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values. That is, for more than 50% of the statements they responded positively.

From the above paragraphs we can conclude that students liked learning mathematics through CAI and investigator observed that the students liked the concept of CAI and enjoyed while learning. They also requested investigator to develop CAI in some of the topics of mathematics which they found difficult to learn. We can conclude that CAI is one of the effective method to learn mathematics.

4.15 Discussion

After analysing and interpreting the obtained data in both the initial and final try-out, the investigator found that there is a significant gain in terms of achievement of the students who learnt mathematics through CAI with simultaneous discussion. Responses in the reaction scale was positive, students liked both the modes of teaching that is only CAI and CAI with simultaneous

discussion. Majority of students enjoyed learning through CAI and even suggested to prepare CAI in other topics too. Students were actively involved in learning process. Contents were presented in variety of ways so they enjoyed learning. Visual images helped the students to understand content with ease. Variety of exercises helped students to be actively involved in the learning process. These facts are elaborated in the following paragraphs. The findings of the studies conducted in mathematics by the following researchers Singh, Ahluwalia, and Verma (1991), Rose Antony Stella, V. (1992), Singh (1992), Vansia (2011), Vaisopha (1999), Rosales (2005), Pilli (2008), Jackson and Dave (2011), Bayturan and Kesan (2012) also revealed that there was significant difference between the learning of mathematics through CAI and conventional teaching. Therefore we can conclude that CAI is one of the effective methods in learning mathematics. Thus CAI can be used along with the usual conventional class room teaching to make teaching very effective, interesting and develop a deeper understanding of the subject. CAI helps students to understand different concepts thoroughly. There is a need to develop CAI in different topics of mathematics for class VIII mathematics textbook and also for all levels of mathematics at primary school level. More researches should be conducted to know the effectiveness of CAI in different topics of mathematics and at different levels.

Students of schools selected for initial try-out and final try-out had many differences between them like entry level knowledge, level of understanding, facilities available in the school, nature of students, inclination towards mathematics, grasping power, attachment towards their teacher, boldness etc. Final try-out students had more positive orientation towards the above stated matter than initial try-out students.

The school selected for final try-out had good computer facility than initial try-out and if at all there was any problem it was taken care of immediately. The Principal of final try-out school asked several questions to the investigator like full programme schedule, content to be taught, every day programme, brief description about developed CAI, and result about initial try-out. She insisted that week end test should be taken for all the selected groups and result should be reported to the class teacher then and there. She also arranged a meeting with the supervisor, mathematics teachers and class teacher of the selected groups. Meetings were arranged every week end to discuss about the progress made by the students. Investigator activity and students activity was continuously monitored. School was well managed, organised and everything went on according to pre plan.

Planning, implementation and monitoring was done perfectly. This fact is reflected in students also who were found to be bright, intelligent, active, disciplined and well mannered.

Whereas in the initial try-out the scenario was very different in the sense that investigator was not asked several questions and full freedom was given to the investigator to conduct the experiment. Principal was open towards the new method and absolutely no monitoring was done throughout the experiment. Investigator arranged meeting with the class teacher, mathematics teacher and computer teacher about the time table, content to be taught, purpose of the programme, full programme schedule and about the material developed. Most of the students were naughty, had low level of understanding but were very active. Students discussed with the investigator freely and expressed their feelings without fear. They gave many suggestions to improve CAI and even suggested to include some plays in CAI. Students wrote some plays to include in CAI and they drew some cartoon for the play. Investigator was very much impressed by the gesture of students. Most of the students possessed creativity and expressed their feelings freely.

Investigator also observed that knowledge of the mathematics teacher and their dedication in teaching made lot of difference in students understanding level, love of subject and perception about classroom teaching. In initial try-out students enjoyed CAI and showed enthusiasm throughout the programme. Investigator made some changes in the CAI like inclusion of video, some corrections in the slide as suggested by the students of initial try-out. Because of this change made in CAI enthusiasm of students was sustained throughout the programme in final try-out.

One area of difficulty that the investigator faced was students started surfing other sites and playing games when unmonitored especially this behaviour was exhibited by initial try-out students. Investigator was vigilant throughout the programme. This behaviour can be easily controlled by inculcating self-discipline in students. CAI should not be used for all subjects simultaneously because sitting near the computer for long time is not good for the students and may result in stress to eyes.

In both the try-outs students learnt through the developed CAI only for thirty periods and only certain topics were covered so the result cannot be generalized for all the topics of mathematics at this level. In order to generalize the result, CAI should be developed in all the topics of class VIII mathematics and students should learn mathematics through CAI throughout the year.

4.16 Conclusion

Knowledge of mathematics plays an important role in student's preparation for all competitive exams and job prospects. The findings suggest that CAI motivates the students to learn mathematics, removes fear of mathematics and provides a clear presentation of the subject based on the needs of the students.

In both the tryouts it was found that CAI was as effective as conventional method therefore it can be concluded that CAI can be used as substitution for conventional method wherever and whenever necessary. In both the tryouts it was found that CAI with simultaneous discussion was effective than the conventional method therefore it can be concluded that CAI should be developed in mathematics at primary school level in the topics students find it difficult to learn in the classroom teaching and can be used along with the conventional method. In Initial Tryout CAI with simultaneous discussion was effective than the only CAI and in Final Tryout CAI with simultaneous discussion was as effective as only CAI. The students in the Final Tryout was intelligent and computer savvy than the Initial Tryouts therefore it can be concluded that the need for presence of teacher depends upon the entry level of students.

It can be concluded that CAI along with simultaneous discussion increases the achievement of the students; their understanding of the subject is also increased, and therefore will give good result. Thus CAI can be used along with the conventional classroom teaching to make teaching very effective, interesting and develop a deeper understanding of the subject. There is a need to develop CAI in mathematics for all topics at primary school level.

The overall reaction of the students towards the CAI was found positive. Majority of the students perceived that learning through CAI was quite interesting and motivated them to learn further. The fact that students can learn mathematics themselves without the help of others developed a sense of self-esteem and self-confidence amongst the learners.

4.17 Implications for the Present Study

Students use computers for many purpose especially playing games. This inclination of students towards computers can be used for constructive purpose. They can be used to teach school subjects, especially mathematics, where most of the students are weak and also dislike the subject. CAI can be developed in mathematics and some games using the concept of mathematics can be included to make learning more interesting and to sustain enthusiasm throughout learning. Learning becomes an enjoyable experience as compared to blackboard teaching which could get rather boring. Students

become active learners rather than passive learners as in the case of usual conventional learning. Psychological theories can be extensively used, more visual images can be included using computer experts and large scale materials can be developed. Many educators, psychologists, computer experts can jointly develop such materials which can help students to sustain interest throughout learning process especially in an abstract subject like mathematics.

4.18 Suggestions for Further Scope of the Study

The present study may bring new area to be studied by the future researchers. The content which was not covered by the present study can be taken up for further study. CAI can be developed in other subjects too. Most of the schools have computer facility and this facility can be used to learn other subjects. CAI should be developed in other topics of class VIII mathematics textbook. CAI should be developed in other subjects of class VIII mathematics textbook. CAI should be developed for higher secondary mathematics text book. CAI should be developed with the help of new emerging software or computer language. A study should be conducted with variables other than those that were not covered in the present study. CAI should be developed with facility of on line discussion with the students. An in-depth and comprehensive study should be conducted using qualitative and quantitative techniques, more data should be collected in all possible data collection techniques and accordingly data analysis should be performed to draw conclusions. Spoken tutorials can be developed using Camp studio software and effectiveness of the developed programme can be found out.

CHAPTER –V SUMMARY

5.01 Introduction

Education has always been important but perhaps, never more so, in man's history than today. In a science based world, education and research are crucial to the development process of a country, its welfare, progress and security" (Education Commission 1964-66)

This statement is more relevant even after forty seven years in today's world of knowledge explosion but rather increased. Education is a process of overall development of man. Education was given primary importance right from the Vedic period. During that period the Guru used to impart knowledge and mathematics was given due importance, for example Astronomy and Astrology use mathematics. In Vedas it is clearly stated that only through education one can reach the ultimate Reality (God). So, we acknowledge the importance of education. Education has capacity to convert the biological man to social man. 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. Education is also viewed as investment and this investment is considered as most vital by all nations. The Education commission states, "The destiny of the nation is being shaped in its classrooms".

Ravindra (2006), "Ours and previous few generations have failed to produce good mathematics teachers at school level in adequately large numbers." 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. This is so since teaching mathematics to impressionable young minds is a specialised task that many mathematicians may not measure. Mathematics is a hard task master that demands implicit and whole attention from the disciple. 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.

5.02 Rationale of the Study

Mathematics is an important subject to be learnt at school level. The National Curriculum Framework for School Education-2000 (NCFSE-2000) reiterates importance of mathematics education as visualized in NPE- 1986. According to NCFSE-2000. One of the basic aims of teaching mathematics in schools is to inculcate the skills of quantification of experiences around the learners who in turn carryout experiments with numbers and forms of geometry; frame hypothesis and verify them; generalize the findings with proof; make decisions applying mathematics; develop precision, rational and analytical thinking, reasoning, competence to solve problems, positive attitudes and aesthetic sense. There is huge gap between prescription and practice of a mathematical curriculum. Most of the time of the classrooms of mathematics is preoccupied with routine teaching and not much time is devoted to learning of mathematics. Hardly a student asks questions in a mathematics classroom implying that the learning rarely takes place in the classrooms. The teacher education colleges in India prepare the mathematics teachers at secondary level and unfortunately some of the teacher educating colleges doesn't have teacher educators who studied mathematics as a subject at degree level or have experience of teaching mathematics at school level. Many of the mathematics teachers do not distinguish between teaching of mathematics and teaching of say, English. Ravindra (2006) in his report on the sixth survey of research in Education states that, "Many of the teachers at secondary level do not understand mathematics well as is evident from the fact that more than 90% in in-service programmes conducted for teachers at Regional Institute of Education, Bhopal and Mysore during 1998-2000 did not answer correctly questions like the following:

- i) Why is it that the product of two negative numbers is positive?
- ii) What is the number after $\frac{1}{2}$?
- iii) Why cannot addition replace multiplication?"

We can imagine about students difficulties if such teachers teach mathematics. Kapoor(1997) stated that, " Quality of research is good, but quantity is poor. In Mathematics education both research and development should go together and it was time that the utilization of

research should be considered as important as research.” Developmental research is important in two ways. First it increases the applicability of educational practices in specific situations, and secondly in generating better insight into the instructional process.

The language of mathematics is difficult to comprehend for many students (because of less verbosity and more symbols). Chel(1990), “Underachievement was due to lack of understanding of mathematics concepts of earlier stages. Thus, weaknesses of students in mathematics at lower stage also hinder their progress in learning mathematics at higher stage. The causes found responsible for underachievement were gaps in knowledge of concepts, difficulties in understanding of mathematics language, lack of openness and flexibility in teaching, difficulty in mathematisation of verbal problems and interpretation of mathematical results, the abstract nature of mathematics, fear and anxiety on the part of the students.” Sashidharan (1992), “the initial deficiencies have a long term damaging effect because the content of education is organized in such a way that learning in each class is depend on prior learning. Weakness of students in mathematics can be major factors, which cause the gap between the expected achievement and actual achievement in mathematics. This hinders to achieve desirable outcomes in the instruction process of mathematics.” Students in secondary school require an education in mathematics that goes beyond what was needed by students in the past. Learning mathematics demands practice. One can learn mathematics in an easy way if the subject is presented in a systematic manner, especially for slow learners who cannot cope up with classroom teaching. If for some reason or other they have not learnt the previous class mathematics thoroughly, it is obvious that they cannot learn the next class mathematics. For example a student who scored 35% in class VII is promoted to class VIII. Since he scored pass mark he was promoted to the next class but he may not have been thorough in all the chapters of class VII mathematics textbook. So in class VIII he finds difficult to learn mathematics. Consider a situation where a student is absent for 3 to 4 days to school due to some reason or other. He cannot understand the next class, as he finds it difficult to comprehend because there is a break in continuity. In another case, mathematics teacher may not be presenting the subject in an interesting manner so students find it difficult to understand. The teaching style of the teacher may not match the learning style of the student. In many Schools it is seen that teachers are constantly changing in an academic year. In the same year students may face two to three mathematics teachers and so they find it difficult to cope up with the subject, especially subjects like mathematics. Moreover classes are overcrowded and teachers have less face-to-face contact with the students.

Apart from being taught in school, students get guidance from their parents. Many parents find it difficult to teach higher mathematics, so they cannot guide their wards. In some cases they cannot get help from their parents perhaps because they are occupied with their own work. Nowadays trend has changed, students are going to tuition classes and sometimes they use books such as guides. This shows that formal classroom system is not sufficient to guide them and they cannot learn by self-efforts. Many a times teacher adopts a mechanical method rather than interesting method of teaching. Parents remark that they spend so much money for school fees and also for tuition classes but in spite of that their ward has failed or scored less than expected. In this scenario CAI plays an important role in helping students learn mathematics without stress, so that students become independent and they can learn by themselves, at their own pace.

Knowledge of mathematics plays an important role in student's preparation for all competitive exams and job prospects. Vaisopha (1999) study revealed that students were satisfied and appreciated the CAI program. But study was conducted on V grade students. Rosales (2005) conducted a study on CAI for IX grade students and found that no significant difference between control group students and experimental group students. But the subjects were non-exempted ninth grade students from two schools paired by ethnicity and percentage of socio-economically disadvantaged.

As far as investigator's knowledge there are few studies in mathematics related to CAI and no study was conducted in mathematics using CAI with different modes (only CAI, CAI with discussion) and very few studies is done in the arithmetic unit so investigator wants to study the effectiveness of CAI with different modes.

There are many methods to teach and learn mathematics like Drill work, Assignment etc. CAI is one of the methods to learn mathematics; it is especially helpful to slow learners and gifted learners who can learn at their own pace. Thus CAI leads to a better appreciation and understanding of mathematics and thereby develops a sense of self-esteem and self-confidence among learners this would also help students to lessen their dependency on tuition classes will definitely encourage self-study and thereby encourage self-directed learning.

5.03 Statement of the Problem

Development and Implementation of Computer Assisted Instruction in Mathematics for Standard VIII Students

5.04 Objectives of the Study

- To develop the CAI in Mathematics for Standard VIII GSHSEB (Gujarat State Secondary and Higher Secondary Education Board) students.
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with one of the experimental groups of standard VIII students.
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with another experimental group of standard VIII students along with treatment of simultaneous discussion.
- To study the relative effectiveness of learning mathematics in class VIII among the three groups A, B and C (Where C is the control group and A and B are experimental groups) in terms of achievement of the students.
- To study the reaction of the students belonging to experimental groups about the mode of learning mathematics at the end of the experimentation.

5.05 Hypothesis

- There will be no significant difference in the achievement scores of group C students and group A students.
- There will be no significant difference in the achievement scores of group C students and group B students.
- There will be no significant difference in the achievement scores of group A students and group B students.

5.06 Explanation of Terms

- CAI with Discussion: The learners will learn arithmetic unit with the help of CAI along with the simultaneous discussion led by the investigator with students where ever and whenever needed.
- Reaction of Students: The belief of the students regarding the effectiveness of learning mode of arithmetic unit.

5.07 Operationalization of Terms

- CAI: For this study CAI means Computer Assisted Instruction, which will be a self-learning software package, developed by the investigator after observation of mathematics classroom to understand the student's ability, potential, grasping power and other learning behaviour.
- Achievement in Mathematics: The marks scored by each student in the test constructed by the investigator on the arithmetic unit will be the achievement of that student.
- Effectiveness: In the context of the present study effectiveness refers to relative increase in the scholastic achievement of the experimental group students compared to that of control group students and the reaction of experimental will be considered.

5.08 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 2009 was covered during experimentation of the present study.

5.09 Methodology of the Study

5.9.1 Design of the Study

The present study is experimental in nature. True experimental design was followed in this present study. The design was posttest-only control group design.

Initial Try out

Investigator collected VII standard mathematics scores of the students from school 1 and three matched groups were formed randomly according to comparable mean and standard deviation of their mathematics achievement, during this process different sections (section A, B and C) of the school were not disturbed. Groups A, B and C were randomly selected by using lottery method for experimental purpose. Section C of school 1 was selected as control group, which was taught by conventional method by schoolteacher. Section B of school 1 was selected as experimental group which learnt through only CAI and named as group A for the study purpose. Section A of school 1 was selected as experimental group, which learnt through CAI with simultaneous discussion and named as group B for the purpose of the study. After completion of CAI on profit and loss, simple interest and compound interest, they were tested by scholastic achievement test prepared by the investigator during phase III.

CAI was further modified according to the suggestions given by the students and observation by the investigator. Modified CAI was used for final try-out.

Final Try out

Three matched groups were formed randomly from VIII standard school 2 students according to comparable mean and standard deviation of their mathematics achievement test prepared by the investigator, during this process different sections (section A, B and C) of the school were not disturbed. Groups A, B and C were randomly selected by using lottery method for experimental purpose. Section B of school 2 was selected as control group which was taught by conventional method by schoolteacher. Section A of school 2 was selected as experimental group which learnt through only CAI and named as group A for the study purpose. Section C of school 2 was selected as experimental group which learnt through CAI with simultaneous discussion and named as group B for the purpose of the study. After completion of CAI on profit and loss, simple interest and compound interest, they were tested by scholastic achievement test prepared by the investigator during phase III.

5.9.2 Population of the Study

All students studying in Standard VIII English Medium school of GSHSEB was constituted the population.

5.9.3 Sample of the Study

VIII Standard students of two English medium school of Vadodara, following GSHSEB Syllabus, form the sample of the study. In order to select the school for sample, the researcher approached different English Medium Schools of Baroda, explaining and requesting the school authorities to grant permission for conducting study. In this case after approaching few schools, the researcher got permission from School 1 and School 2 having the required computer facility. Thus the selection of the schools for this study was done purposively considering the availability of computer facility and willingness of school to conduct the study.

5.10 Tools for Data Collection

Scholastic Achievement test (serving the purpose of post test). Achievement test was prepared by the investigator on the basis of content analysis. The test was validated by the experts. Reaction Scale was prepared by the investigator and was given to experts for their suggestions.

5.11 Data Analysis

Collected data were analysed through appropriate statistical techniques. To study the effectiveness of the developed CAI ANOVA was computed. Reaction Scale was analysed using Chi Square technique.

5.12 Major Findings

The analysis and interpretation of data in the previous paragraphs reveals the following major findings.

5.12.1 Findings from the Analysis of the ANOVA Result for Initial Try-out

Initial try out using inferential statistics ANOVA at .05 level of significance it was found that there was significant difference between the mean achievement score of Experimental Group A, Experimental Group B and the Control Group. Further using Tukey HSD Test it was found that

- i. There was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Control Group (Conventional Method).
- ii. There was significant difference between the mean achievement score of Experimental Group B (CAI with simultaneous discussion) and the Control Group (Conventional Method)
- iii. There was significant difference between the mean achievement score of Experimental Group A (only CAI) and the Experimental Group B (CAI with simultaneous discussion).

5.12.2 Findings from the Analysis of the ANOVA Result for Final Try-out

Final try out using inferential statistics ANOVA at .05 level of significance it was found that there was significant difference between the mean achievement score of Experimental Group A, Experimental Group B and the Control Group. Further using Tukey HSD Test it was found that

- i. There was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Control Group (Conventional Method).
- ii. There was significant difference between the mean achievement score of Experimental Group B (CAI with simultaneous discussion) and the Control Group (Conventional Method)
- iii. There was no significant difference between the mean achievement score of Experimental Group A (only CAI) and the Experimental Group B (CAI with simultaneous discussion).

5.12.3 Findings from Analysis of Reaction Scale for Initial Try-out **I. Experimental Group A**

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *twenty six* statements were found to have statistically significant *higher values*

than the tabulated value of chi-square at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *twenty four* statements were *not found to be significant* at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is *uniformly distributed* in the 5-point scale.

The computed chi-square values of remaining *four statements* were found to have statistically significant higher values than the chi-square table value at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have neutral attitude* towards the statements carrying such higher values.

II. Experimental Group B

Out of total *fifty four* statements bearing positive as well as negative nature, *the computed chi-square values of twenty five statements were found to have statistically significant higher values than the chi-square table values* at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *twenty four* statements were *not found to be significant* at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *five statements* were found to have *statistically significant higher values* than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have neutral attitude* towards the statements carrying such higher values.

5.12.4 Findings from Analysis of Reaction Scale for Final Try-out Experimental Group A

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *twenty seven* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was a *significant difference* between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *twenty four* statements were not found to be significant at 4 degrees of freedom and at .05 level of significance which shows that there was *no significant difference* between the observed frequency and expected frequency therefore *null hypothesis is not rejected*. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *two* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was a *significant difference* between the observed and expected frequencies and the students were found to have neutral attitude towards the statements carrying such higher values.

The computed chi-square values of *one* statement was found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was a *significant difference* between the observed and expected frequencies and equal number of students were found to have positive reaction as well as equal number of negative reaction towards the statement.

Experimental Group B

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *thirty one* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was *significant difference* between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *nineteen* statements were not found to be significant at 4 degrees of freedom and at .05 level of significance which shows that there was *no significant*

difference between the observed frequency and expected frequency therefore *null hypothesis is not rejected*. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *four* statements were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was *significant difference* between the observed and expected frequencies and the students were found to have negative attitude towards the statements carrying such higher values.

5.13 Conclusion

- In both the tryouts it was found that CAI was as effective as conventional method therefore it can be concluded that CAI can be used as substitution for conventional method wherever and whenever necessary.
- In both the tryouts it was found that CAI with simultaneous discussion was effective than the conventional method therefore it can be concluded that CAI should be developed in mathematics at primary school level in the topics students find it difficult to learn in the classroom teaching and can be used along with the conventional method.
- In Initial Tryout CAI with simultaneous discussion was effective than the only CAI and in Final Tryout CAI with simultaneous discussion was as effective as only CAI. The students in the Final Tryout was intelligent and computer savy than the Initial Tryouts therefore it can be concluded that the need for presence of teacher depends upon the entry level of students.
- The overall reaction of the experimental group students in both the tryouts was positive towards developed CAI therefore it can be concluded that students liked learning mathematics through CAI.

5.14 Suggestion

The present study may bring new area to be studied by the future researchers. The content which was not covered by the present study can be taken up for further study. CAI can be developed in other subjects too. Most of the schools have computer facility and this facility can be used to learn other subjects. CAI should be developed in other topics of class VIII mathematics textbook. CAI should be developed in other subjects of class VIII mathematics textbook. CAI should be developed for higher secondary mathematics text book. CAI should be developed with the help of new emerging software or computer language. A study should be conducted with variables other than those that were not covered in the present study. CAI should be developed with facility of on line

discussion with the students. An in-depth and comprehensive study should be conducted using qualitative and quantitative techniques, more data should be collected in all possible data collection techniques and accordingly data analysis should be performed to draw conclusions. Spoken tutorials can be developed using Camp studio software and effectiveness of the developed programme can be found out.

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APPENDICES

Appendix 1 Content Analysis

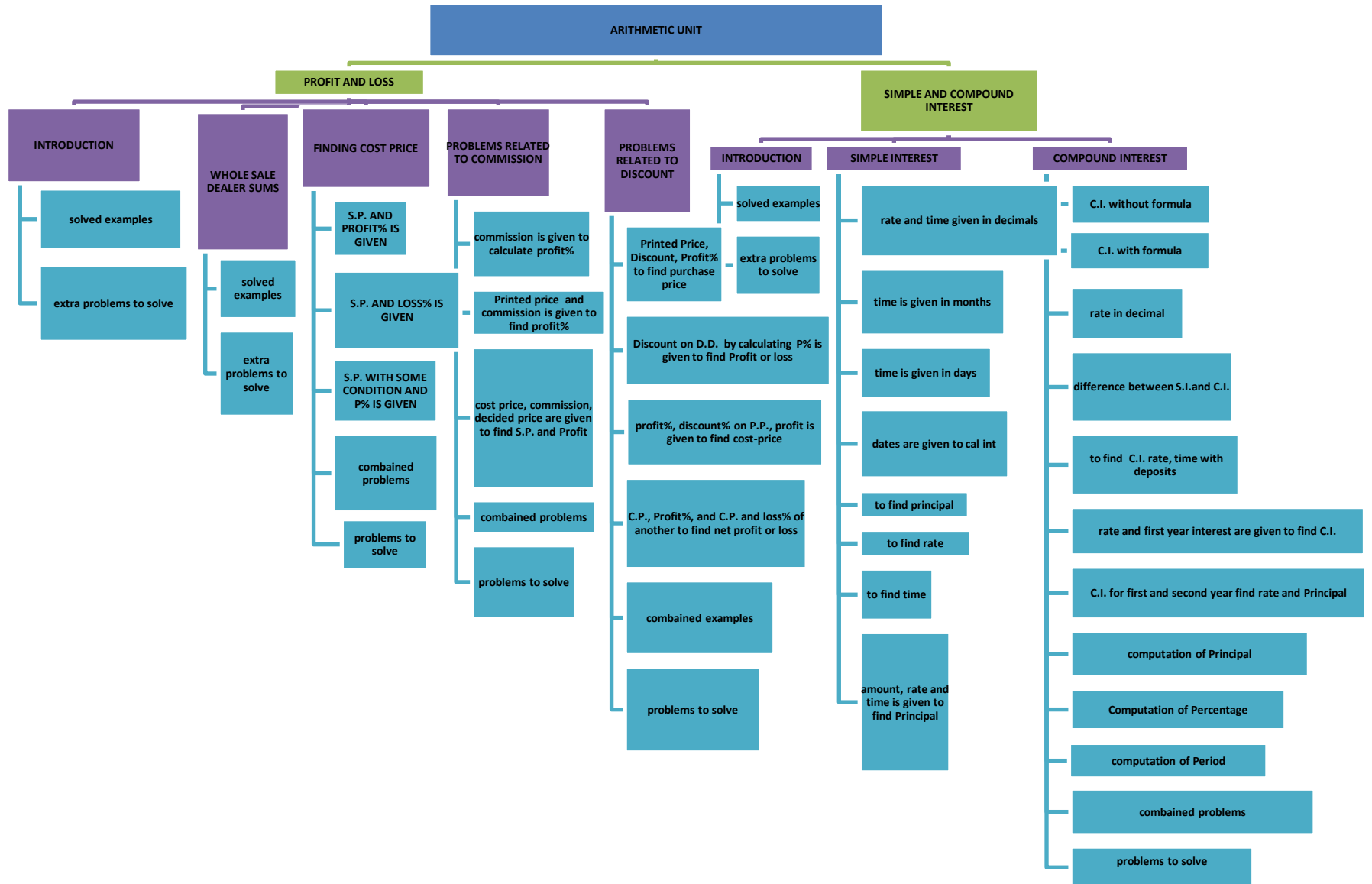
ARITHMETIC UNIT

- Profit And Loss
 - INTRODUCTION
 - solved examples
 - extra problems to solve
 - WHOLE SALE DEALER SUMS
 - solved examples
 - extra problems to solve
 - FINDING COST PRICE
 - S.P. AND PROFIT% IS GIVEN
 - S.P. AND LOSS% IS GIVEN
 - S.P. WITH SOME CONDITION AND P% IS GIVEN
 - combined problems
 - problems to solve
 - PROBLEMS RELATED TO COMMISSION
 - commission is given to calculate profit%
 - Printed price and commission is given to find profit%
 - cost price, commission, decided price are given to find S.P. and Profit
 - combined problems


- problems to solve
- PROBLEMS RELATED TO DISCOUNT
 - Printed Price, Discount, Profit% to find purchase price
 - Discount on D.D. by calculating P% is given to find Profit or loss
 - profit%, discount% on P.P., profit is given to find cost-price
 - C.P., Profit%, and C.P. and loss% of another to find net profit or loss
 - combined examples
 - problems to solve
- SIMPLE AND COMPOUND INTEREST
 - Introduction
 - solved examples
 - extra problems to solve
 - SIMPLE INTEREST
 - rate and time given in decimals
 - time is given in months
 - time is given in days
 - dates are given to calculate interest
 - to find principal
 - to find rate
 - to find time
 - amount, rate and time is given to find Principal

- COMPOUND INTEREST
 - C.I. without formula
 - C.I. with formula
 - rate in decimal
 - Difference between S.I. and C.I.
 - to find C.I. rate, time with deposits
 - Rate and first year interest are given to find C.I.
 - C.I. for first and second year find rate and Principal
 - computation of Principal
 - Computation of Percentage
 - computation of Period
 - combined problems
 - problems to solve

Flow Chart of Content Analysis




Appendix 2 Sanction Letter for Data Collection



Gujarat Public School™

(Residential)



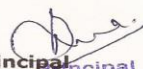
B.R.G. Estate, Nr. Kaloli-Atladara Railway Crossing off old Padra Road, Vadodara-12. Ph. : 0265 - 2680215 Telefax : 0265-2680696

To, Date: 30/11/10
 Pramila Gururajan,
 PhD Student,
 M.S.U. Baroda.

Sub : Permission to Pramila Gururajan for conducting Experiment in our school.

Dear Pramila,

With reference to your letter dated **25/08/10**, we take pleasure in granting you permission for conducting the experiment entitled. "Development and Implementation of Computer Assisted Instruction in Mathematics for Std. VIII." The experiment should be conducted from **1st December 2010 to 31st December 2010**. Please ensure that you facilitate learning for the students of Std. VIII and abide by the rules and regulations of the school.



Principal
Ms. Beena Prashant
 B.R.G. Estate,
 Near Kaloli-Atladara Railway Crossing
 Off. Old Padra Road, Vadodara



St. Kabir School
VADODARA

Vasna Road, Vadodara - 390 015.
Phone: 91-265-2253377

S.S.C. Index No. 65.455
H.S.C. Index No. 15.221

From
St. Kabir School
Vasna
Baroda

To

Pramila Gururajan
Phd Student
MSU

Dear Pramila,

Sub: Permission to Pramila Gururajan for conducting Experiment in our school-m/r

With reference to your letter dated 25/08/10- we take pleasure in granting you permission for conducting the experiment entitled, "Development and Implementation of Computer Assisted Instruction in Mathematics for std VIII. The experiment should be conducted from 17th Jan to 4th Feb. Please ensure that you facilitate learning for the students of std VIII and abide by the rules and regulations of the school.

With best wishes,

Place: Vadodara

Date: 11/01/11

Principal Incharge
St. Kabir School

Swati Khot
Principal Incharge

Swati Khot

Appendix 3 Tools for the Present Study**POST TEST**

Name of the school:

Name of the student and Roll no.:

Class and section:

Date:

Maximum time: 60 min

1. By selling an umbrella for Rs. 30, a shopkeeper gains 20%. During a clearance sale, the shopkeeper allows a discount of 10% of the marked price, his gain percent during the sale season is
(a) 7 (b) 7.5 (c) 8 (d) 9
 2. A shopkeeper allows a discount of 10% on the marked price of an item but charges a sales tax of 8% on the discounted price. If the customer pays Rs. 680.40 as the price including the sales tax, what is the marked price of the item?
(a) Rs. 630 (b) Rs. 700 (c) Rs. 780 (d) None
 3. The difference between the cost price and sale price of an article is Rs. 240. If the profit percent is 20, at what price was the article sold?
(a) Rs. 1240 (b) Rs. 1400 (c) Rs. 1600 (d) None of these.
 4. By selling a motor cycle for Rs. 22600, A person gains 13%, what was his gain?
(a) Rs. 600 (b) Rs. 2936 (c) Rs. 2600 (d) Data inadequate
 5. A shopkeeper bought locks at the rate of 8 locks for Rs. 34 and sold them at 12 locks for Rs. 57. The number of locks he should sell to have a profit of Rs.900, is ?
(a) 1400 (b) 1600 (c) 2000 (d) 1800
 6. A shopkeeper earns 15% profit on a shirt even after allowing 31% discount on the list price. If the list price is Rs. 125, then the cost price of the shirt is?
(a) Rs. 75 (b) Rs. 87 (c) Rs. 80 (d) Rs. 69
 7. The amount charged for the use of borrowed money is called:
(a) Principle (b) Term (c) Interest (d) Rate
 8. The amount of an original investment is called:
(a) Principle (b) Term (c) Interest (d) Rate
 9. What will Rs.1500 amount to in three years if it is invested in 20% p.a. compound interest, interest being compounded annually?
(a) 2400 (b) 2592 (c) 2678 (d) 2540
 10. At the rate of 6% p.a. simple interest, a sum of Rs. 2500 will earn how much interest by the end of 5 years ?
(a) 500 (b) Rs. 700 (c) Rs. 750 (d) Rs. 3250
 11. How long will it take for a sum of money to grow from Rs.1250 to Rs.10,000, if it is invested at 12.5% p.a simple interest?
(a) 8 years (b) 64 years (c) 72 years (d) 56 years
-

12. Find the simple interest and amount on Rs.3000 for 4 months at the rate of 12%.
 (a) Rs.120, Rs.3120 (b) Rs.150, Rs.3150 (c) Rs.200, Rs.3000 (d) none of the above

13: Mohan borrowed Rs.6000 at 12% rate of simple interest from a financier on 10-3-04. What total sum should he pay on 22-5-04 to clear the debt?
 (a) Rs.6144 (b) Rs.6530 (c) Rs.6320 (d) none of the above

14: Find the Compound Interest and amount on Rs.5000 for 2 years at the rate of 8%.
 (a) Rs.440, Rs.5440 (b) Rs.832, Rs.5832 (c) Rs.100, Rs.5100 (d) none of the above

15: Find the difference between compound interest and simple interest on Rs 12,000 at 10% for 2 years.
 (a) Rs. 120 (b) Rs.530 (c) Rs. 634 (d) Rs. 325

16: The compound interest for the second year on Rs.1600 at the rate of 5% is Rs._____
 (a) Rs.50 (b) Rs. 60 (c) Rs. 84 (d) Rs. 35

17: Peter borrowed Rs. 4000 from a friend at 8% rate of compound interest. At the end of first year, he repaid Rs.1320. What sum should he pay at the end of second year to clear the debt?
 (a) Rs. 4022 (b) Rs. 4000 (c) Rs. 3529 (d) Rs. 3240

18: If the compounded amount at the rate of $6\frac{1}{4}\%$ for 3 years is Rs.4913, then what is the principal?
 (a) Rs.5012 (b) Rs. 4096 (c) Rs. 4100 (d) Rs. 3900

Test for initial comparison

Achievement Test based on 7th standard Gujarat State Board of School Textbooks

Name of the school:

Name of the student:

Class and section:

Date and time of the test:

1. 2.28×11.5 _____
 (a) 23.52 (b) 26.22 (c) 34.22 (d) 54.22

2. The cube root of 512 is
 (a) 6 (b) 8 (c) 7 (d) 9

3) A thing is bought for Rs. 400 and sold at Rs. 480. What is the profit in Percentage?
 (a) 30% (b) 23% (c) 20% (d) 34%

4) Prachi bought old scooter through a broker for Rs.9600 by paying 2% brokerage. How much amount had Prachi to pay for the scooter?
 (a) Rs.9792 (b) Rs. 9670 (c) Rs. 9690 (d) Rs.9780

5) As Shiva is going abroad, he sells his motorcycle worth Rs. 38,000 for Rs. 28,000 through a broker. If the broker charges 2% brokerage then how much loss will Shiva suffer?

- (a) Rs. 10,500 (b) Rs. 10,560 (c) Rs.10, 860 (d) Rs. 10,870

6) A sari trader bought sari worth Rs.600 each at 20% discounts. If he sells each sari for Rs. 520, then how much profit will he get on each sari?

- (a) Rs.50 (b) Rs. 43 (c) Rs. 40 (d) Rs. 53

7) C.P. = Rs. 2350; Additional expense = Rs 50: Loss = 5%: S.P. =?

- (a) Rs. 2280 (b) Rs. 2270 (c) Rs. 2380 (d) Rs. 2355

8) Find the interest and amount of Rs.500 at the rate of 8% for 1 year.×

- (a) Rs. 40, Rs.540 (b) Rs. 50, Rs.550 (c) Rs. 60, Rs.560 (d) Rs. 40, Rs.570

9) Find the interest and amount of Rs. 3650 at the rate of 4% for 45 days.

- (a) Rs.14, Rs.3664 (b) Rs.18, Rs.3668 (c) Rs.17, Rs.3667 (d) Rs.10, Rs.3660

10) Find the compound interest for 2 years for Rs. 1200 at the rate of 5%

- (a) Rs. 124 (b) Rs. 120 (c) Rs. 123 (d) Rs. 133

11) The area of the circle with radius 7cm is

- (a) 150 cm^2 (b) 154 cm^2 (c) 134 cm^2 (d) 130 cm^2

12) The measures of a cuboids' are $10\text{cm} \times 8\text{cm} \times 4\text{cm}$. Volume = _____

- (a) 300 cm^3 (b) 367 cm^3 (c) 343 cm^3 (d) 320 cm^3

13) In a recipe, 3 cups of fruit serves 5 people. How many cups of fruit would serve 100 people?

- (a) 70 cups (b)90 cups (c)80 cups (d)60 cups

14) Express the ratio 15 red marbles out of 50 marbles as a fraction in simplest form.

- (a) $\frac{10}{3}$ (b) $\frac{15}{50}$ (c) $\frac{3}{10}$ (d) $\frac{50}{15}$

15) If we add 10 to a certain number, we get 7. Then the number is

- (a) -5 (b) -3 (c) -15 (d) -4
-

REACTION SCALE

Instructions for Reaction Scale**Dear students,**

Thanks for your cooperation in participation of the experiment conducted in your school for my research project entitled “Development and Implementation of Computer Assisted Instruction in Mathematics for Standard VIII Students”.

Please give your feedback regarding CAI used during the experiment. Read the instructions before filling the reaction scale.

Read the sentence fully and understand what the sentence says. Put tick mark in **one of the boxes**

SA	A	ND	DA	SD
----	---	----	----	----

given like these against each sentence (whichever you find appropriate about that sentence)
While doing this keep in mind the meaning for the following abbreviations.

SA- Strongly agree
A - Agree
ND- Not decided
DA- Disagree
SD- Strongly disagree

(Pramila Gururajan)
The investigator

Centre of Advanced Study in Education
Department of Education
Faculty of Education and Psychology
The Maharaja Sayajirao University of Baroda
Vadodara-390002

Reaction Scale

1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	SA	A	ND	DA	SD
2	I like illustrations given in the slides which actually made me learn the lesson.	SA	A	ND	DA	SD
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	SA	A	ND	DA	SD
4	CAI is effective way of presentation because there is little stress in learning situation.	SA	A	ND	DA	SD
5	I can learn with my own speed.	SA	A	ND	DA	SD
6	I can immediately test myself because there is lot of practice exercise.	SA	A	ND	DA	SD
7	This method is having more freedom to learn.	SA	A	ND	DA	SD
8	CAI didn't focus on more freedom situation.	SA	A	ND	DA	SD
9	Learning mathematics is fun in this CAI method.	SA	A	ND	DA	SD

10 This method is not good in learning mathematics because my doubts are not cleared.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

11 In CAI I can teach myself (self-study) without the help of others.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

12 Matter presented in CAI is not very clear.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

13 CAI is easy to understand.

SA	A	ND	DA	SD
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14 Animations are distracting in understanding the concept.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

15 CAI took more time to understand the concept than usual classroom teaching.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

16 Illustrations given in CAI are enough to understand the concept clearly.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

17 Matter presented in CAI was logically arranged.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

18 Learning through CAI was waste of time.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

19 Illustrations given in CAI are related to day today life experiences.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

20 Classroom teaching is more enjoyable.

SA	A	ND	DA	SD
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21	The language used in CAI is easy and simple to understand.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
22	The exercises given in each chapter is adequate.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
23	CAI takes care of previous knowledge in the subject.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
24	The solution to the problem is not easy to understand.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
25	The exercises helped in understanding the chapter in depth.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
26	Solutions didn't help me whenever I was not able to solve the problem.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
27	Break given in CAI helped me to refresh my mind.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
28	I am feeling tired while going through the slide.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
29	Animation shown in CAI is appropriate to help me in understanding the concept.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
30	Topic is not introduced properly.	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			
31	CAI does not take care of previous knowledge	<table border="1"><tr><td>SA</td><td>A</td><td>ND</td><td>DA</td><td>SD</td></tr></table>	SA	A	ND	DA	SD
SA	A	ND	DA	SD			

(Percentage) needed to understand the present concept.

32	Enough revision is not done in CAI after the topic simple interest.	SA	A	ND	DA	SD
33	Enough revision is not done in CAI after the topic compound interest.	SA	A	ND	DA	SD
34	Enough revision is not done in CAI after the topic profit and loss.	SA	A	ND	DA	SD
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	SA	A	ND	DA	SD
36	I had to read the slide many times to understand what is being said as there was no clarity in understanding.	SA	A	ND	DA	SD
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	SA	A	ND	DA	SD
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	SA	A	ND	DA	SD
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	SA	A	ND	DA	SD
40	CAI is not enough in understanding the concept very clearly.	SA	A	ND	DA	SD

41 Independent learning is not possible through CAI.

SA	A	ND	DA	SD
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42 Evaluation is done objectively (objective questions) so no partiality is involved in scoring.

SA	A	ND	DA	SD
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43 Evaluation done at the end of the topic “simple interest” is not suitable measure to know my understanding about that topic.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

44 Instruction given in each slide of CAI is easy and clear to follow.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

45 Evaluation done at the end of the topic profit and loss is not suitable measure to know my understanding about that topic.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

46 Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).

SA	A	ND	DA	SD
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47 To get the correct answer I had to go back to the slide/s many times for topic simple interest.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

48 To get the correct answer I had to go back to the slide/s many times for topic compound interest.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

49 To get the correct answer I had to go back to the slide/s many times for topic profit and loss.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

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

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

51 Discussion with mathematics teacher is needed along with CAI.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

52 Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

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

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

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

SA	A	ND	DA	SD
-----------	----------	-----------	-----------	-----------

Appendix 4 Research Papers Published in the Referred Journals

S.No	Journal Name	Article Name
1	International Journal of Scientific and Research Publications	The Effectiveness of Computer Assisted Instruction in Teaching of Arithmetic
2	Journal of Computing Technologies	The Effectiveness of Computer Assisted Instruction in Teaching of Arithmetic Final Tryout
3	Journal of Humanities and Social Science	Computer Assisted Instruction in Teaching of Mathematics
4	Abstracts of Educational Research Studies in India	Using Compatible Research Methodology in Social Science
5	Journal of Humanities and Social Science	Comparative Analysis of Reaction of Students on Final Version of Computer Assisted Instruction for Teaching Arithmetic with Different Modes
6	Indian Journal of education Research Experimentation and Innovation	Students' Reaction on Computer Assisted Instruction for Teaching and Learning Arithmetic

The Effectiveness of Computer Assisted Instruction in Teaching Arithmetic

Pramila Ramani*, Harsha Patadia**

* School of Science and Education, Navrachana University, Vadodara, Gujarat, India

** Department of Education, Faculty of Education and Psychology, CASE, The M.S. University of Baroda, Vadodara, Gujarat, India

Abstract- This True Experimental study compared 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. ANCOVA was used in data analysis. There was significant difference in the post test scores of students receiving traditional method, only CAI and CAI with simultaneous discussion. Bonferroni correction was used for Post hoc test. It revealed that traditional method is as effective as only CAI. CAI with simultaneous discussion is more effective than traditional method. CAI with simultaneous discussion is more effective than only CAI.

Index Terms- Computer Assisted Instruction, Self Learning Material, Auto Instructional Method, Simultaneous Discussion and symbolic language

I. INTRODUCTION

A Significant number of students find it difficult to learn mathematics. 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. Currently, Science stream is divided into group A with Mathematics and group B without Mathematics. As 21st century progresses there will be two kinds of people - mathematically abled and mathematically disabled or disadvantaged. The latter takes orders from the former. Our country requires technically skilled manpower and in order to meet this objective mathematics plays an important part. [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. In this line investigators developed and implemented CAI and found its effectiveness.

II. RATIONALE OF THE STUDY

Many studies have been conducted on low achievements in mathematics. [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. 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. 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

The Effectiveness of Computer Assisted Instruction in Teaching Arithmetic

B. Objectives of the Study

- To develop the CAI in Mathematics for Standard VIII students studying in schools affiliated to GSHSEB (Gujarat State Secondary and Higher Secondary Education Board).
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with one of the experimental groups (Group A) of standard VIII students.
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with another experimental group (Group B) of standard VIII students along with treatment of simultaneous discussion.
- To study the relative effectiveness of learning mathematics in class VIII among the three groups A, B and C (Where C is the control group and A and B are experimental groups) in terms of achievement of the students.

C. Hypotheses of the Study

- There will be no significant difference in the mean achievement scores of group C students and group A students.
- There will be no significant difference in the mean achievement scores of group C students and group B students.
- There will be no significant difference in the mean achievement scores of group A students and group B students.

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 28 students and Experimental Group B consisted of 24 students and Control Group consists of 21 students. Experimental Group A studied through the developed CAI. Experimental Group B studied through the developed CAI along with simultaneous discussions and Control Group studied through traditional method. Students in all 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 each period consisted of 35 minutes in each group for one month.

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) Achievement tests developed by the investigator served as pre test and post test.

I. Steps in 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: Class VII final examination mathematics marks were collected by the investigators for the purpose of calculation of ANCOVA.

Step 4: Students were taught in their respective methods for one month till the completion of the selected arithmetic unit. Control group students were taught by school mathematics teacher.

Step 5: Post test was administered to the students and their response was collected and analyzed.

IV. DATA ANALYSIS AND INTERPRETATION

[22] ANCOVA Calculation

Table 1: Calculation of ANCOVA Control Group (traditional Method)

S.No	X VII Marks out of 100	Y Post Test out of 100	X*X	Y*Y	X*Y
1	70	33.33	4900.00	1111.11	2333.33
2	54	40.00	2916.00	1600.00	2160.00
3	57	46.67	3249.00	2177.78	2660.00
4	39	53.33	1521.00	2844.44	2080.00
5	99	53.33	9801.00	2844.44	5280.00
6	37	60.00	1369.00	3600.00	2220.00
7	58	53.33	3364.00	2844.44	3093.33
8	75	46.67	5625.00	2177.78	3500.00
9	39	40.00	1521.00	1600.00	1560.00
10	37	60.00	1369.00	3600.00	2220.00
11	57	33.33	3249.00	1111.11	1900.00
12	91	46.67	8281.00	2177.78	4246.67
13	56	60.00	3136.00	3600.00	3360.00
14	77	26.67	5929.00	711.11	2053.33
15	52	33.33	2704.00	1111.11	1733.33
16	63	33.33	3969.00	1111.11	2100.00
17	51	33.33	2601.00	1111.11	1700.00
18	66	60.00	4356.00	3600.00	3960.00
19	46	40.00	2116.00	1600.00	1840.00
20	44	40.00	1936.00	1600.00	1760.00
21	74	53.33	5476.00	2844.44	3946.67
sum	1242	946.67	79388.00	44977.78	55706.67
avg	59.14	45.08			
S.D.	17.22	10.73			

Table 2: Calculation of ANCOVA Experimental Group A (only CAI)

	X	Y	X*X	Y*Y	X*Y
S.No	VII Marks out of 100	Post Test out of 100			
1	52	26.67	2704.00	711.11	1386.67
2	51	33.33	2601.00	1111.11	1700.00
3	43	40.00	1849.00	1600.00	1720.00
4	35	33.33	1225.00	1111.11	1166.67
5	43	40.00	1849.00	1600.00	1720.00
6	35	33.33	1225.00	1111.11	1166.67
7	40	40.00	1600.00	1600.00	1600.00
8	59	40.00	3481.00	1600.00	2360.00
9	38	46.67	1444.00	2177.78	1773.33
10	78	40.00	6084.00	1600.00	3120.00
11	84	60.00	7056.00	3600.00	5040.00
12	37	46.67	1369.00	2177.78	1726.67
13	90	100.00	8100.00	10000.00	9000.00
14	79	20.00	6241.00	400.00	1580.00
15	36	40.00	1296.00	1600.00	1440.00
17	69	46.67	4761.00	2177.78	3220.00
18	35	20.00	1225.00	400.00	700.00
19	81	73.33	6561.00	5377.78	5940.00
20	100	73.33	10000.00	5377.78	7333.33
21	35	40.00	1225.00	1600.00	1400.00
22	35	40.00	1225.00	1600.00	1400.00
23	46	33.33	2116.00	1111.11	1533.33
24	38	40.00	1444.00	1600.00	1520.00
25	40	46.67	1600.00	2177.78	1866.67
26	38	40.00	1444.00	1600.00	1520.00
27	93	40.00	8649.00	1600.00	3720.00
28	77	46.67	5929.00	2177.78	3593.33
sum	1487	1180.00	94303.00	58800.00	70246.67
avg	55.07	43.70			

S.D.	21.85	16.68			
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Table 3: Calculation of ANCOVA Experimental Group B (CAI with simultaneous discussion)

s.n	x	y	x*x	y*y	x*y
	vii marks out of 100	post test out of 100			
1	38	93.33	1444.00	8711.11	3546.67
2	35	80.00	1225.00	6400.00	2800.00
3	42	73.33	1764.00	5377.78	3080.00
4	41	93.33	1681.00	8711.11	3826.67
5	55	66.67	3025.00	4444.44	3666.67
6	52	73.33	2704.00	5377.78	3813.33
7	35	93.33	1225.00	8711.11	3266.67
8	64	73.33	4096.00	5377.78	4693.33
9	36	60.00	1296.00	3600.00	2160.00
10	96	100.00	9216.00	10000.00	9600.00
11	40	60.00	1600.00	3600.00	2400.00
12	55	66.67	3025.00	4444.44	3666.67
13	44	73.33	1936.00	5377.78	3226.67
14	95	100.00	9025.00	10000.00	9500.00
15	45	73.33	2025.00	5377.78	3300.00
16	61	60.00	3721.00	3600.00	3660.00
17	35	46.67	1225.00	2177.78	1633.33
18	56	46.67	3136.00	2177.78	2613.33
19	42	60.00	1764.00	3600.00	2520.00
20	94	93.33	8836.00	8711.11	8773.33
21	93	60.00	8649.00	3600.00	5580.00
22	48	66.67	2304.00	4444.44	3200.00
23	76	80.00	5776.00	6400.00	6080.00
24	100	100.00	10000.00	10000.00	10000.00
sum	1378	1793.33	90698.00	140222.22	106606.67
avg	57.42	74.72			

Table 4: ANOVA table for Adjusted X

Source	d.f.	SS	MS	F-Ratio
Between groups	2	2972.085	1486.043	3.880082
Within groups	68	26043.49	382.9926	
Total	70	29015.58		

Table 5: Result of One-Way ANCOVA

ANCOVA Results (k=3)						
	Source	SS	df	MS	F	P
	adjusted means	14643.36015	2	7321.68008	37.516212	0.00000000010
	adjusted error	13270.90918	68	195.160429		
	adjusted total	27914.26934	70			
Test for Homogeneity of Regressions						
	Source	SS	df	MS	F	P
	between regressions	904.9218154	2	452.460908	2.4880619	0.090605826
	remainder	12365.98737	68	181.852755		

Table 6: Adjusted Means of the respective groups

	CV Observed	DV Observed	Adjusted	Group
Means				
1	57.41666667	74.72222	74.61422	EXP B
2	55.07407407	43.7037	44.27039	Control
3	59.14285714	45.07937	44.4742	Exp A

At 5% level, the table value of F for $v_1 = 2$ and $v_2 = 68$ is 3.132 this value is less than the calculated value (i.e. calculated value of 37.516 is greater than table value) and accordingly we infer that F-ratio is significant at 5% level which means the difference in group means is significant.

At 1% level, the table value of F for $v_1 = 2$ and $v_2 = 68$ is 4.92 this value is less than the calculated value (i.e. calculated

value of 37.516 is greater than table value) and accordingly we infer that F-ratio is significant at 1% level which means the difference in group means is significant.

Adjusted Mean of Experimental Group B(74.61422) with discussion is more than the other two groups namely Experimental Group A(44.4742) and Control Group(44.27039).

[23] Post test results (Bonferroni correction) at 5% level

Table 7: Mean and size of the sample of the respective groups

Comparison	Mean 1	Mean 2	N1	N2
1: Control GP and Exp A	+ 45.08	+ 43.70	21	28
2: Control GP and Exp B	+ 45.08	+ 74.72	21	24
3: Exp A and Exp B	+ 43.70	+ 74.72	28	24

Mean Square= 382.9926 DF= 68

Table 8: Calculation of confidence intervals

Comparison	Mean1 - Mean2	95% CI of difference
1: Control GP and Exp A	+ 1.38	- 12.49 to + 15.25
2: Control GP and Exp B	- 29.64	- 43.99 to - 15.29
3: Exp A and Exp B	- 31.02	- 44.38 to - 17.66

Table 9: Comparison of Statistical Significance of three groups

Comparison	Significant? (P <0.05?)	t
1: Control GP and Exp A	No	0.244
2: Control GP and Exp B	Yes	5.069
3: Exp A and Exp B	Yes	5.698

At 5% level of significance

1. There is no significant difference between the mean achievement scores of Control Group students and Experimental Group A (Only CAI) students.

This shows that both the methods that is teaching by traditional method is as effective as teaching by only CAI.

2. There is significant difference between the mean achievement scores of Control Group students and Experimental Group B (CAI with simultaneous discussion) students.

From the above result it can be concluded that there is significant difference between teaching by traditional method and CAI with simultaneous discussion. Mean achievement score of students taught by CAI with simultaneous discussion is more than mean achievement score of students taught by traditional

method. Therefore CAI with simultaneous discussion is more effective than traditional method.

3. There is significant difference between the mean achievement scores of Experimental Group A (Only CAI) students and Experimental Group B (CAI with simultaneous discussion) students.

From the above result it can be concluded that there is significant difference between teaching by only CAI and CAI with simultaneous discussion. Mean achievement score of students taught by CAI with simultaneous discussion is more than mean achievement score of students teaching by only CAI. Therefore CAI with simultaneous discussion is more effective than only CAI.

[23] Post test results (Bonferroni correction) at 1% level

Comparison	Mean 1	Mean 2	N1	N2
1: Control GP and Exp A	+ 45.08	+ 43.70	21	28
2: Control GP and Exp B	+ 45.08	+ 74.72	21	24
3: Exp A and Exp B	+ 43.70	+ 74.72	28	24

Mean Square= 382.9926 DF= 68

Confidence intervals

Comparison	Mean1 - Mean2	99% CI of difference
1: Control GP and Exp A	+ 1.38	- 15.81 to +18.57
2: Control GP and Exp B	- 29.64	- 47.43 to -11.85
3: Exp A and Exp B	- 31.02	- 47.58 to - 14.46

Statistical Significance

Comparison	Significant? (P <0.01?)	t
1: Control GP and Exp A	No	0.244
2: Control GP and Exp B	Yes	5.069
3: Exp A and Exp B	Yes	5.698

At 1% level of significance

1. There is no significant difference between the mean achievement scores of Control Group students and Experimental Group A (Only CAI) students.

This shows that both the methods that is teaching by traditional method is as effective as teaching by only CAI.

2. There is significant difference between the mean achievement scores of Control Group students and Experimental Group B (CAI with simultaneous discussion) students.

From the above result it can be concluded that there is significant difference between teaching by traditional method and CAI with simultaneous discussion. Mean achievement score of students taught by CAI with simultaneous discussion is more than mean achievement score of students taught by traditional

method. Therefore CAI with simultaneous discussion is more effective than traditional method.

3. There is significant difference between the mean achievement scores of Experimental Group A (Only CAI) students and Experimental Group B (CAI with simultaneous discussion) students.

From the above result it can be concluded that there is significant difference between teaching by only CAI and CAI with simultaneous discussion. Mean achievement score of students taught by CAI with simultaneous discussion is more than mean achievement score of students teaching by only CAI. Therefore CAI with simultaneous discussion is more effective than only CAI.

V. FINDINGS OF THE STUDY

From the data analysis it can be concluded that teaching students of class VIII the arithmetic part of mathematics by traditional method is as effective as only CAI. Teaching students by CAI with simultaneous discussion is more effective than traditional method that is traditional method should be supplemented by self learning material like CAI so that maximum learning takes place. Teaching students by CAI with simultaneous discussion is more effective than only CAI that is presence of teacher is essential so that students can clear their doubts arising while learning.

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

The results of this study indicate that class VIII students learned mathematics equally well with or without CAI. The mere presence of computers does not improve student learning. Computers have the potential to be useful tools to improve learning; however, it is the responsibility of the teachers to choose software that meets the needs of the students, to use it effectively, and to require its use. Educators can tap into this interest by using technology to deliver instruction and assess learning. Computer learning systems provide educators the opportunity to create lessons in a variety of alternative formats to the traditional lecture in order to address the different learning styles and preferences of students. And this supplement is also useful to the students whenever they are absent to the class during the content is taught. They can refer repeatedly until they understand thoroughly this facility is absent in the traditional method. Ultimately quality is essential in any mode of instruction. There is also limitations in preparing CAI person should know not only the content but also methods to prepare CAI.

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Second Author – Prof. Dr. Harsha Patadia, PhD in Education,
The M.S. University of Baroda, Station, Vadodara, Gujarat,
India. harshapatadia@gmail.com

Correspondence Author – Ms. Pramila Ramani,
pramila.maths@gmail.com, 919427935890.

AUTHORS

First Author – Ms. Pramila Ramani, M.Sc Mathematics, M.Ed
and pursuing Education, Navrachana University, Vasna,
Vadodara, Gujarat, India. pramila.maths@gmail.com

The Effectiveness of Computer Assisted Instruction in Teaching of Arithmetic Final Tryout

Ms.Pramila Ramani^{#1}, Prof. Dr. Harsha Patadia^{#2}

^{#1}*School of Science and Education, Navrachana University
Navrachana University, Vasna, Vadodar:390007, India.*

^{#2}*Department of Education, The MS University of Baroda
The MS University of Baroda, Station, Vadodara:390002, India.*

¹pramila.maths@gmail.com

²harshapatadia@gmail.com

Abstract— This study is the continuation of initial tryout conducted in one of the English Medium school of Vadodara, India. Computer Assisted Instruction (CAI) is modified after initial tryout and used for final tryout. Investigators have selected arithmetic part of class VIII Gujarat State Secondary and Higher Secondary Education Board (GSHSEB) text book and Computer Assisted Instruction was developed in this part. This True Experimental study compared academic performance of students in class VIII in one of the English Medium School of Vadodara following GSHSEB textbook, India among conventional method, 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. ANCOVA was used in data analysis. The findings of the study showed that there was no significant difference between the mean achievement post test scores of students receiving traditional method, only CAI and CAI with simultaneous discussion.

Keywords— Abstract Subject, Auto Instructional Method, Computer Assisted Instruction, Conventional Method Self Learning Material, Simultaneous Discussion and Symbolic language.

I. INTRODUCTION

Teaching and learning mathematics is a challenge because mathematics is a special subject where in symbols occupy an important position. Nature of mathematics is abstract and has a special language called symbolic language. Most of the students find difficult in learning mathematics because of its nature. If a student fails to learn the basic concepts of mathematics it will affect his future career. [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 a theoretical 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. Patel [3] 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.

[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. In CAI is prepared using psychological theories of learning. Mastery learning can be facilitated through programmed learning. The fundamental notion of programmed learning is that reinforcement of learning. Programmed learning is applied through electronic self-learning modules with built in feedback, remediation, and reinforcement of learning. A self-learning module is a self-contained unit or package of study materials, which students study on an individual basis. Students proceed through a pre-test, learning outcomes, content, and activities, post-test. Successful completion of one level of learning is required to proceed to a higher level. CAI supports student-centered learning. It is mediator between information-communication technologies and theories of learning. In this line investigators developed and implemented CAI and found its effectiveness.

II. RATIONAL OF THE STUDY

Investigators have reviewed two studies related to low achievements in mathematics. Jain, and Burad [6] 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. Chel[7] 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. Many studies have been conducted to find out the effectiveness of CAI in terms of achievement of the students in learning. Investigators have reviewed fourteen studies related to CAI. Jeyamani[8] found that experimental group performed better on post test. The studies conducted by authors [9],[10],[11],[12],[13],[14],[15],[16],[17],[18] showed that CAI was effective than conventional method. Vansia[20] in his study found that mathematics learning through CAI with Peer Instruction (CAIPI) was effective on posttest. Spradlin, Kathy Dye and Ackerman, Beth[21] 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. Barad[22] found that science teaching through CAI programme was more effective for boys than girls in rural area. Out of fifteen studies reviewed related to CAI there were only three studies related to mathematics. One was related to higher mathematics and other two were related to school mathematics and these two schools related studies compared the traditional method and CAI. 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. [23] Investigators have conducted the research in initial tryout the title of the study is “Effectiveness of Computer Assisted Instruction in Teaching Arithmetic” and found that there was significant difference between students learning through only computer assisted instruction, conventional method and CAI with simultaneous discussion. CAI was modified after initial tryout and modified CAI was used for the present study (final tryout).

III. METHODOLOGY OF THE STUDY

A. The Present Study Entitles

The Effectiveness of Computer Assisted Instruction in Teaching Arithmetic Final Tryout.

B. Objectives of the Study

- To develop the CAI in Mathematics for Standard VIII students studying in schools affiliated to GSHSEB (Gujarat State Secondary and Higher Secondary Education Board).
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with one of the experimental groups (Group A) of standard VIII students.
- To study the effectiveness of the developed CAI in terms of students' achievement in Mathematics with another experimental group (Group B) of standard VIII students along with treatment of simultaneous discussion.
- To study the relative effectiveness of learning mathematics in class VIII among the three groups A, B and C (Where C is the control group and A and B are experimental groups) in terms of achievement of the

students.

C. Hypotheses of the Study

- There will be no significant difference between the mean achievement scores of group C students and group A students.
- There will be no significant difference between the mean achievement scores of group C students and group B students.
- There will be no significant difference between the mean achievement scores of group A students and group B students.

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 33 students, Experimental Group B consisted of 32 students and Control Group consists of 32 students. Experimental Group A studied through the developed CAI. Experimental Group B studied through the developed CAI along with simultaneous discussions and Control Group studied through traditional method. Students in all 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 each period consisted of 35 minutes in each group for one month.

H. Tools for Data Collection

Achievement tests developed by the investigator served as initial test and post test.

I. Steps in 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: Initial test in mathematics prepared by the investigators was administered to the students and their marks were collected by the investigators for the purpose of calculation of ANCOVA.

Step 4: Students were taught in their respective methods till the completion of the selected arithmetic unit. Control group students were taught by school mathematics teacher.

Step 5: Post test was administered to the students and their marks was collected and analyzed.

IV. DATA ANALYSIS AND INTERPRETATION

[22] ANCOVA Calculation

TABLE 1
ANOVA Table for Adjusted X

Source	d.f.	SS		
Between groups	2	380.6043	190.3021631	0.800956778
Within groups	93	22096.2	237.5935485	
Total	95	22476.8		

At 5% level, the table value(table 1) of F for $v_1 = 2$ and $v_2 = 93$ is 3.094 this value is more than the calculated value (i.e. calculated value of 0.800956778) and accordingly we infer that F-ratio is not significant at 5% level which means the difference in group means is not significant. There is no significant difference between the Control group, Experimental group A(only CAI) and the Experimental Group B(CAI with discussion). All these three methods of teaching are equally same.

TABLE 2
Result of One-Way ANCOVA

Source	SS	df	MS	F	P
adjusted means	188.30	2	94.15	0.21	0.811124672
adjusted error	41732.88	93	448.74		
adjusted total	41921.17	95			

Table 2 shows the result of One-Way ANCOVA p value is approximately 0.811 which means that null hypotheses is not rejected.

TABLE 3
Test for Homogeneity of Regressions

Source	SS	df	MS	F	P
between regressions	1185.90	2	592.95	1.36	0.261714201
remainder	40546.98	93	435.99		

Table 3 shows the result for homogeneity of Regression, F value is 1.36 which is very close to 1 therefore the groups are homogeneous.

TABLE 4
Adjusted Means of the respective groups

Group	CV (Maths marks before treatment)	DV (Post Test Marks)	
Means	Observed	Observed	Adjusted
EXP A	79.39	75.61	76.30
control	83.96	74.38	73.57
EXP B	81.25	76.67	76.75

Table 4 shows the calculation of adjusted means of the Control Group, Experimental Group A (only CAI) and Experimental Group B(CAI with simultaneous discussion). (CV –Concomitant Variable DV- Dependent Variable)

V. FINDINGS OF THE STUDY

From the data analysis it can be concluded that teaching students of class VIII the arithmetic part of mathematics is equally effective for traditional method, only CAI and CAI with simultaneous discussion.

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. CAI is equally effective with or without the presence of teacher and it is as effective as usual conventional method. Therefore in case of non-availability of teacher or due to some reason teacher is not present for few days or in any such incident students can learn mathematics by themselves.

VII. CONCLUSION

The results of this study indicate that class VIII students learned mathematics equally well with or without CAI .The mere presence of computers does not improve student learning. Computers have the potential to be useful tools to improve learning; however, it is the responsibility of the teachers to choose software that meets the needs of the students, to use it effectively, and to require its use. Educators can tap into this interest by using technology to deliver instruction and assess learning. Computer learning systems provide educators the opportunity to create lessons in a variety of alternative formats to the traditional lecture in order to address the different learning styles and preferences of students. And this supplement is also useful to the students whenever they are absent to the class during the content is taught. They can refer repeatedly until they understand thoroughly this facility is absent in the traditional method. Ultimately quality is essential in any mode of instruction.

There is also limitations in preparing CAI person should know not only the content but also methods to prepare CAI.

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Computer Assisted Instruction in Teaching of Mathematics

Ms. Pramila Ramani¹, Prof. Dr. Harsha Patadia²

¹(*Science and Education, Navrachana University, India*)

²(*Education, MS University of Baroda (CASE), India*)

Abstract : *Mathematics is an abstract subject and symbol occupies an important position. Students find it difficult to comprehend this subject. There are many failures in mathematics than any other subject. Considering student teacher ratio and heterogeneous group of students in a normal classroom it is very difficult for a teacher to reach to all the students. Hence there is a need of supplement along with classroom teaching. Computer assisted instruction plays very important role in this situation. This paper explains the nature and importance of mathematics and Computer assisted instruction and its importance.*

Keywords – *Abstract, Computer Assisted Instruction, Heterogeneous Groups, Individualized Instruction, Special Language*

I. INTRODUCTION

“Education has always been important but perhaps, never more so, in man’s history than today. In a science based world, education and research are crucial to the development process of a country, its welfare, progress and security” [1]

This statement is more relevant even after forty-six years in today’s world of knowledge explosion but rather increased. 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. The syllabus of mathematics at secondary level that is currently in use has been prepared by NCERT and is known as new pattern syllabus.

Mathematics is an abstract subject. 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 has a special language in which symbol occupies an important position. Students find it difficult to understand mathematics because of symbols and abstractness. [2] 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 Education Commission (1964-66) recommended mathematics as a compulsory subject for all school students. Thus, mathematics enjoys a unique status in a school curriculum. [3] The National policy on Education NPE- 1986 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. [4] “Ours and previous few generations have failed to produce good mathematics teachers at school level in adequately large numbers.” 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. This is so since teaching mathematics to impressionable young minds is a specialized task that many mathematicians may not measure. Mathematics is a hard task master that demands implicit and whole attention from the disciple.

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. This aspect is elaborated in topics that follow.

1.1 Importance of Mathematics

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. 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.,

1.2 Nature of Mathematics

Mathematics relies on both logic and creativity, and it is pursued both for a variety of practical purposes and for its intrinsic interest. Language of mathematics is symbolic and less verbose. Mathematics is the science of patterns and relationships.

[5] "Mathematics is the science of number and space. Mathematics is the science of measurement, quantity and magnitude. Mathematics is also called science of logical reasoning. Mathematics may also be defined as the science of abstract and imaginative form."

Education Commission (1964-65) "One of the outstanding characteristics of science culture is qualification of Mathematics".

- Mathematics is hierarchical in nature.
- Mathematics is science of logical reasoning.
- Mathematics is more than computation
- Mathematics has peculiar language and symbolism. It has a different language and syntax and uses many words from day today life but in different sense.
- Mathematics is abstract in nature.

According to [6] characteristics of Mathematics is listed as follows:

- It is the science of number and space.
- It is the science of calculation.
- It is the science of measurement, quantity and magnitude.
- It is systemized, organized and exact branch of science.
- It deals with quantitative facts and relationship.
- It is the abstract form of science.
- It is science of logical reasoning.
- It settles in the mind the habit of reasoning

II. CAI 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. Certain chapters like Profit and loss, Simple and compound interest can be explained very easily using CAI. Variety 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.

2.1 Advantages of CAI in learning Mathematics

In this age of technology the teacher should be aware of student's need. CAI can help to satisfy the needs of the students. CAI lessens the workload of the teachers, besides it has many other advantages as given below

- Provides Wide Range Of Experiences
CAI helps the teacher to provide a wide range of experience s/he can give many examples and illustrations and can make the concept clear.
- Provides Motivation
It can sustain the motivation of the students as the topic can be presented in an enjoyable manner as concepts can be presented systematically, interestingly and immediate feedback can be given which sustains the motivation of the students. Graphics and pictures can be presented which can attract and retain student attention. Children get reinforcement when they answer the question correctly and the topic is presented in a systematic manner in an increasing order of difficulty.

- **Individualized Instruction**
CAI is an individualized instruction as it caters to the individual difference. Some students are slow learners and some are fast learners. The Indian classroom is a heterogeneous group. Some students need more time to learn while others need less time, so learning speed differs from learner to learner. CAI also provides different learning experience according to the understanding level of the students. It also provides facilities like selecting the topics of their own interest. It provides individual attention to each and every student and thus enhances the quality of teaching learning process and thus we can overcome the problems faced in a overcrowded classroom.
- **Interactive Learning**
CAI provides immediate feedback to the students and thus constantly interacts with them. In CAI students actively take part in the learning process. As it contains many examples and diagrams it makes the learning process interesting.

1.2 Principles of CAI

Principle of CAI is same as PLM

- Principle of small steps
- Principle of active responding
- Principle of reinforcement
- Principle of self-pacing
- Principle of student –evaluation or student testing

2.3 Characteristics of CAI

CAI refers to any use of computers that interacts with students in any way in the educational process.

- **Practice:** CAI enables the students to practice as many times as they like so this will enable them to achieve the required competencies. Students come from different background it is a heterogeneous group so their understanding level differs from student to student so a single teacher cannot cater such heterogeneous group so there is a need of right learning tool and a supporting environment. Practice makes a man perfect. Many psychologists like Thorndike support the usefulness of practice in learning.
- **Immediate feedback:** CAI enables the students to see the correct answer immediately as soon as they answer a particular question so that they can correct themselves. If the answer is correct then they will get immense happiness and added confidence. If the answer is wrong they can correct themselves immediately. In traditional classroom teaching, teacher gives students homework for practice. The child comes to know of any mistake when the teacher checks the homework and corrects the mistake. Normally teachers do not provide the correct answer during checking, so child knows that his answer is wrong but does not know the correct answer. If the teacher does sometimes provide the correct answer, the child may not pay due attention to the corrected answer and may consider it as a part of his work is to complete the homework and would proceed with the next homework.
- **Self-Evaluation:** CAI enables the students to find their strengths and weakness and student can overcome his weakness before proceeding further.
- **Reinforcement:** CAI reward students immediately whenever they answer the question correctly immediate reinforcement gives immense pleasure as indicated by many psychologists.
- **Immediate Evaluation:** As soon as each concept is completed students should answer questions related to that particular concept this enables immediate evaluation.

III. LIMITATIONS OF PREPARING CAI

- Constructing a program needs a highly specialized skill.
- The author should have thorough knowledge of the subject matter and of programming techniques.
- The steps should proceed in a more sequential and illustrative examples should be selected carefully so that error-rate of a learner has to be minimized. If the learner commits more error then he will be demotivated.
- It consumes more time.

IV. NECESSITY OF CAI

- **To achieve mastery learning**
Mastery is a recent innovation introduced in the sphere of education. Mastery learning implies a systematic approach to the process of teaching or instruction.
- **Individual differences**

Each and every child is different. In a classroom teacher teaches to a group of students. Some students are slow learners, some are medium, and some are gifted. Classroom group is a heterogeneous group they come from different family background and with different interest. Some are extrovert and some are introvert.

- To make learning continuous.

When the child is absent on the previous day he cannot understand the lesson taught on that day because of lack of continuity and whatever is taught on that day he finds difficult to comprehend. CAI helps him to understand the concept without any difficulty whenever he misses a class.

- Span of attention

The time span the student remains attentive in a class. This is different for different students.

Definition of attention

- [7] “Attention may be described as the selective activity of the human organism whereby one’s consciousness is focused upon a specific, narrow field to the exclusion of everything else in the environment.”

V. CONCLUSION

In a typical mathematics classroom we can observe that teacher spends approximately 5 minutes for introduction, 15 to 20 minutes for content explanation, 10 to 15 minutes for question and answers to heterogeneous group’s verification and confirmation either at the end or continuously along with teaching. Thereafter, the teacher recapitulates all the subtopics. It is not possible to interact with all students, so teacher interacts with about 4 to 5 students. Having confirmed that these 4 to 5 students have understood the content explanations, the teacher assumes that the entire class has followed the content. Some students are mere spectators because they did not get a chance to answer. In this process teacher cannot cater to slow learners, obviously the teacher does not have time. This is not the teacher’s fault but the system’s fault. Certain students cannot grasp the contents fully. So it is not possible for the teacher to cater to all the students. Certain methodology and supporting methods are needed hence there is a need for development of CAI in mathematics. Certainly students cannot learn the entire topics by themselves using CAI, teachers roll is very important therefore CAI can be used as a supplement along with the teachers teaching.

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Using Compatible Research Methodology in Social Science

Ms. Pramila Gururajan
Assistant Professor, Navrachna
University,
Vadodara

Dr. Harsha Patadia
Centre Of Advanced Study In Education
Faculty Of Education And Psychology
The M.S. University Of Baroda
Vadodara

1. Introduction

Social research refers to research conducted by social scientists, which follows a systematic plan. Social science research can be broadly classified into qualitative and quantitative or a combination of these two. Social scientists employ a wide range of methods in order to analyse the data, from census survey derived from millions of individuals to in depth study like case study. Social scientist can be divided according to the research techniques they support. These disputes are related social theories like positivism and anti positivism; structure and agency. Sampling is another concern whether to follow positivistic approach like statistics derived from a sample are analysed in order to draw inferences regarding the population as a whole. In that case what sampling methods to adapt random sampling or non-random sampling. Social science research generally attempts to create or validate theories through data collection and data analysis and its goal is exploration, description, explanation and prediction. Social research aims to find social patterns of regularity in social life and usually deals with social groups. Data analysis is the heart of any research and the methods used in data analysis determines the usefulness of the research done. In all research there is inference and conclusion. Therefore we can understand the usefulness of research methodology used in any social science research. Research methodology used in social science is borrowed from other discipline therefore it cannot be compatible to social science. There is a dire need to evolve own methodology in social science.

2. Foundations of Social Research

The origin of the survey can be traced back at least early as the Domesday Book in 1086. Some scholars believe that the origin of Demography as 1663 with the publication of John Graunt's *Natural and Political Observations upon the Bills of Mortality*. But the social science research became more intensively after positivistic philosophy of science in the early 19th century. The formal academic discipline of sociology began after the work of Emile Durkheim (1858-1917). (Wikipedia, Paul Lazarsfeld, 2013) Paul Felix Lazarsfeld (February 13, 1901 – August 30, 1976) was one of the major figures in 20th-century American sociology. The founder of Columbia University's Bureau of Applied Social Research, he exerted a tremendous influence over the techniques and the organization of social research. His many contributions to sociological method have earned him the title of the "founder of modern empirical sociology".

3. Designs in Social Science research

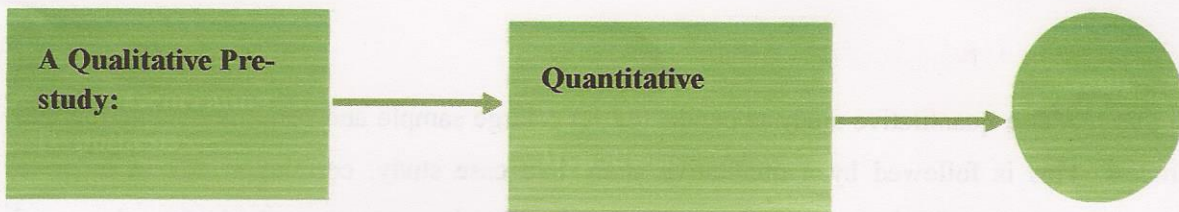
Social research methods can generally vary from qualitative and quantitative dimension. (Wikipedia, Social Research, 2013) Quantitative designs approach social phenomena through quantifiable evidence, and often rely on statistical analysis of many cases (or across intentionally designed treatments in an experiment) to create valid and reliable general claims related to quantity. Qualitative designs emphasize understanding of social phenomena through direct observation, communication with participants, or analysis of texts, and may stress contextual and subjective accuracy over generality related to quality. While various methods may sometimes be classified as quantitative or qualitative, most methods contain elements of both. For example, qualitative data analysis often involves a fairly structured approach to coding the raw data into systematic information, and quantifying inters coder reliability. Thus, a strong distinction between "qualitative" and "quantitative" should really be seen as a somewhat more complex relationship, such that many methods may be both qualitative and quantitative.

(Gautam, Sharma, & Gautam, 2007) the researchers suggested some models with reference to context(variables, sample, population etc) of specific research study/problem. These models are combinations of Qualitative and Quantitative research and they are as follows:

Combination of Qualitative and Quantitative research

Model 1

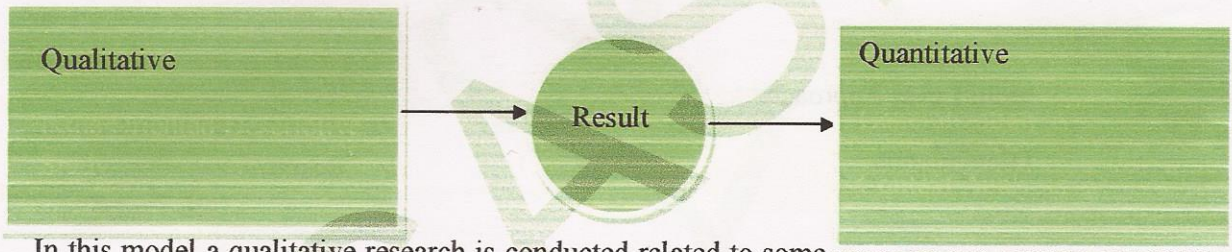
Pre-study Model



In this model a qualitative research is conducted first before the actual research. This exercise is done in order to generate hypotheses. It is followed by actual research in order to verify the hypotheses, in this process the result is generated. Suppose a researcher wanted to find the effectiveness of a new programme he has developed. If he conducts the qualitative research in order to generate the hypotheses then he conducts quantitative research in this way he gets result. This type of study is known as Pre-study model.

Model 2

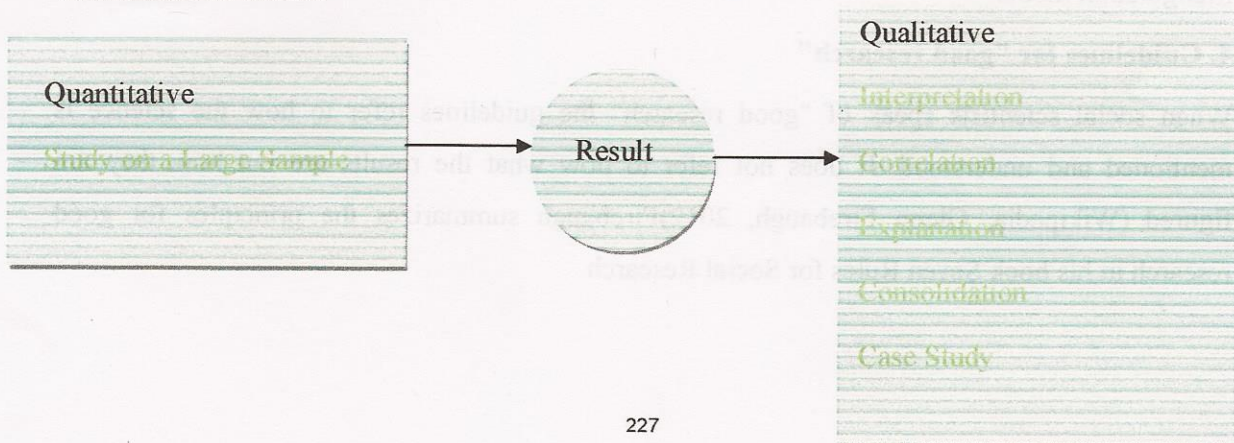
Generalization- Model



In this model a qualitative research is conducted related to some issue. In this process the result is generated. This is followed by a quantitative research in order to generalize the result to a larger group. Suppose a researcher conducts a descriptive study on a small group of people facing some problem over an issue. This will end up in some result. Same study is conducted to a larger group and generalization is done for the larger group.

Model 3

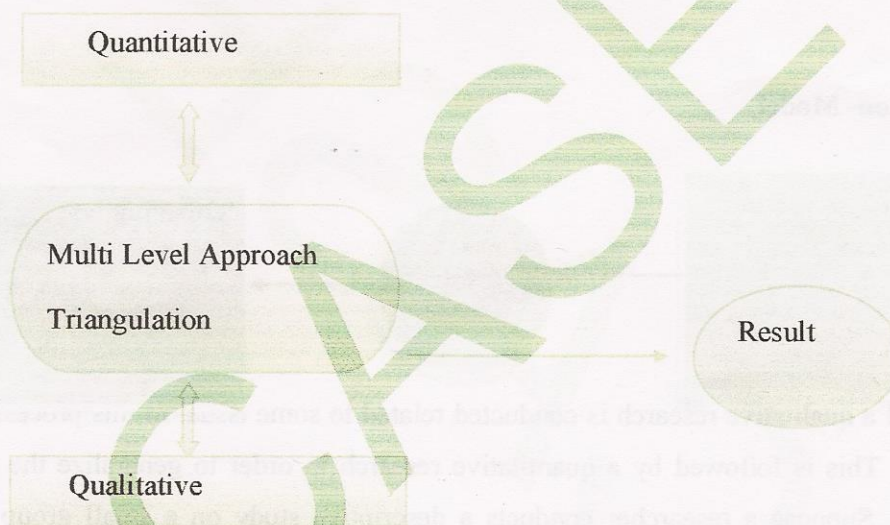
Consolidation Model



In this model a quantitative study is conducted for a large sample and result is obtained in this process. This is followed by a qualitative study like case study, correlation etc. in order to consolidate the result obtained. Suppose a researcher develops a new method of teaching and tests the effectiveness of the developed method on sample and inference is made about population using inferential statistics. Then he does follow up by testing the result by selecting small group using case study using qualitative technique this method is called consolidation model.

Model 4

Triangulation Model



In this model researcher conducts a study using qualitative as well as quantitative technique i.e., he uses multi level approach in order to arrive at a result. Suppose a researcher conducts a study using all possible angle and direction in order to arrive at a result this method is called triangulation model.

4. Guidelines for "good research"

When social scientists speak of "good research" the guidelines refer to how the science is mentioned and understood. It does not refer to how what the results are but how they are figured. (Wikipedia, Glenn Firebaugh, 2012) Firebaugh summarizes the principles for good research in his book Seven Rules for Social Research.

Rule (1) there should be the possibility of surprise in social research.

Rule (2) Good research also will “look for differences that make a difference.

Rule (3) Build in reality checks

Rule (4) advises researchers to replicate, that is, “to see if identical analyses yield similar results for different samples of people.

Rule (5) to compare like with like.

Rule (6) to study change. (Rule (5) and (6) are especially important when researcher want to estimate the effect of one variable on another)

Rule (7) **“Let method be the servant, not the master,”** reminds researchers that methods are the means, not the end, of social research; it is critical from the outset to fit the research design to the research issue, rather than the other way around.

5. Need for Change to Obtain Compatible Methodology in Social Science Research

Social Scientist sometimes uses methodologies that are not exactly matching with their problem. They use methodologies that are ready made available and no modification is done according to their need. Especially in experimental type of study control becomes an important part. There should be balance between internal and external validity in establishing this validity sometimes they keep problem in secondary position. (External Validity, 2013)Both internal and external validity are not captured in a single experiment.

Another problem social scientist is facing is getting the permission from the authorities. Sometime after selecting the sample by using certain sampling technique they may not get permission from the authorities to conduct the research. They are forced to conduct experiment wherever they are getting permission. Suppose a researcher after adopting stratified random sampling techniques selected some schools for conducting experiment. If s/he finds that authorities from the selected schools are not ready to give permission then s/he finds it difficult to proceed his/her research further. S/he cannot compel the school authorities to give permission because s/he selected the school randomly. Rule (7) given by Glenn Firebaugh can be used in this situation.

In social science research, experiment is done with human beings; therefore their cooperation is very important. In many cases we include subject without their consent. Suppose a school gives

permission to carry out certain research then all students selected for the study are compelled to be subject of the study. But students/subjects should not be compelled like this; even their permission for cooperation should be made compulsory. In some developing and developed countries getting permission from subject is mandatory. (U.S. Department of Health & Human Services, 2010) Except as provided elsewhere in this policy, no investigator may involve a human being as a subject in research covered by this policy unless the investigator has obtained the legally effective informed consent of the subject or the subject's legally authorized representative. An investigator shall seek such consent only under circumstances that provide the prospective subject or the representative sufficient opportunity to consider whether or not to participate and that minimize the possibility of coercion or undue influence. The information that is given to the subject or the representative shall be in language understandable to the subject or the representative. No informed consent, whether oral or written, may include any exculpatory language through which the subject or the representative is made to waive or appear to waive any of the subject's legal rights, or releases or appears to release the investigator, the sponsor, the institution or its agents from liability for negligence.

Sometimes social scientist gets some result after data analysis which they did not expect like there is no significant difference between the methods used. That is the new method the researcher developed is as effective as the existing method. Researcher becomes upset and thinks that the new method they developed may not be good. But there are possibilities that subject did not want to change the mindset that is according to them old method is the best and they might have responded accordingly. Unidirectional approach should be avoided data should be collected in multidirectional and then only we can conclude. Sometimes because of this unidirectional approach we may conclude that the new method that the social scientist developed is not effective. But there may be possibility if the researcher conducted the research in multidirectional result might be different. Holistic approach should be used to solve a problem and should be viewed in all possible direction. That is different set of data should be collected from the same sample and hypotheses should be verified accordingly to arrive at final result. Social scientist should be given freedom to conducts multidirectional approach. If researcher opts for multidirectional approach they don't know how to collate the results obtained by such methods because there are few literatures which discusses such methods.

Therefore research methodologies should be developed according to the need of the social scientist. They should be allowed to mix methodologies and modify it according to the need of their problem.

6. Conclusion

- Social scientist face genuine problem because they are using humans as their subject.
- They borrow methodologies from outside which may not be appropriate
- There is a dire need to develop methodologies compatible to social science.
- Modifications in the existing methodologies should be allowed according to the specific problem and should not be compelled to use the existing methodologies.
- Methodologies can be mixed and a new can be formed according to the specific need of social scientist.
- Need of multidirectional approach in social science research.

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

Ms. Pramila Ramani¹, Prof. Dr. Harsha Patadia²

¹(School of Science and Education, Navrachana University, India)

²(Faculty of Education and Psychology, Department of Education, CASE, the M.S. University of Baroda, India)

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 :

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

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

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

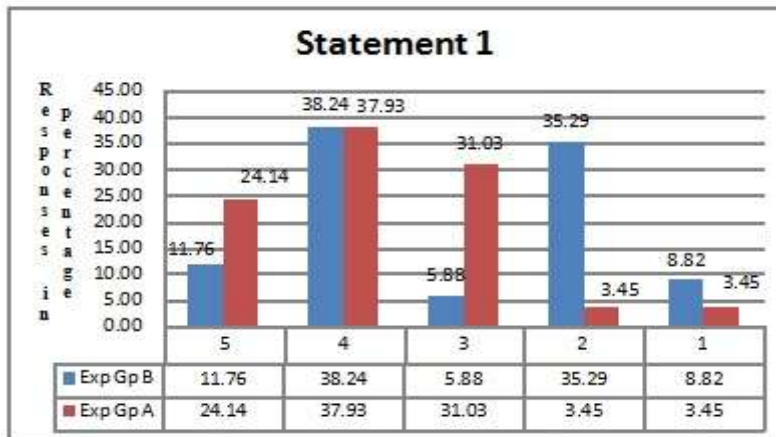
degrees of freedom = 4

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

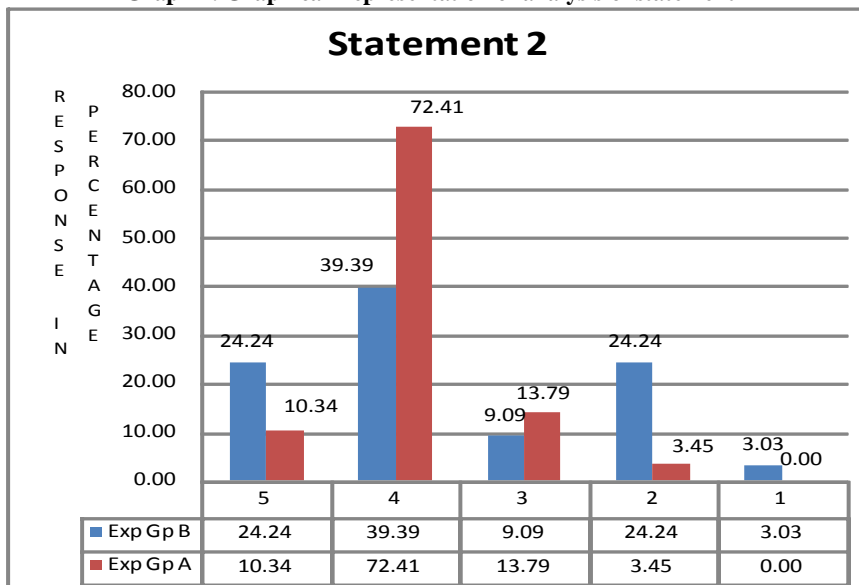
Degrees of freedom = 4

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

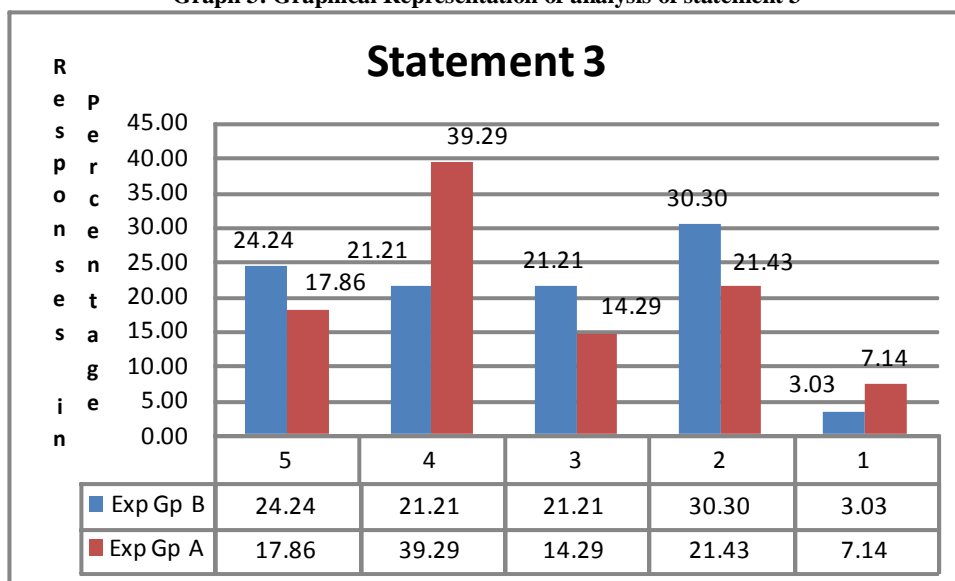
Chi-Square statistics= 3.35

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

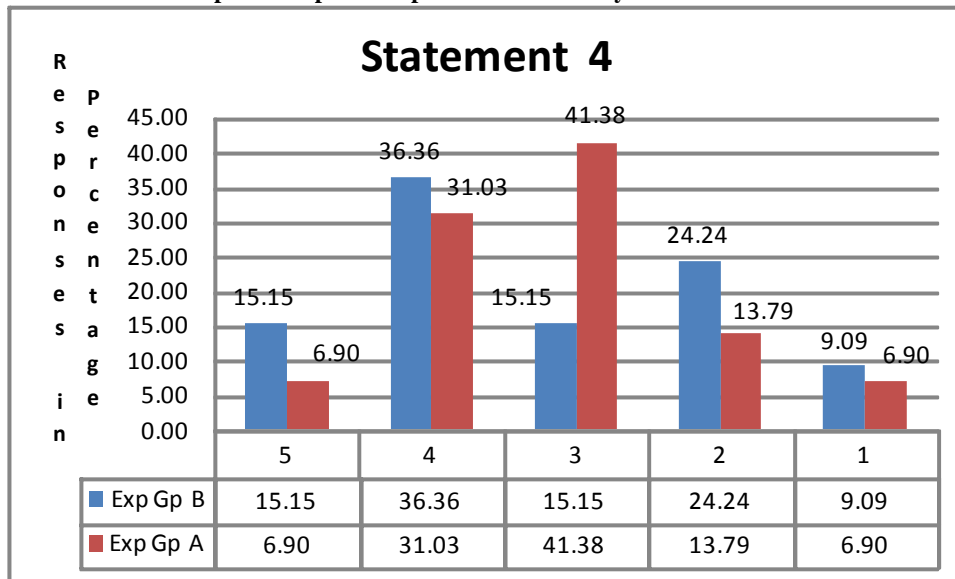
Chi-Square statistics = 5.90

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

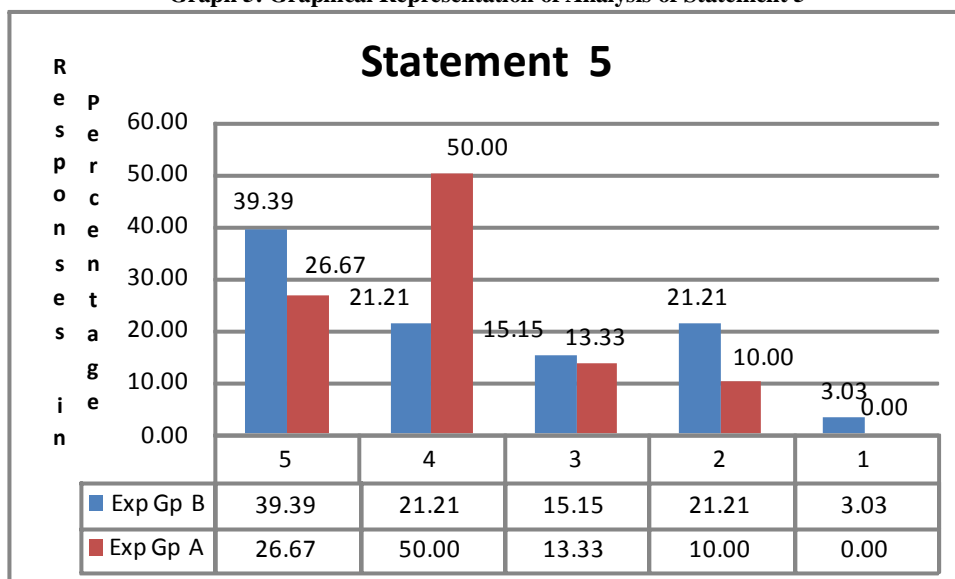
Chi-Square statistics= 6.68

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

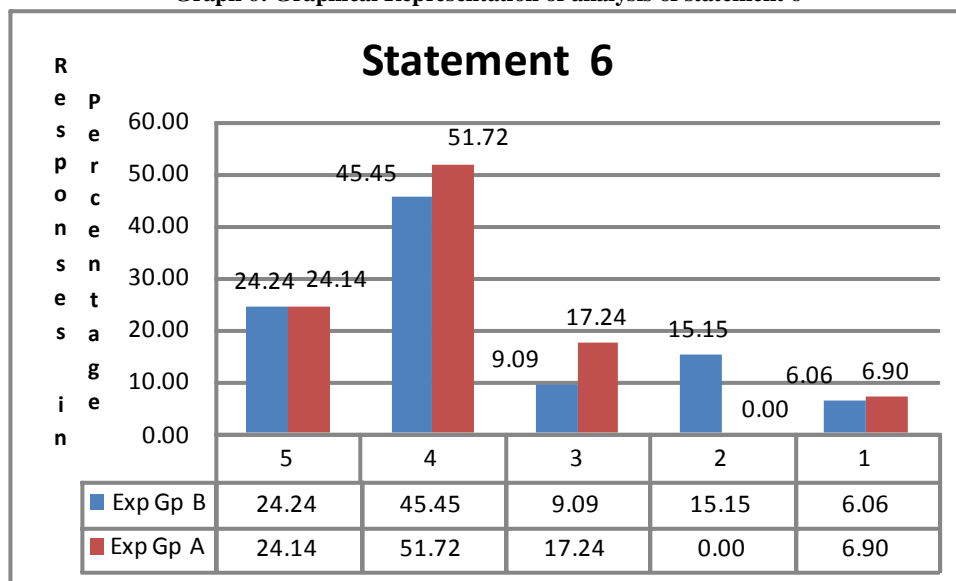
Chi-Square statistics= 5.33

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



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

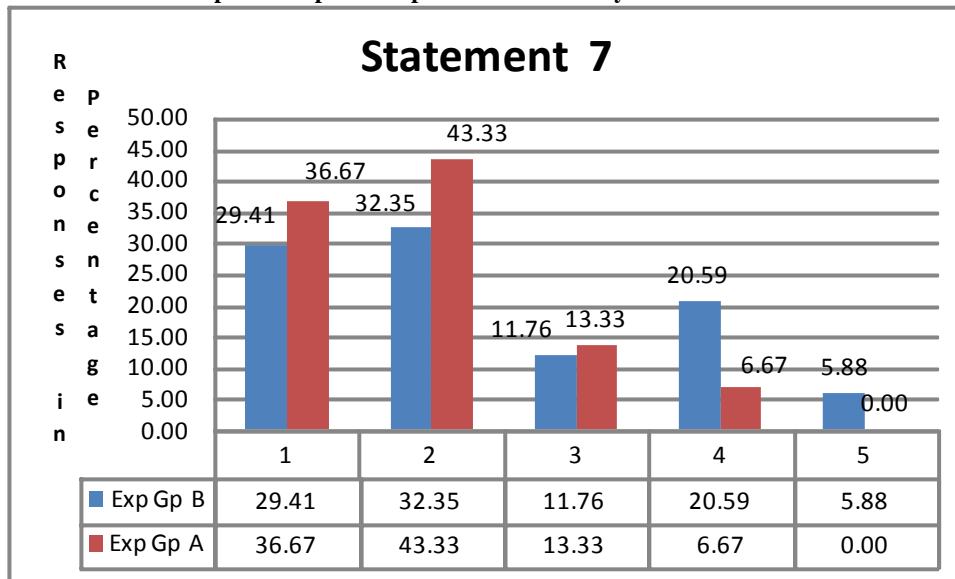
Chi-Square statistics = 4.76

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



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

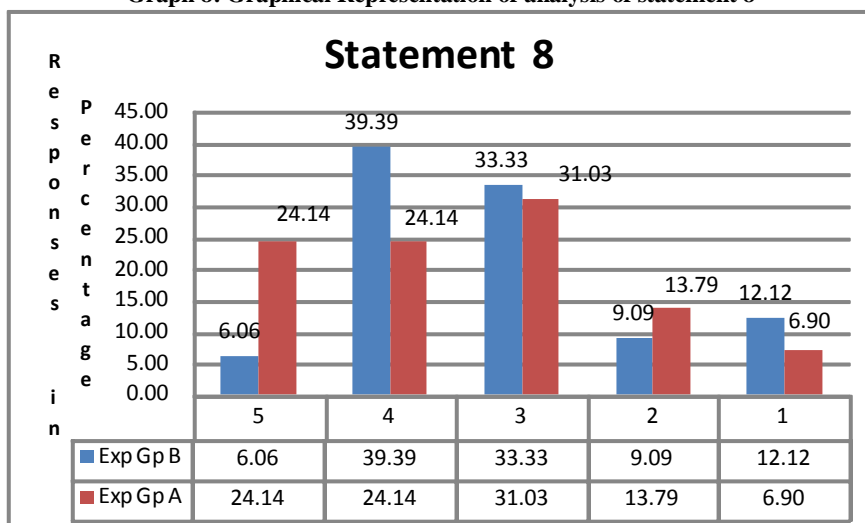
Chi-Square statistics = 5.35

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



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

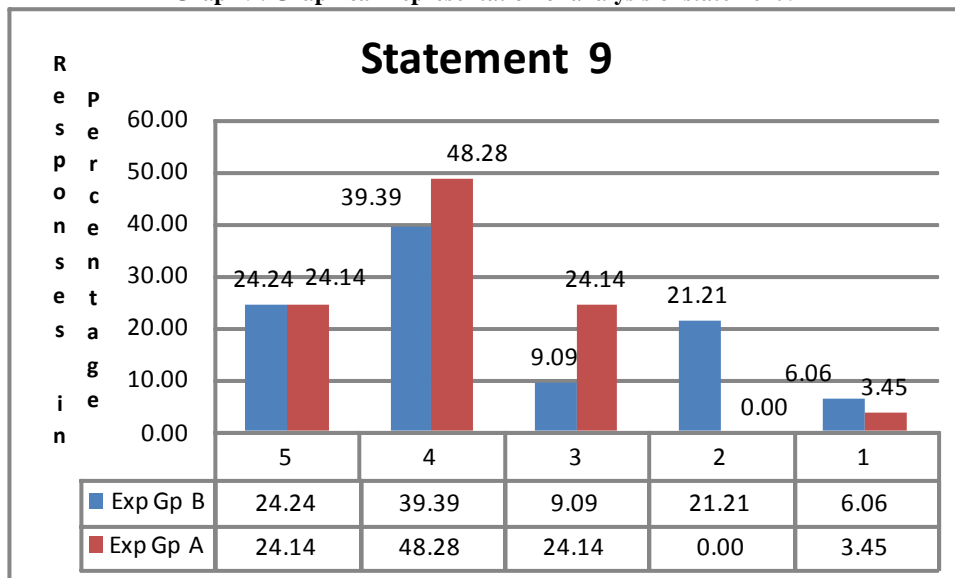
Chi-Square statistics = 8.82

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



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

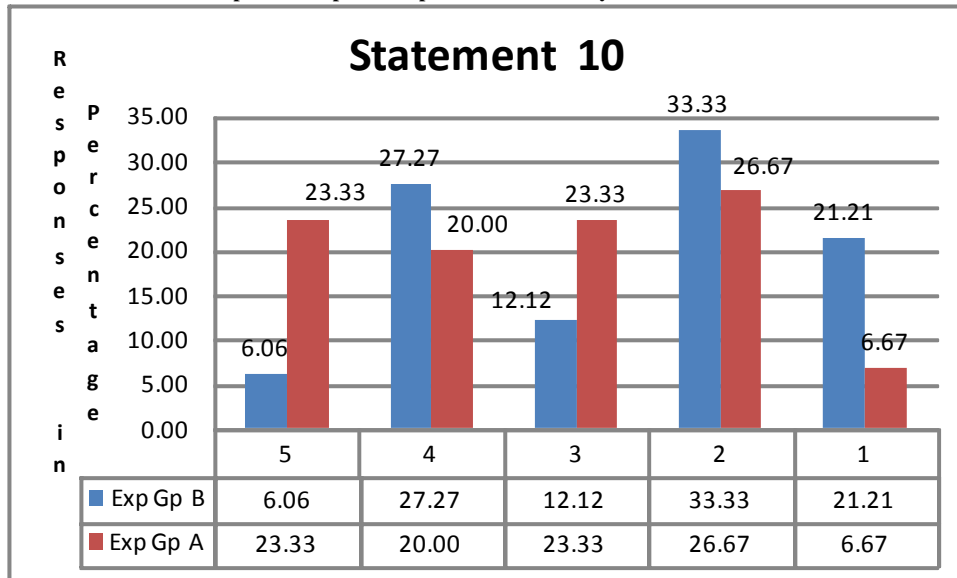
Chi-Square statistics = 7.32

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 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

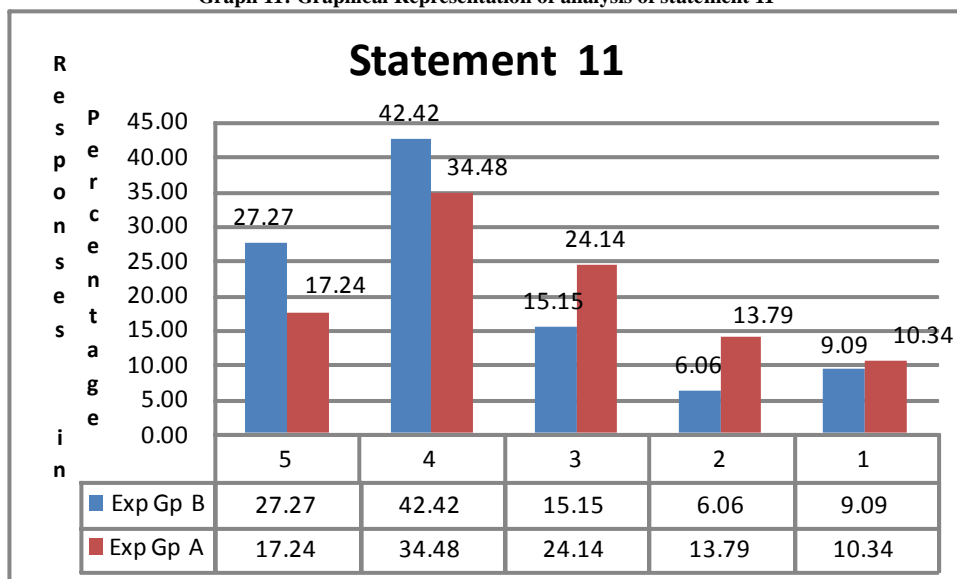
Chi-Square statistics = 2.56

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 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

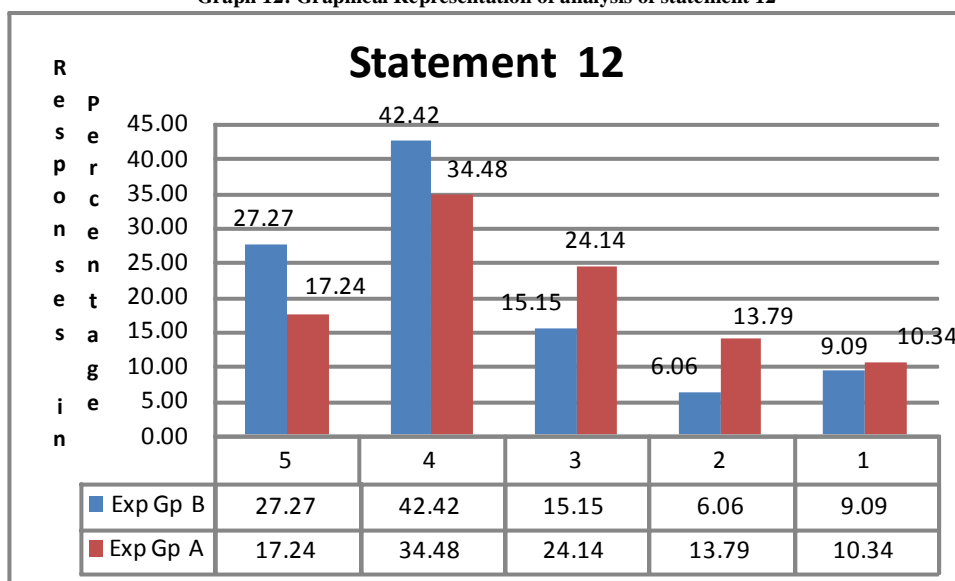
Chi-Square statistics= 1.52

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



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

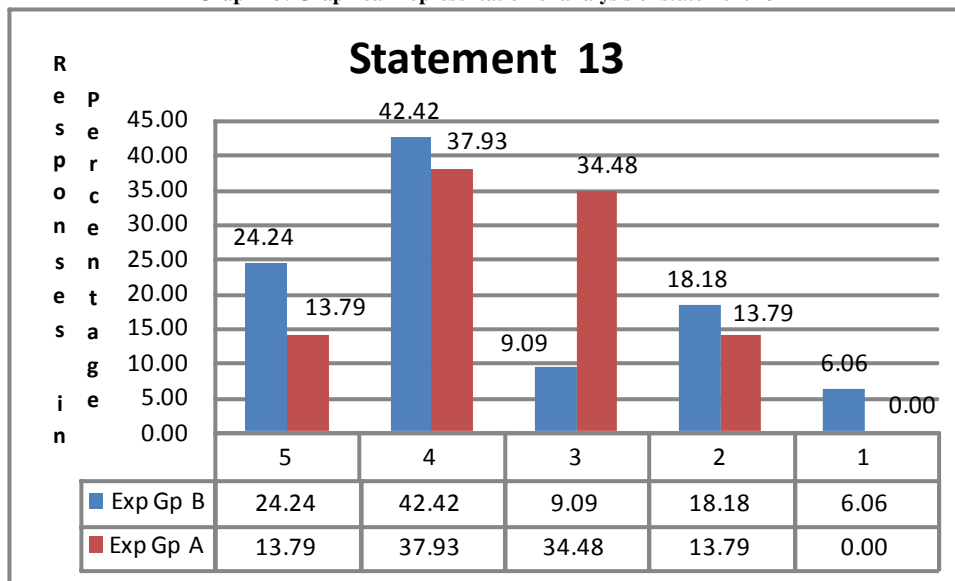
Chi-Square statistics = 7.64

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 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

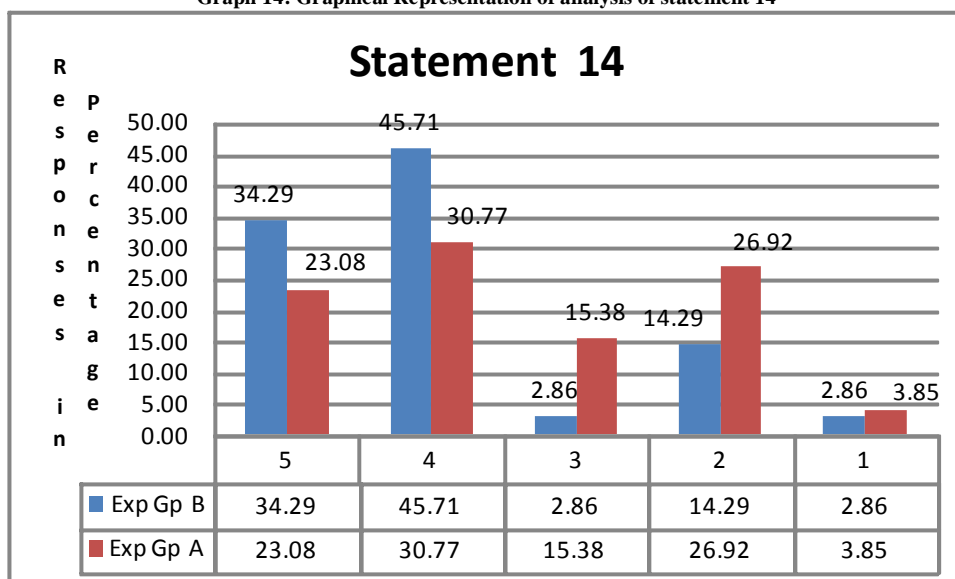
Chi-Square statistics = 5.59

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 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

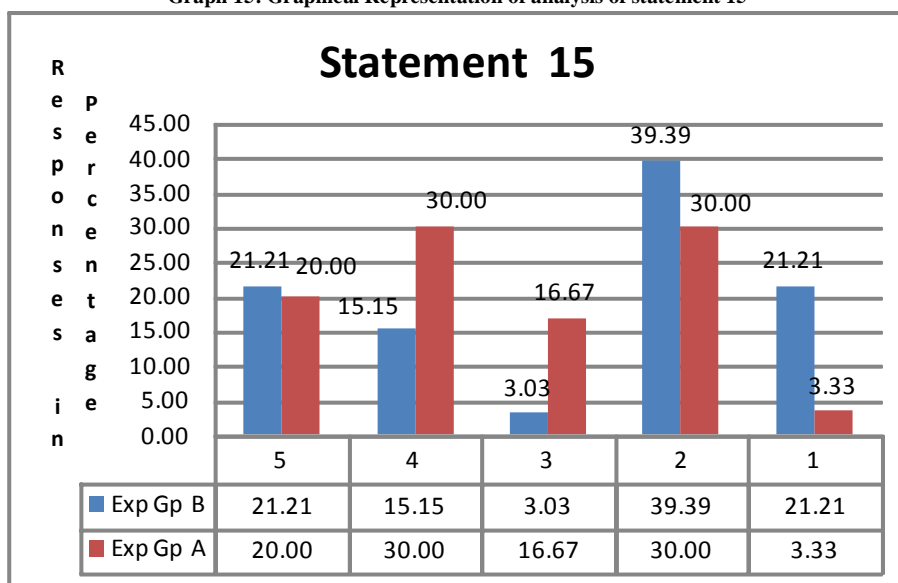
Chi-Square statistics = 8.99

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



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

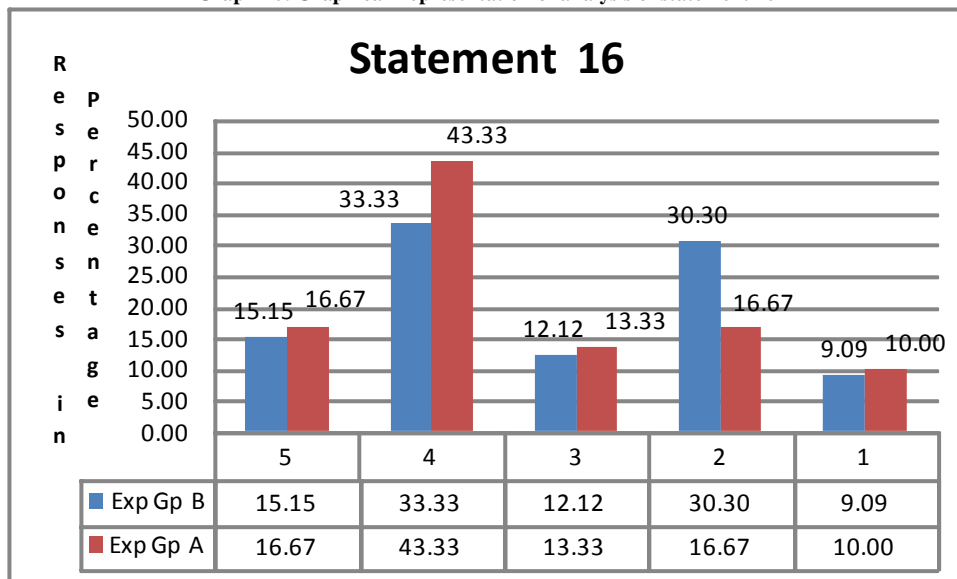
Chi-Square statistics= 1.69

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 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

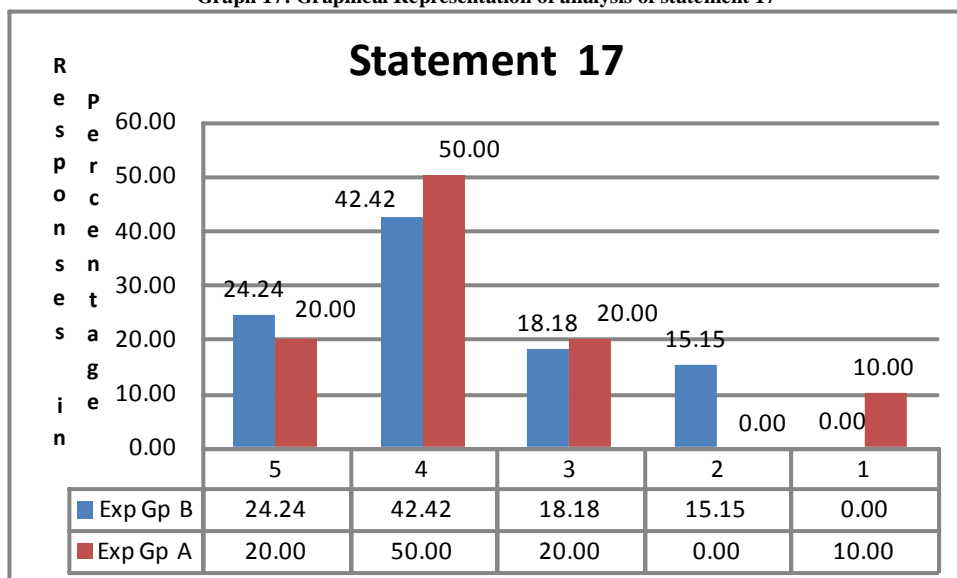
Chi-Square statistics = 8.20

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 18: Learning through CAI was waste of time.

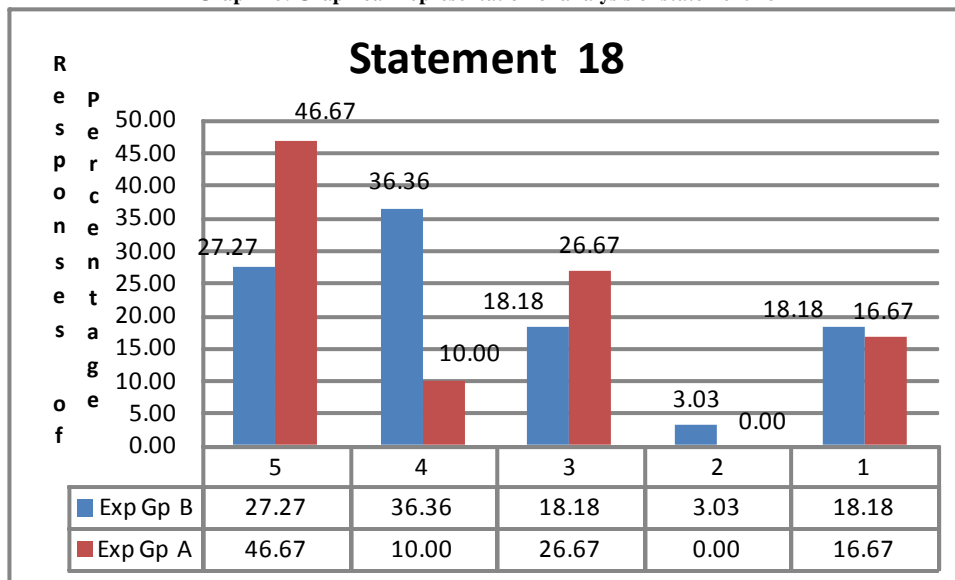
Table 20: Responses for statement 18

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



Statement 19: Illustrations given in CAI are related to day today life experiences.

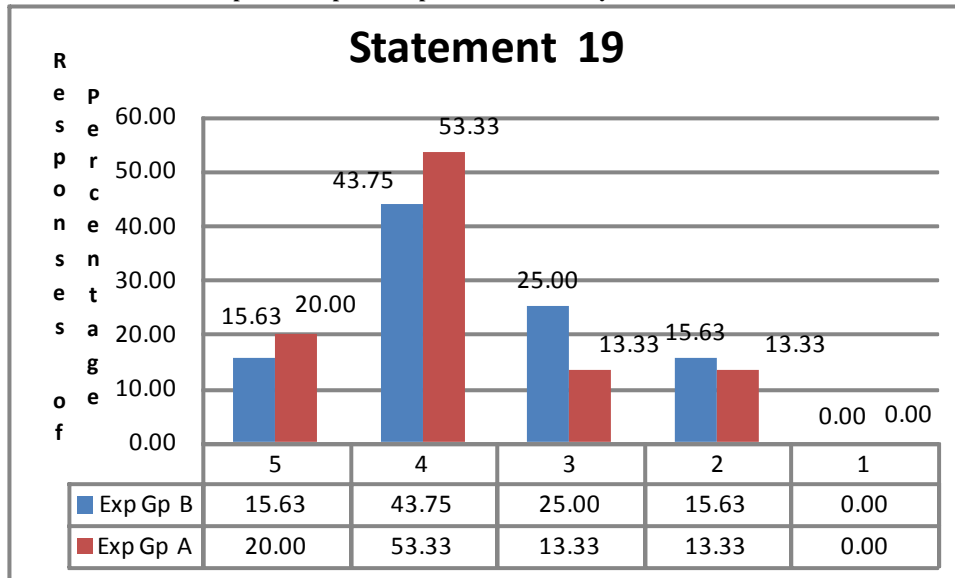
Table 21: Responses for statement 19

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 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

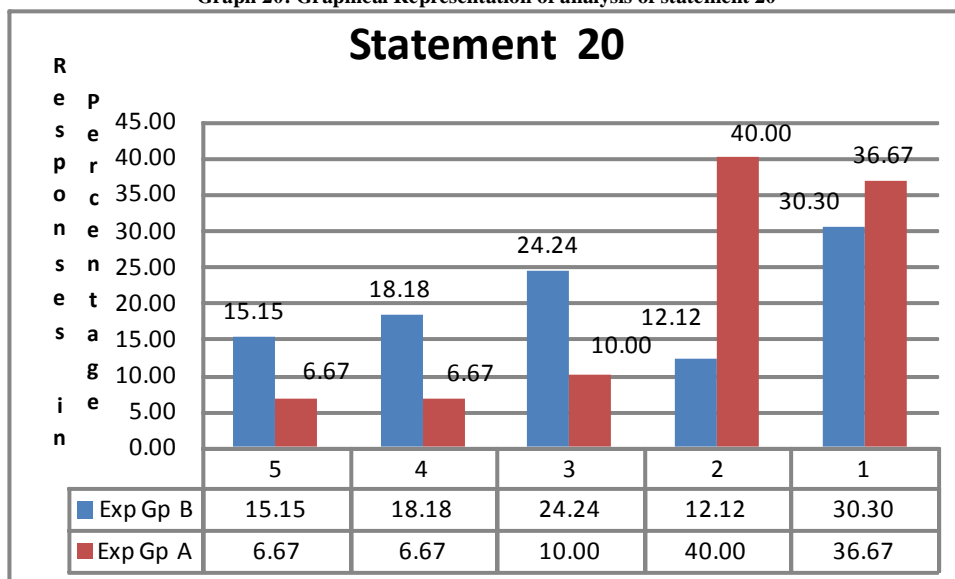
Chi-Square statistics= 9.48

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 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

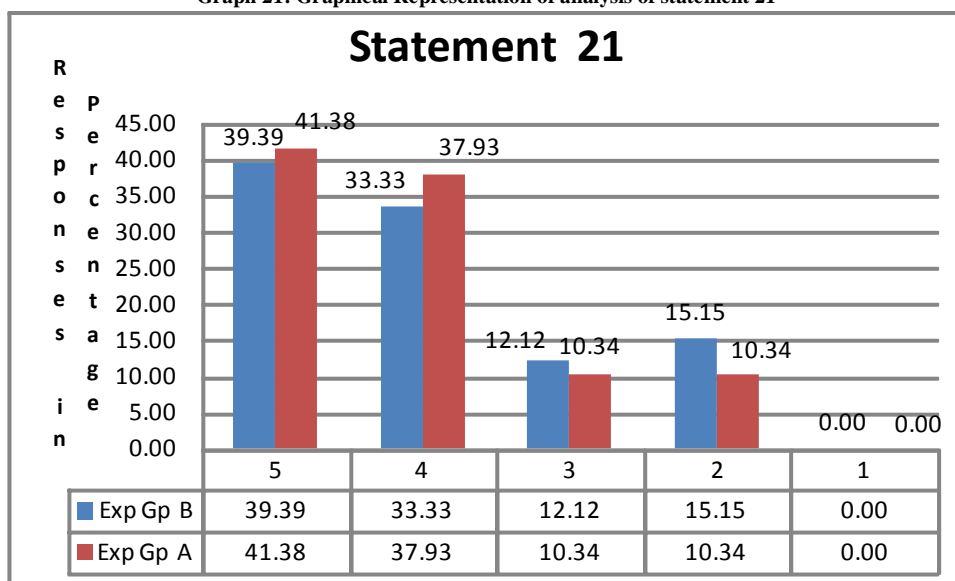
Chi-Square = 0.427

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



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

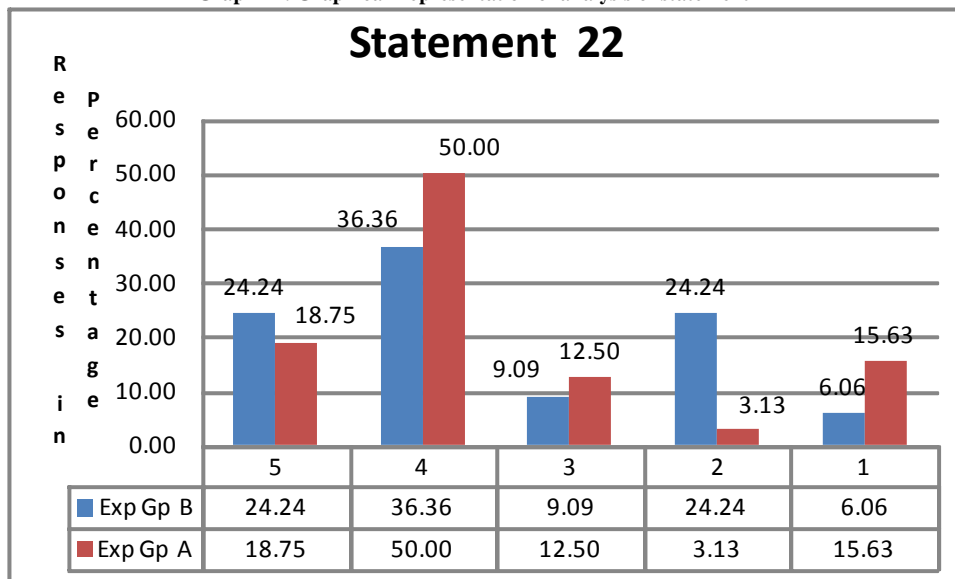
Chi-Square statistics= 7.72

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 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

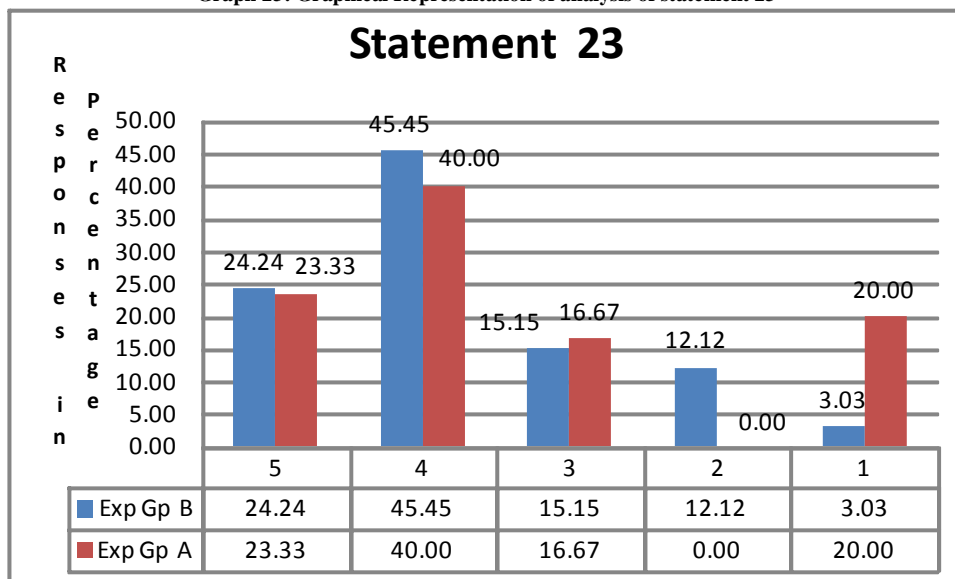
Chi-Square statistics= 7.85

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 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

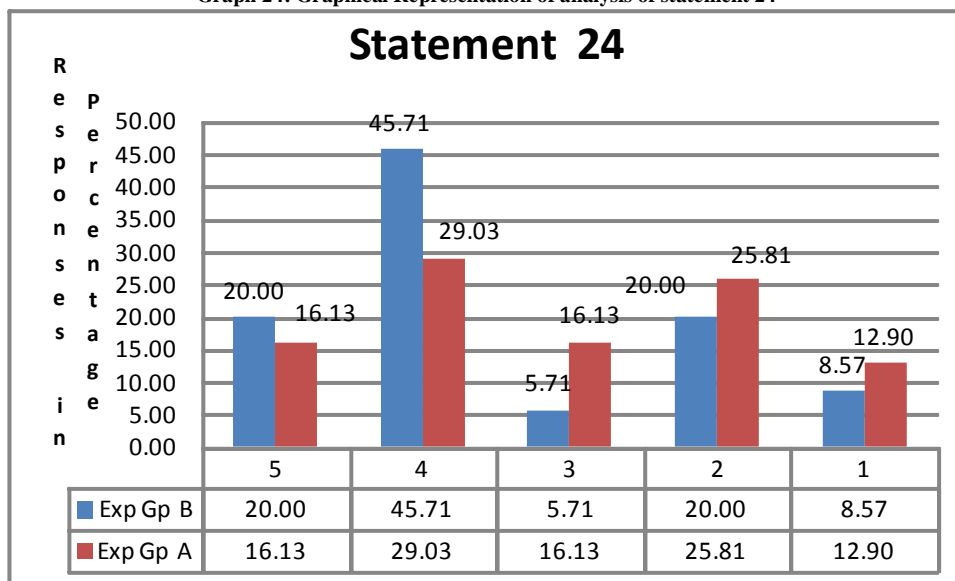
Chi-Square statistics = 3.56

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



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

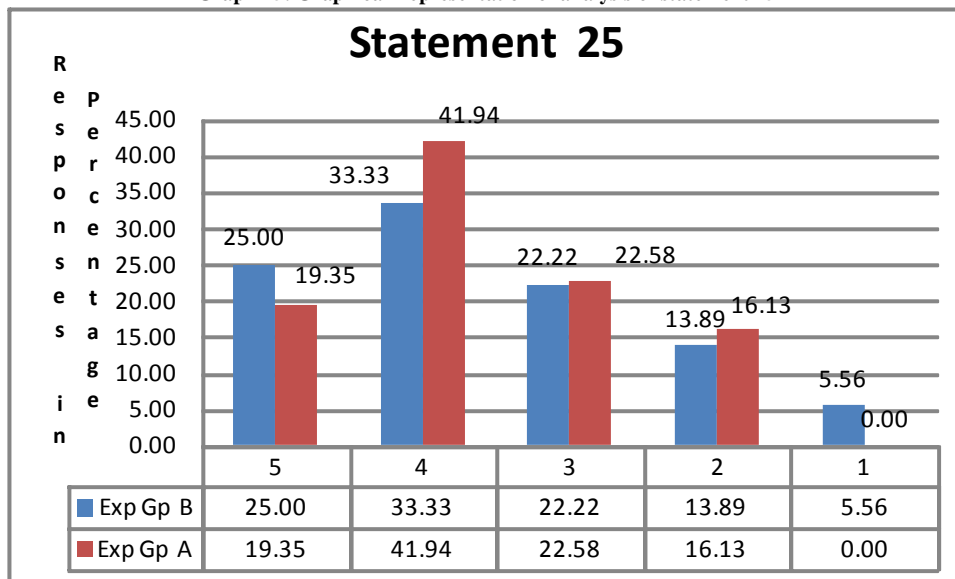
Chi-Square statistics= 2.35

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



Statement 26: Solutions didn't help me whenever I was not able to solve the problem.

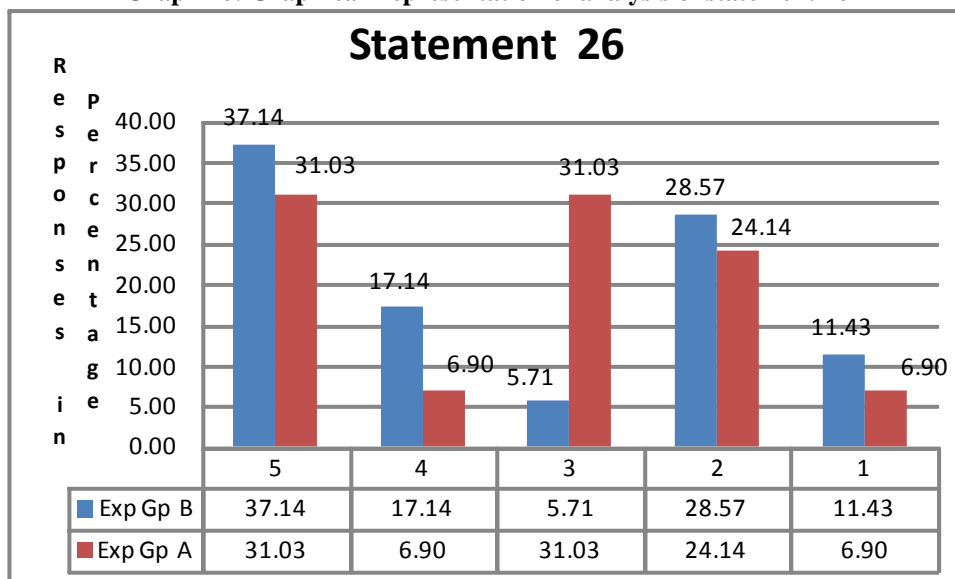
Table 28: Responses for statement 26

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



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

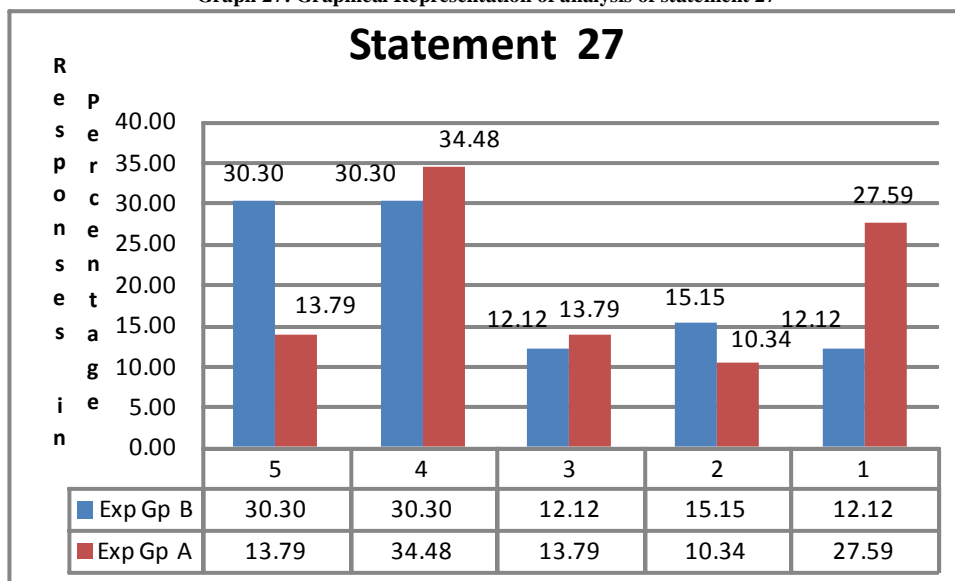
Chi-Square of statistics = 4.16

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

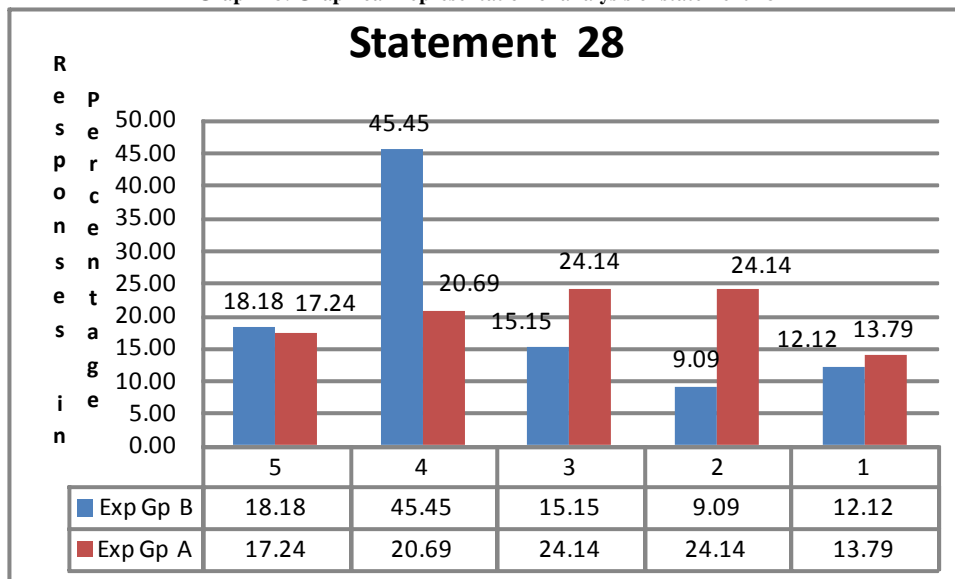
Chi-Square statistics = 5.65

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 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

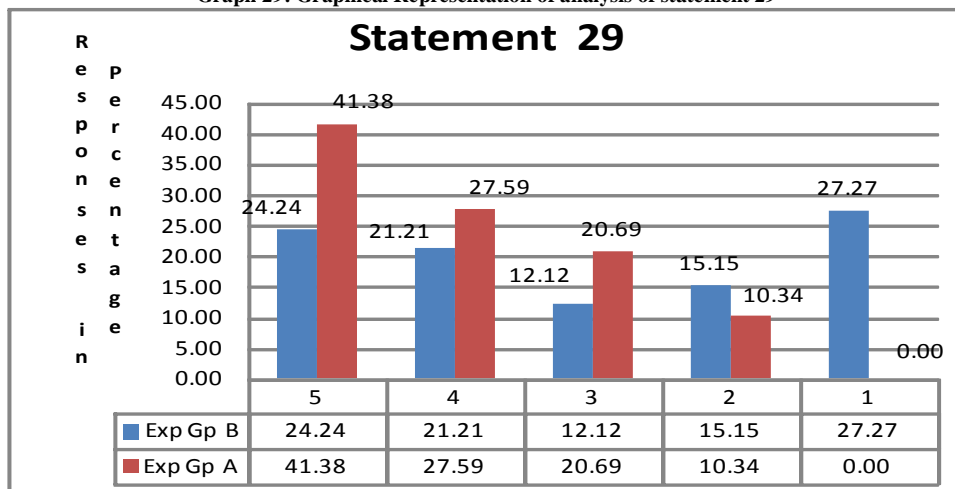
Degrees of freedom = 4

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 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

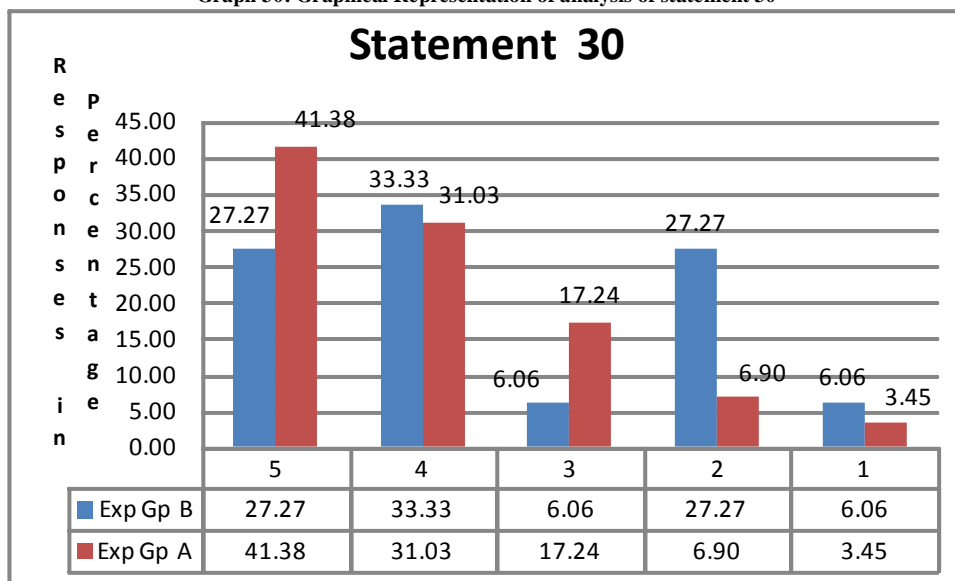
Chi-Square statistics= 6.47

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 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

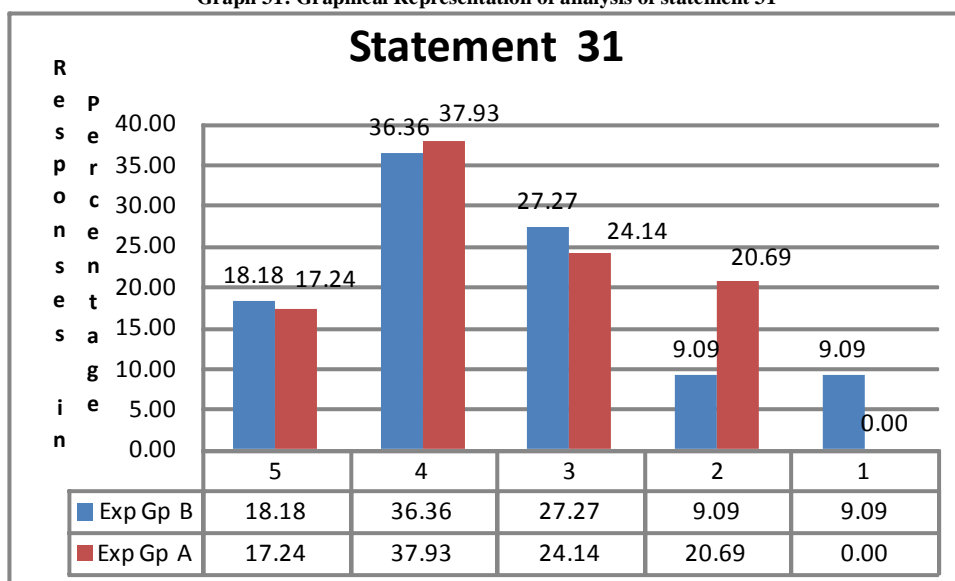
Chi-Square statistics= 4.14

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



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

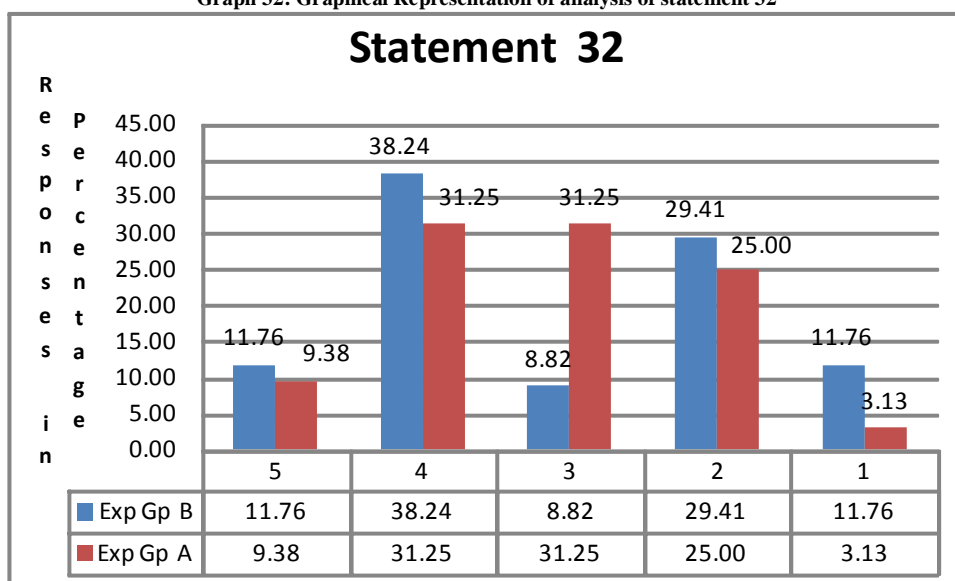
Chi-Square statistics= 6.27

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



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

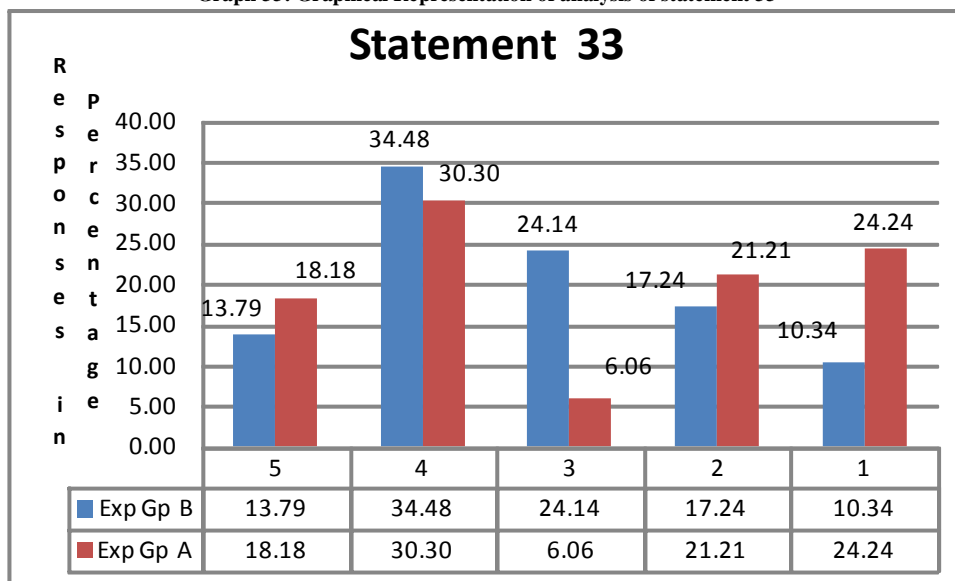
Chi-Square statistics = 5.55

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



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

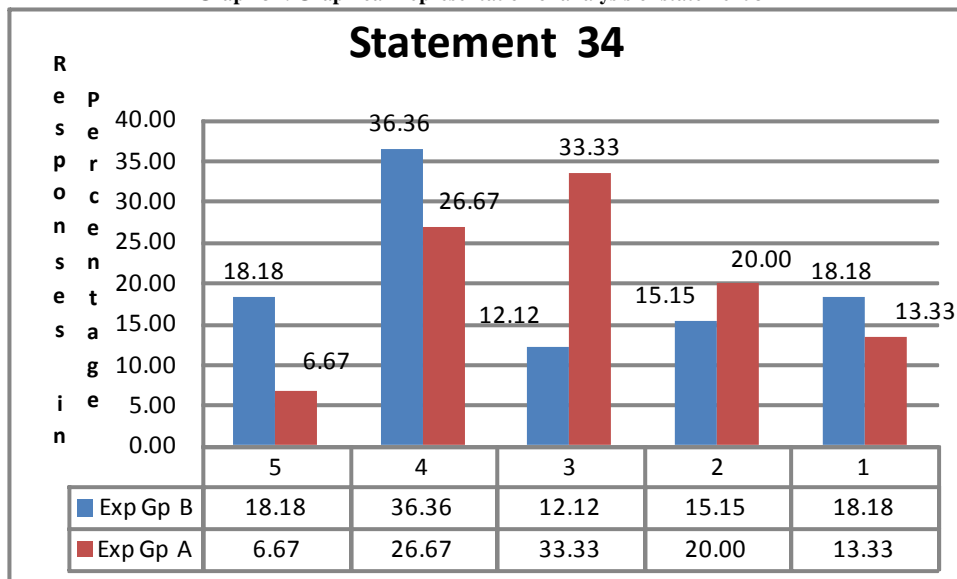
Chi-Square statistics = 5.73

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 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

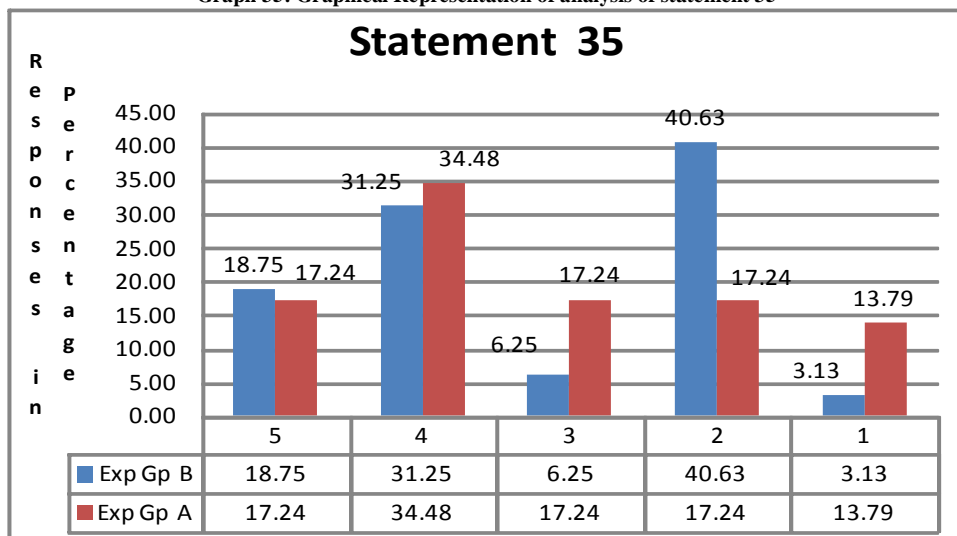
Chi-Square statistics = 6.60

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 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

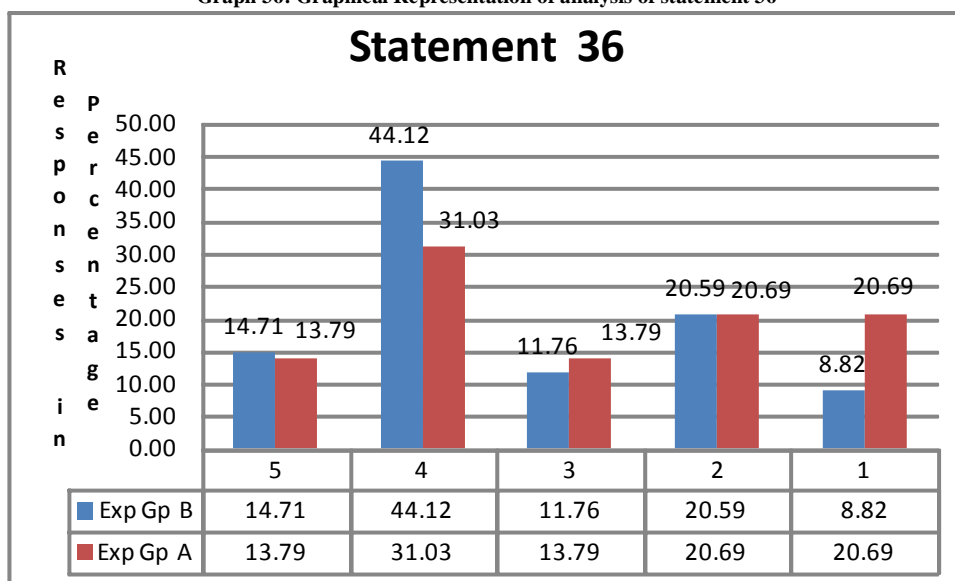
Chi-Square statistics = 2.31

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



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

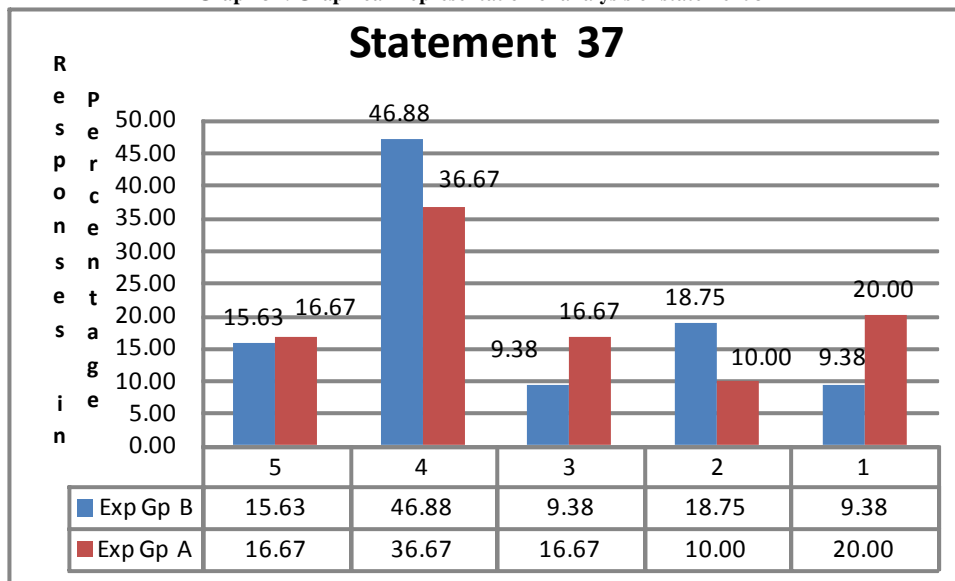
Chi-Square = 3.05

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 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

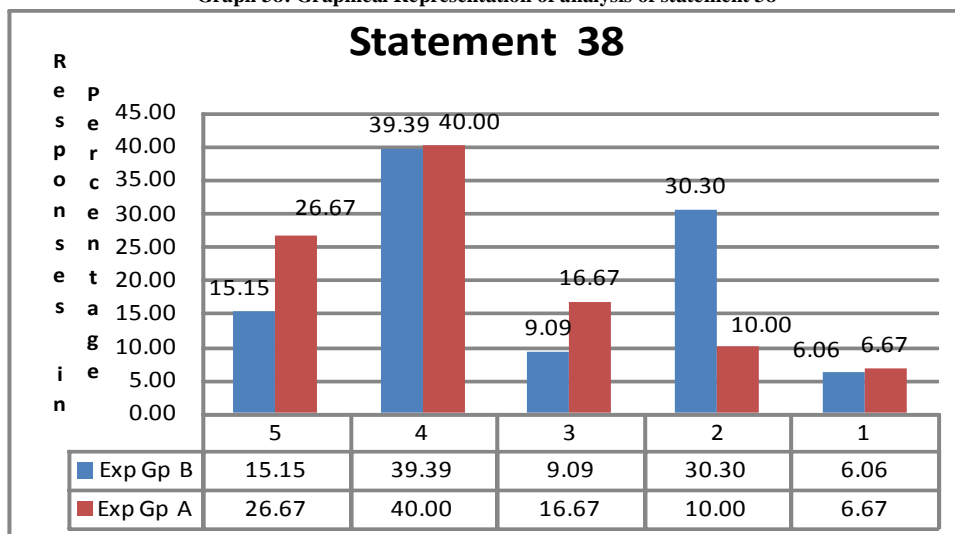
Chi-Square statistics = 4.87

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 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

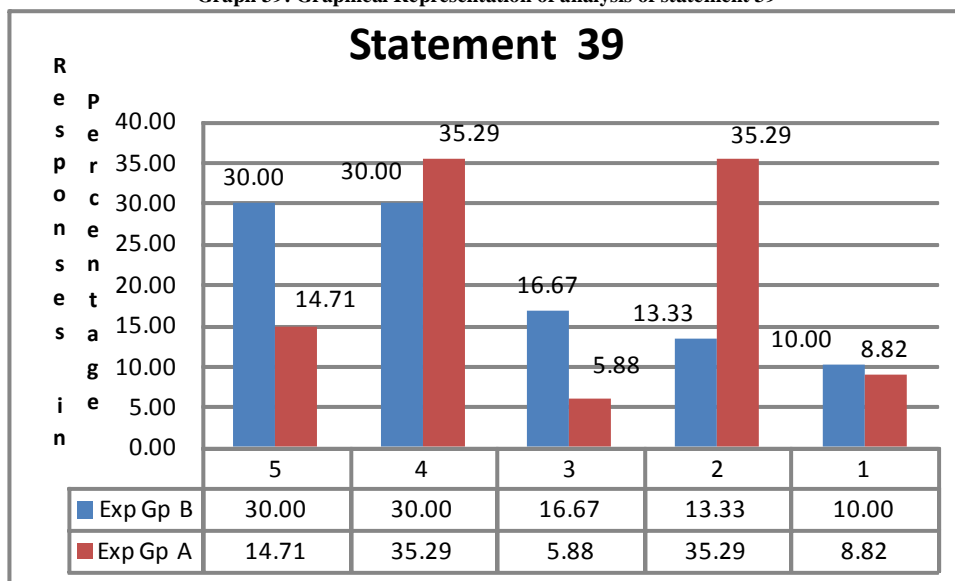
Chi-Square statistics = 6.63

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



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

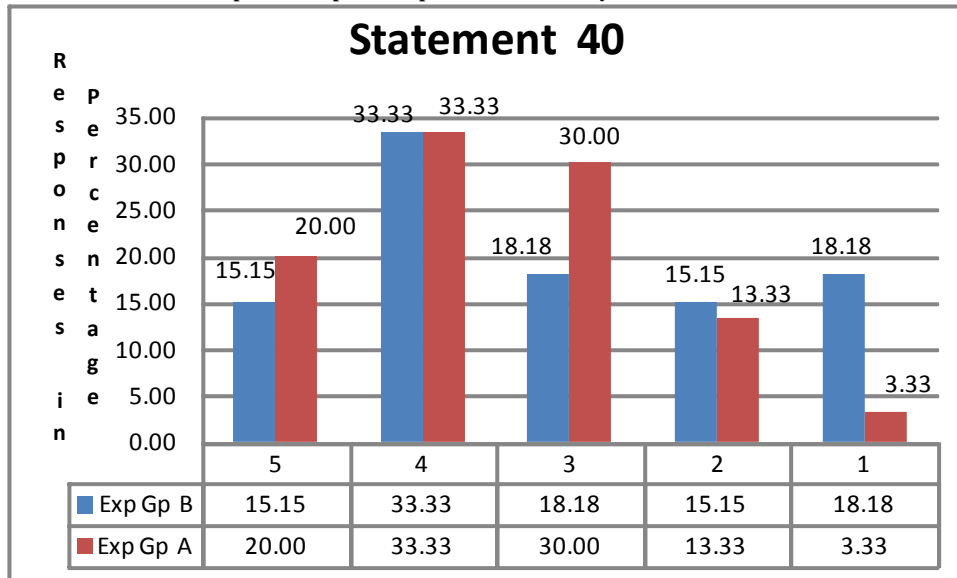
Chi-Square statistics = 4.29

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 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

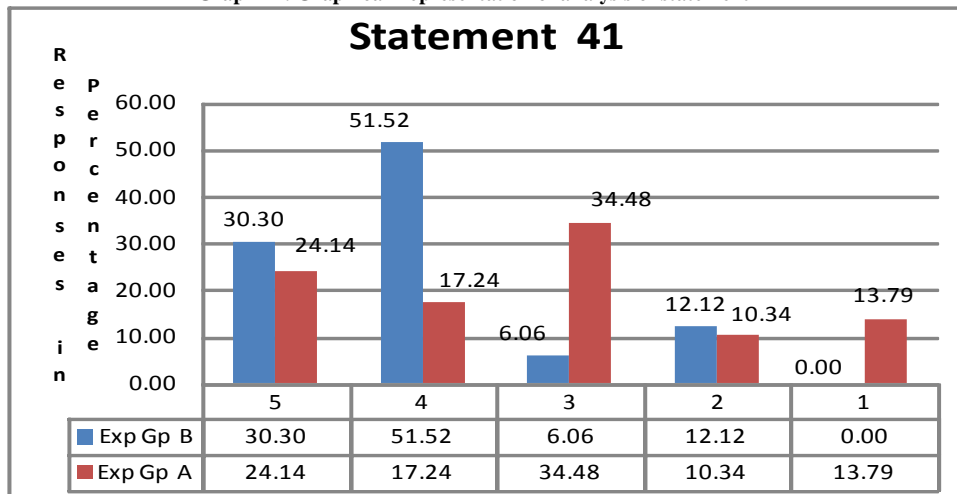
Degrees of freedom = 4

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 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

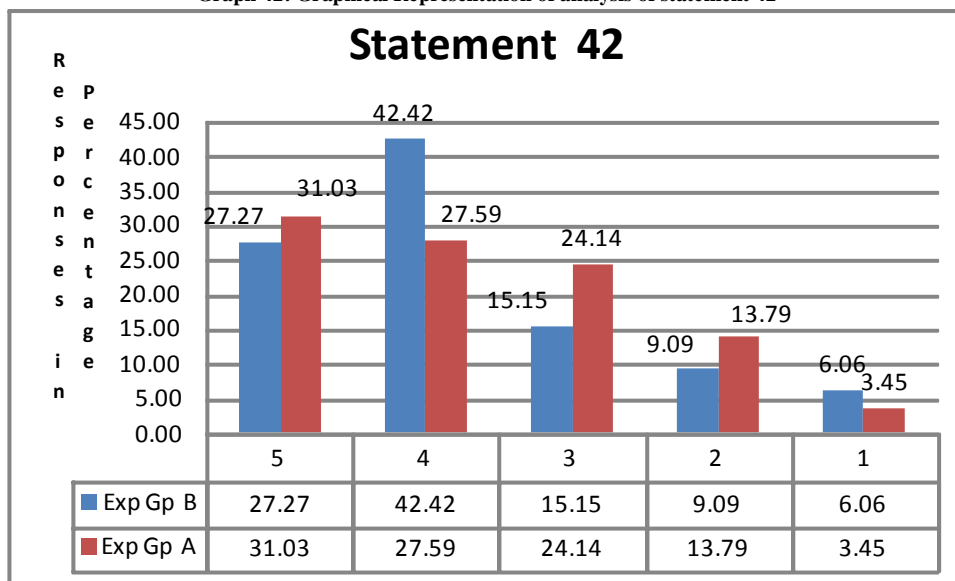
Chi-Square statistics= 2.20

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 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

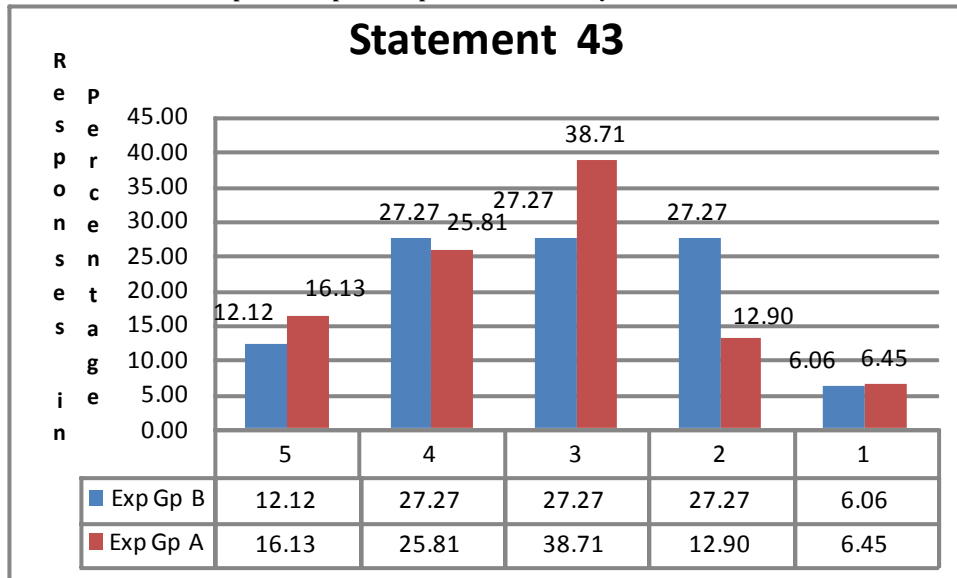
Chi-Square statistics = 2.46

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

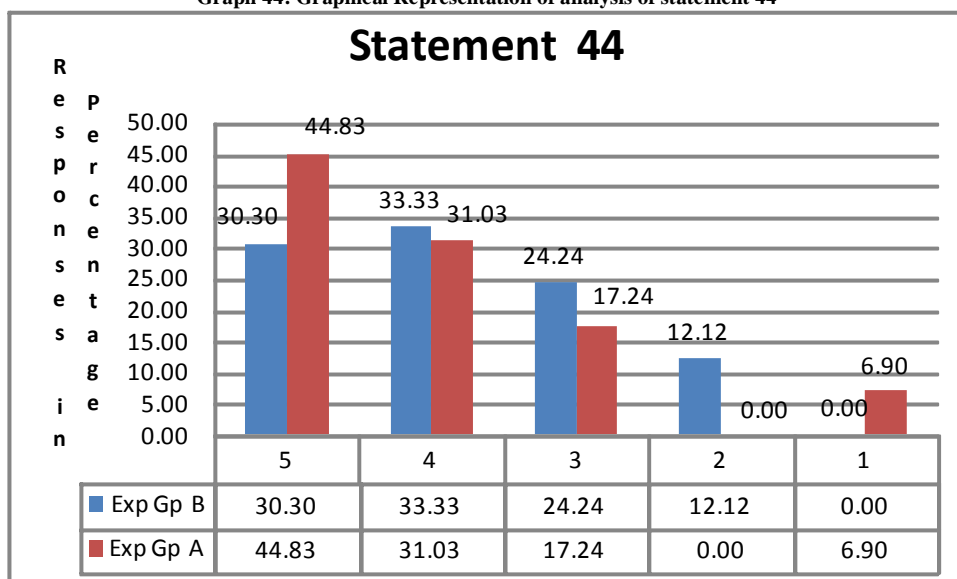
Chi-square statistics = 7.05

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

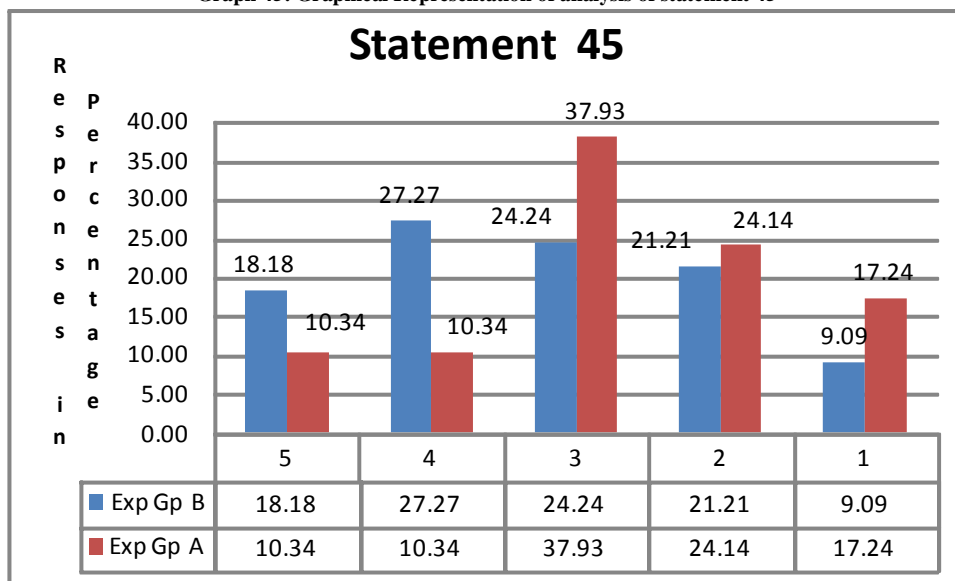
Chi-square statistics = 4.74

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



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

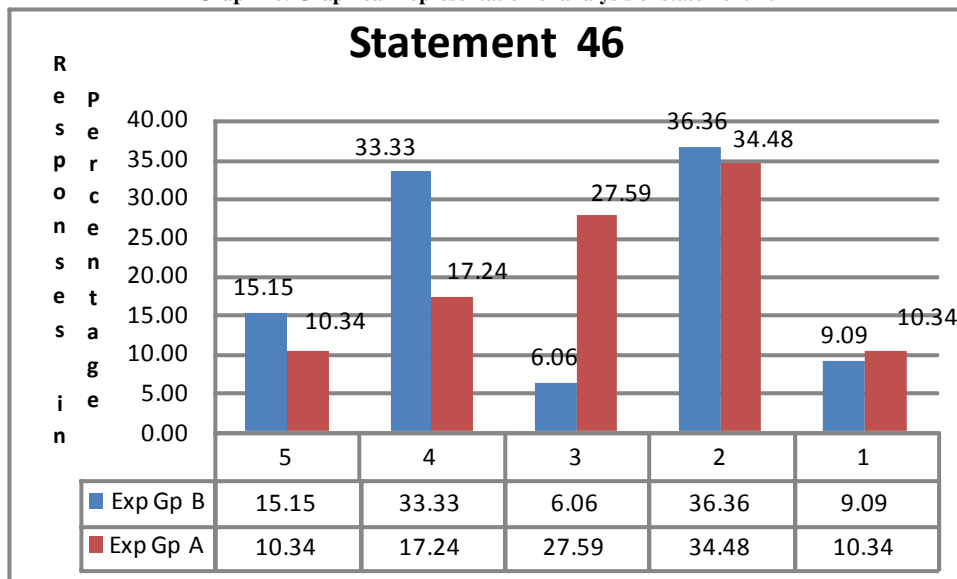
Chi-square statistics = 6.30

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 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

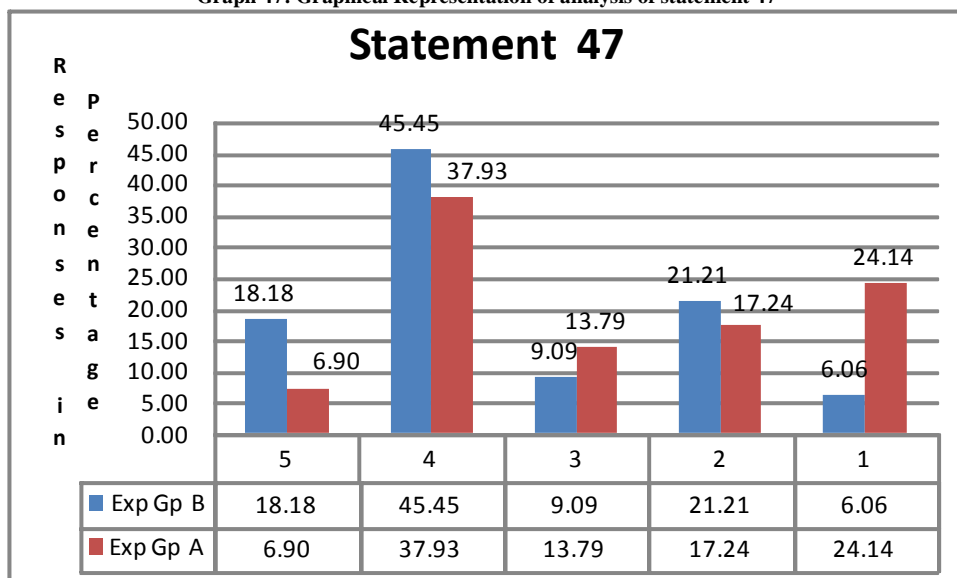
Chi-square statistics = 5.63

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 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

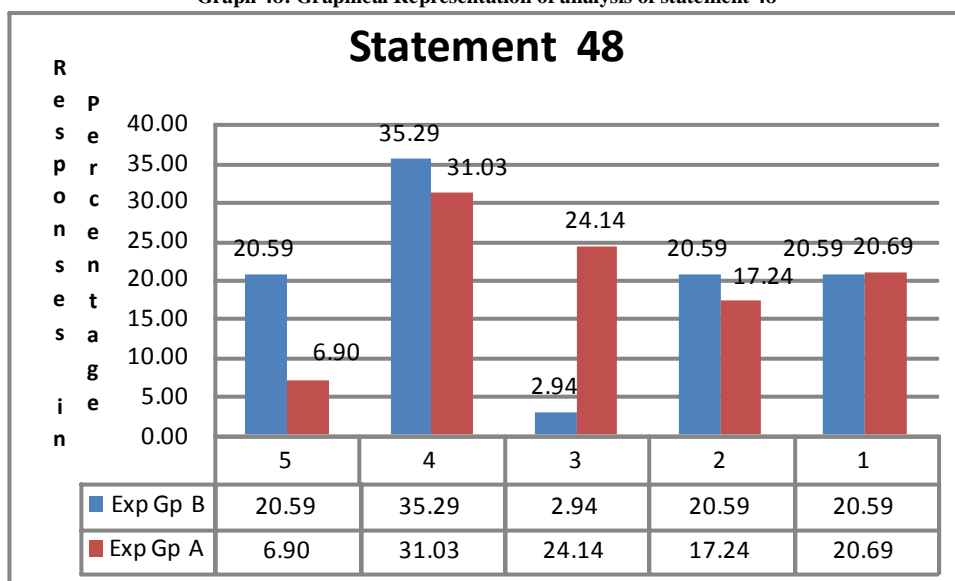
Chi-square statistics = 7.77

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



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

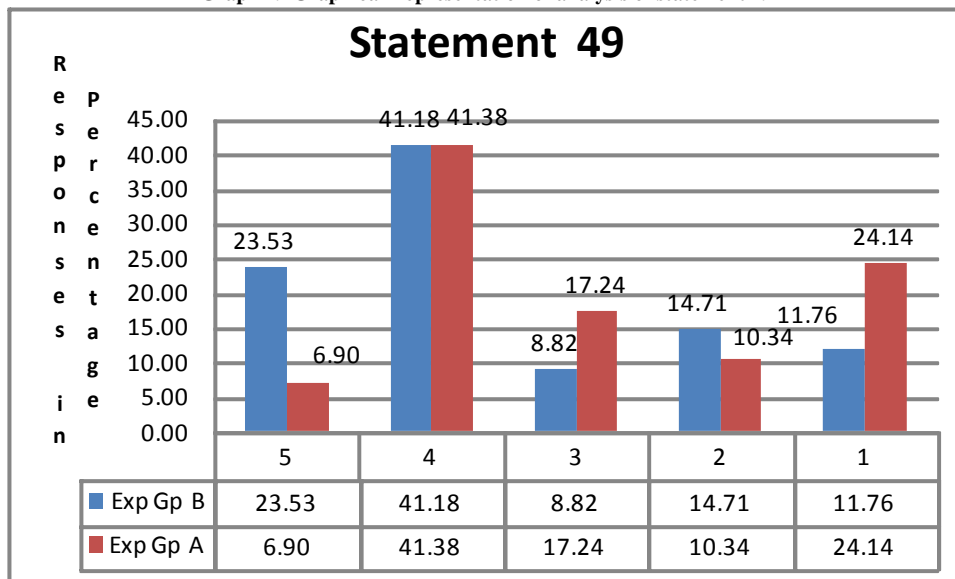
Chi-square statistics = 5.21

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



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

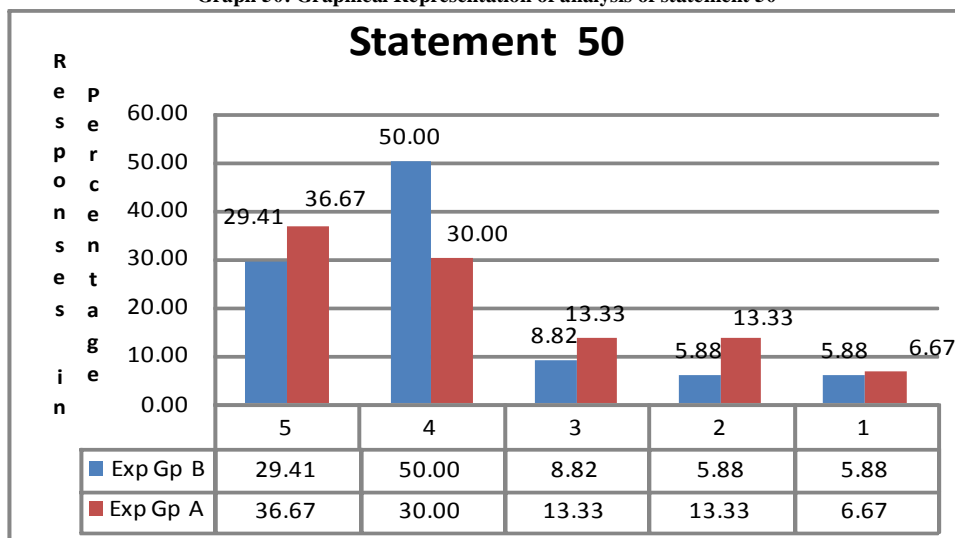
Chi-square statistics = 3.08

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



Statement 51: Discussion with mathematics teacher is needed along with CAI.

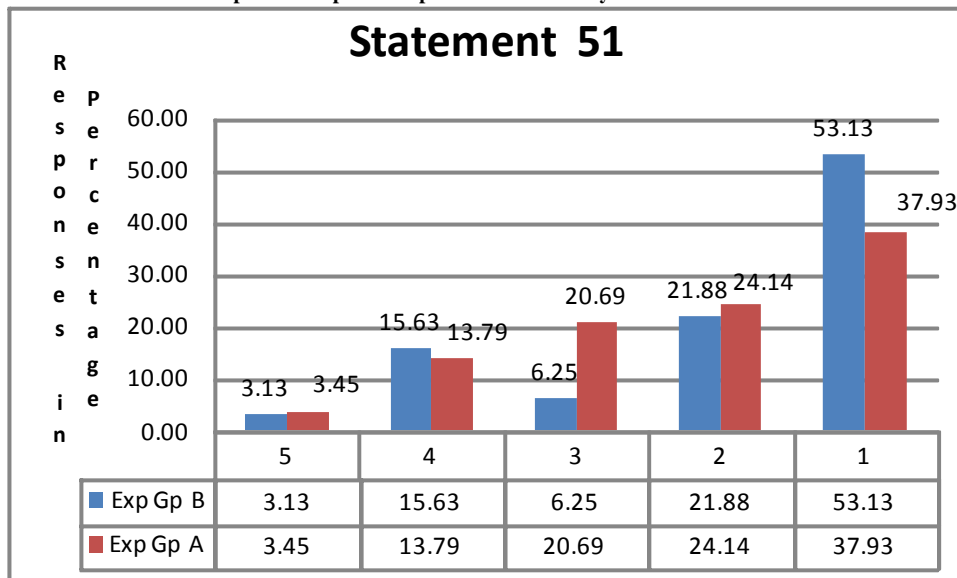
Table 53: Responses for statement 51

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



Statement 52: Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.

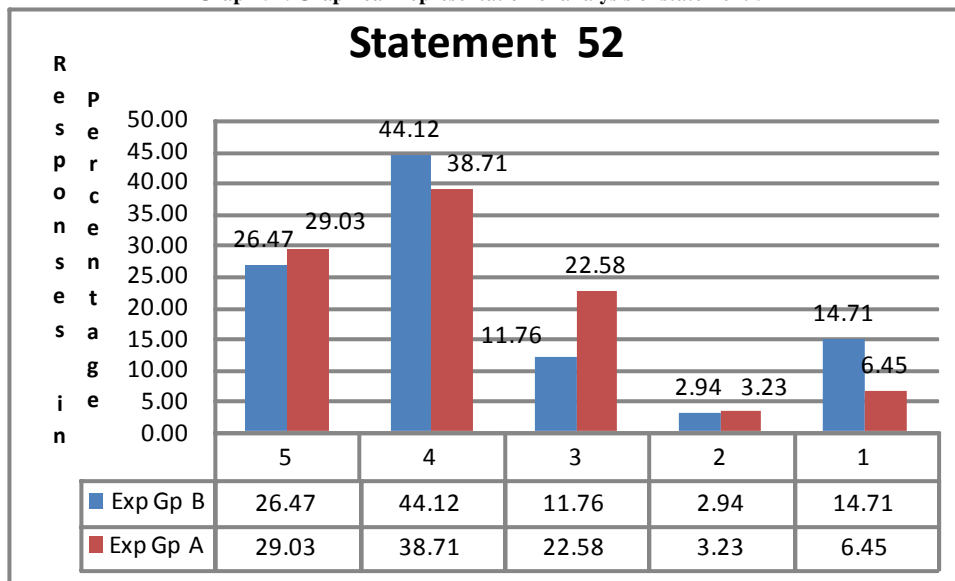
Table 54: Responses for statement 52

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



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

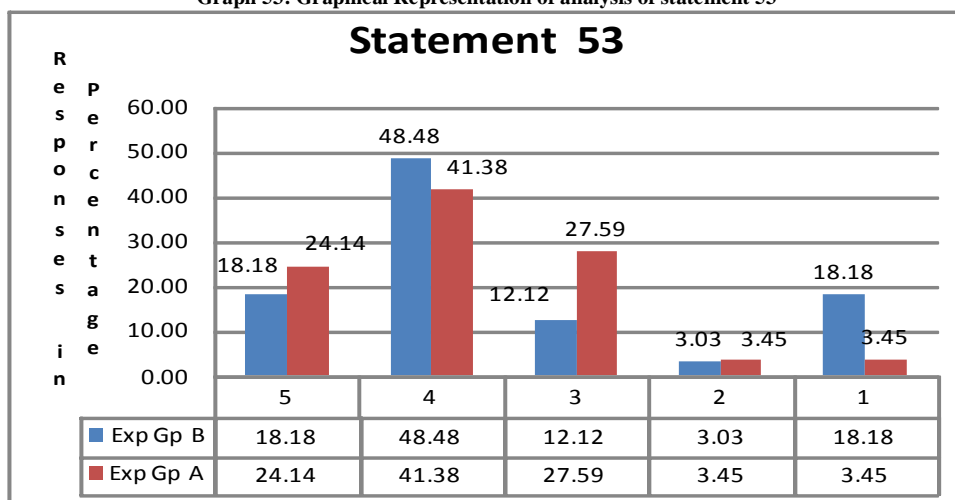
Chi-square statistics = 5.32

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



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

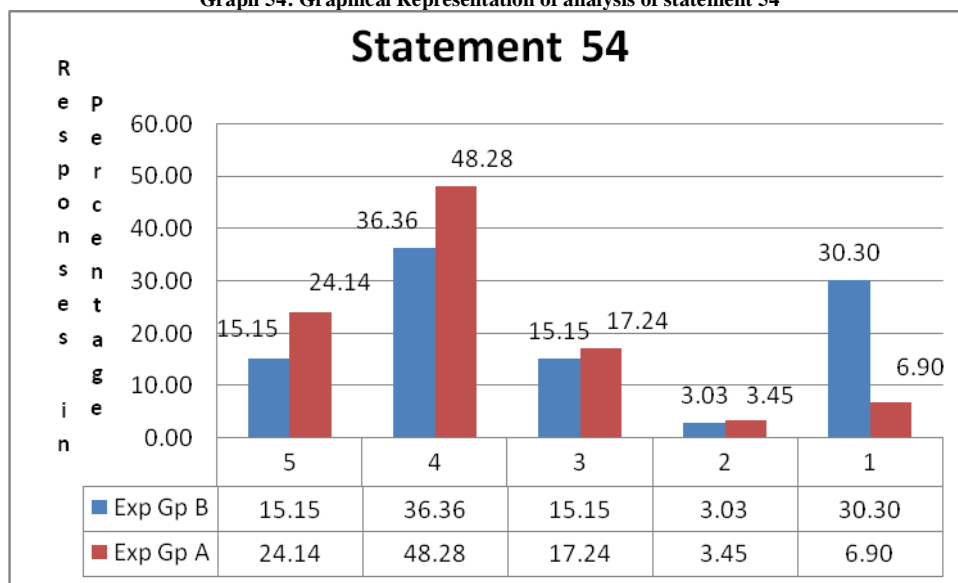
Chi-square statistics = 5.59

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



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

We investigators are thankful to

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3. Last but not least to all those students participated in our study.

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Students' Reaction on Computer Assisted Instruction for Teaching and Learning Arithmetic

Ms. Pramila Gururajan

Assistant Professor

School of Science and Education

Navrachana University, India

Prof. Dr. Harsha Patadia

Professor

Faculty of Education and Psychology

MS University of Baroda (CASE), India

Abstract

Learning mathematics requires lot of practice and dedication. There are few teachers who can teach this subject interestingly therefore in addition to classroom teaching there should be supplement to students. Self learning material with auto instruction should be developed using psychological theories and concepts. Computer can be used for this purpose because it can provide audio visual effects and also face to face interaction with students is possible. Computers can be utilized to develop auto instructional material with the following facilities viz. 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 so they learn better if all the senses are involved in the learning process. In this line investigators developed Computer Assisted Instruction and implemented in one of the schools of Vadodara. Three groups were formed control group (taught through usual conventional method), Experimental Group A(taught through only Computer Assisted Instruction(CAI)) and Experimental Group B(taught through CAI with simultaneous discussion). Reaction scale of five points was developed by the investigators and data were analyzed through chi-square test to know the effectiveness of the developed CAI.

Keywords: Computer Assisted Instruction, Effectiveness, Self Learning Material and auto instruction.

Introduction

Education is very important in all stages of human life. It helps man to live a better life and also helps in social well being. It helps in overall development of personality. Especially, mathematics is part and parcel of our life. Learning mathematics not only helps in understanding other subjects but trains one's mind to think logically and rationally. It develops problem solving ability in day to day life and to think precisely. Learning mathematics demands different faculties of mind. A Student may be good in performing calculation but he may have difficulty in solving problems in geometry which demands lot of logical thinking or vice versa. Unlike other science subjects, most of the students have difficulty in learning mathematics because of abstract nature of mathematics. A student can learn other subjects a day before examination but mathematics needs continues practice and dedication. While proving any mathematical principle/theorem it starts with known statement and one statement leads to another by using deductive logic and finally theorem is proved. In the process of proving principle / theorems, steps are logically and rationally followed and this proves the fact that mathematics is science. All theorems are based on previously proved theorem and ultimately based on postulates and axioms. Each and every part of mathematics is based on Postulates and Axioms which ultimately forms the base of mathematics. Thus looking at the nature of mathematics discipline it seems that Computer Assisted Instruction is one of the best methods to teach and learn mathematics subject as Computer Assisted Instruction also follows the principle of logically sequenced frames to deduce the knowledge. Mathematics can be taught in many ways such as laboratory method, drill method and so on. Computer Assisted Instruction (CAI) is one of the way to teach and learn mathematics.

Looking to the importance of teaching of mathematics through Computer Assisted Instruction the investigators have developed Computer Assisted Instruction in the year 2010 to teach mathematics in arithmetic part for class VIII students. The same was tested over standard VIII students and the reactions of these students were studied further.

Learning Mathematics through Computer Assisted Instruction

Computer can play vital role in learning process as it can work with the imagination of students. CAI brings with it several

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. The more senses through which we receive information, the easier it is to remember. According to Fletcher (1990), people remember 20% of what they hear, 40% of what they see and hear and 75% of what they see, hear and do. The fact that the computer can exercise various senses and present information in a variety of media can enhance the learning process. 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.

Rationale of the Study

Many studies have been conducted on low achievements in mathematics. Jain and Burad (1988) 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. Chel (1990) 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. Many studies have been conducted to find out the effectiveness of CAI in terms of achievement of the students in learning. Jeyamani (1991) found that experimental group performed better on post test. The studies conducted by Rose Antony Stella V (1992), Singh (1992), Adhikari (1992), Khirwadkar (1998), Zyoud (1999), Yadav (2000), Dalwadi (2001), Sharma (2003), Helaiya (2004), Barot (2005) and Rathwa (2007) showed that CAI was effective than conventional method. Vansia (2009) in his study found that mathematics learning through CAI with Peer Instruction (CAIPI) was effective on posttest. Many studies on the effects of computer-assisted instruction on the mathematical learning of students of various ages and ability levels suggest that computer-assisted instruction (CAI) as a supplement to traditional classroom

instruction is more effective than traditional instruction alone (Brothen & Wambach, 2000; Butzin, 2000; McSweeney, 2003; Nguyen, 2002; Olusi, 2008). Spradlin & Ackerman(2010) in their research the effectiveness of computer assisted Instruction in Developmental Mathematics conducted quasi experimental study compared academic performance of students enrolled in a developmental mathematics course using traditional instruction (i.e., lecture) and traditional instruction supplemented with computer-assisted instruction. In addition, gender differences in mathematical performance were also investigated. They found that (1) there was no statistically significant difference in the posttest scores of students receiving traditional instruction and traditional instruction supplemented with computer-assisted instruction. (2) There was a significant difference in the posttest scores of females and males, with females outperforming males in both modes of instruction. From the above argument it can be found that computer assisted instruction is effective in most of the cases in teaching and learning mathematics and there were few studies in primary section especially in the arithmetic part. Therefore investigators has developed and implemented CAI and found students reaction on developed CAI.

The Present Study Entitles

Students' reaction on computer assisted instruction for teaching and learning arithmetic

Objectives of the Study

- To study the impact of the developed CAI in terms of responses to the reaction scale given by the students of Experimental Group 'A' who studied through CAI only.
- To study the impact of the developed CAI in terms of responses to the reaction scale given by the students of Experimental Group 'B' who studied through CAI with simultaneous discussion.

Hypotheses of the Study

- Response is uniformly distributed in the 5 point scale for group A students.
- Response is uniformly distributed in the 5 point scale for group B students.

Delimitation of the Study

The present study was delimited to standard VIII English Medium Gujarat Secondary and Higher Secondary Educational Board students in Vadodara city. Only arithmetic unit of the mathematics textbook of standard VIII in the year 2010 was covered during experimentation of the present study.

Methodology 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 investigators 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 of arithmetic viz 'Profit and Loss' and 'Simple and Compound Interest' through the respective instructional strategy. Experiment time duration was 30 periods (each period of 35 minutes) for each the group and experiment went on for full month.

Tools for Data Collection

- 1) CAI was developed by the investigators and further modified according to the comments given by the experts in the field of Mathematics, Mathematics Education, English and Computer Science
- 2) Once CAI was finalized by the investigators, the Reaction Scale was developed by the Investigators which was further modified according to the comments given by the experts in the area of Education and English.

Data Analysis and Interpretation

Data were analyzed through the statistical technique χ^2 . Data analysis of responses of Group A is presented through table 1 while that of Group B is presented through table 2.

Tabulated Value of χ^2 at 4 df at .05 level is 9.49.

Table 1: Analysis of responses on Reaction Scale given by the Experimental Group A

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	12.8	Yes	Positive Side
2	I like illustrations given in the slides, which actually made me learn the lesson.	50.5	Yes	Positive Side
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	28.1	Yes	Positive Side
4	CAI is effective way of presentation because there is little stress in learning situation.	12.8	Yes	Neutral
5	I can learn with my own speed.	19.0	Yes	Positive Side
6	I can immediately test myself because there is lot of practice exercise.	16.9	Yes	Positive Side
7	This method is having more freedom to learn.	12.1	Yes	Positive Side
8	CAI didn't focus on more freedom situation.	12.07	Yes	Positive Side
9	Learning mathematics is fun in this CAI method.	10.96	Yes	Positive Side
10	This method is not good in learning mathematics because my doubts are not cleared.	10.2	Yes	Positive Side
11	In CAI I can teach myself (self-study) without the help of others.	13.2	Yes	Positive Side
12	Matter presented in CAI is not very clear.	3.79	No	-
13	CAI is easy to understand.	12.4	Yes	Positive Side
14	Animations are distracting in understanding the concept.	4.14	No	-

15	CAI took more time to understand the concept than usual classroom teaching.	2.00	No	-
16	Illustrations given in CAI are enough to understand the concept clearly.	4.14	No	-
17	Matter presented in CAI was logically arranged.	11.6	Yes	Positive Side
18	Learning through CAI was waste of time.	22.2	Yes	Positive Side
19	Illustrations given in CAI are related to day today life experiences.	14.5	Yes	Positive Side
20	Classroom teaching is more enjoyable.	13.4	Yes	Positive Side
21	The language used in CAI is easy and simple to understand.	33.6	Yes	Positive Side
22	The exercises given in each chapter is adequate.	3.07	No	-
23	CAI takes care of previous knowledge in the subject.	30.6	Yes	Positive Side
24	The solution to the problem is not easy to understand.	3.79	No	-
25	The exercises helped in understanding the chapter in depth.	22.0	Yes	Neutral
26	Solutions didn't help me whenever I was not able to solve the problem.	9.5	Yes	Positive Side
27	Break given in CAI helped me to refresh my mind.	15.0	Yes	Positive Side
28	I am feeling tired while going through the slide.	3.19	No	-
29	Animation shown in CAI is appropriate to help me in understanding the concept.	19.5	Yes	Positive Side
30	Topic is not introduced properly.	12.1	Yes	Positive Side
31	CAI does not take care of previous knowledge (percentage) needed to understand the present concept.	1.70	No	-
32	Enough revision is not done in CAI after the topic simple interest.	0.96	No	-
33	Enough revision is not done in CAI after the topic compound interest.	3.56	No	-
34	Enough revision is not done in CAI after the topic profit and loss.	5.78	No	-
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	5.78	No	-
36	I have to read the slide many times to understand what is being said as there was no clarity.	6.52	No	-
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	12.07	Yes	Positive Side
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	15.8	Yes	Positive Side
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	2.07	No	-
40	CAI is not enough in understanding the concept very clearly.	2.81	No	-
41	Independent learning is not possible through CAI.	9.85	Yes	Positive Side
42	Evaluation is done objectively (objective questions) so no partiality is involved in scoring.	18.4	Yes	Positive side
43	Evaluation done at the end of the topic "simple interest" is not suitable measure to know my understanding about that topic.	3.19	No	-

44	Instruction given in each slide of CAI is easy and clear to follow.	13.6	Yes	Positive Side
45	Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.	0.96	No	-
46	Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).	1.70	No	-
47	To get the correct answer I had to go back to the slide/s many times for topic simple interest.	7.26	No	-
48	To get the correct answer I had to go back to the slide/s many times for topic Compound interest.	10.2	Yes	Neutral
49	To get the correct answer I had to go back to the slide/s many times for topic profit and loss.	6.15	No	-
50	Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.	11.7	Yes	Neutral
51	Discussion with mathematics teacher is needed along with CAI.	3.56	No	-
52	Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.	5.41	No	-
53	Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.	8.74	No	-
54	Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.	4.67	No	-

Table 2: Analysis of responses on Reaction Scale given by the Experimental Group B

S.No	Statement	Calculated Value of χ^2 at 4 df .05 level	Significant Difference	Maximum Load
1	I enjoyed this class compared to normal classroom teaching because this method is more interesting to understand than lectures.	17.2	Yes	Positive Side
2	I like illustrations given in the slides, which actually made me learn the lesson.	19.3	Yes	Positive Side
3	Illustrations didn't help me to relate what we learned in mathematics to real life situation.	13.9	Yes	Neutral
4	CAI is effective way of presentation because there is little stress in learning situation.	23.1	Yes	Neutral
5	I can learn with my own speed.	28.1	Yes	Positive Side
6	I can immediately test myself because there is lot of practice exercise.	12.7	Yes	Positive Side
7	This method is having more freedom to learn.	11.00	Yes	Positive Side
8	CAI didn't focus on more freedom situation.	4.75	No	-
9	Learning mathematics is fun in this CAI method.	14.3	Yes	Positive Side
10	This method is not good in learning mathematics because my doubts are not cleared.	1.4	No	-

11	In CAI I can teach myself (self-study) without the help of others.	4.75	No	-
12	Matter presented in CAI is not very clear.	9.75	Yes	Positive Side
13	CAI is easy to understand.	5.17	No	-
14	Animations are distracting in understanding the concept.	12.25	Yes	Positive Side
15	CAI took more time to understand the concept than usual classroom teaching.	3.08	No	-
16	Illustrations given in CAI are enough to understand the concept clearly.	6.0	No	-
17	Matter presented in CAI was logically arranged.	3.5	No	-
18	Learning through CAI was waste of time.	11.8	Yes	Neutral
19	Illustrations given in CAI are related to day today life experiences.	17.2	Yes	Positive Side
20	Classroom teaching is more enjoyable.	2.8	Yes	Positive Side
21	The language used in CAI is easy and simple to understand.	13.2	Yes	Positive Side
22	The exercises given in each chapter is adequate.	10.58	Yes	Positive Side
23	CAI takes care of previous knowledge in the subject.	13.3	Yes	Neutral
24	The solution to the problem is not easy to understand.	2.25	No	-
25	The exercises helped in understanding the chapter in depth.	6.83	No	-
26	Solutions didn't help me whenever I was not able to solve the problem.	6.35	No	-
27	Break given in CAI helped me to refresh my mind.	11.4	Yes	Positive Side
28	I am feeling tired while going through the slide.	10.40	Yes	Positive Side
29	Animation shown in CAI is appropriate to help me in understanding the concept.	11.8	Yes	Positive Side
30	Topic is not introduced properly.	11.2	Yes	Positive Side
31	CAI does not take care of previous knowledge (percentage) needed to understand the present concept.	2.43	No	-
32	Enough revision is not done in CAI after the topic simple interest.	2.00	No	-
33	Enough revision is not done in CAI after the topic compound interest.	4.00	No	-
34	Enough revision is not done in CAI after the topic profit and loss.	1.13	No	-
35	Remedial (re teaching the difficult concept which is not understood by you) teaching is not done.	3.74	No	-
36	I have to read the slide many times to understand what is being said as there was no clarity.	5.17	No	-
37	Number of questions at the end of the slides for the topic profit and loss is adequate for providing practice.	11.6	Yes	Positive Side
38	Number of questions at the end of the slides for the topic simple interest is adequate for providing practice.	9.75	Yes	Positive Side
39	Number of questions at the end of the slides for the topic compound interest is adequate for providing practice.	14.4	Yes	Positive Side

40	CAI is not enough in understanding the concept very clearly.	2.67	No	-
41	Independent learning is not possible through CAI.	2.67	No	-
42	Evaluation is done objectively (objective questions) so no partiality is involved in scoring.	16.4	Yes	Positive side
43	Evaluation done at the end of the topic "simple interest" is not suitable measure to know my understanding about that topic.	9.75	Yes	Positive Side
44	Instruction given in each slide of CAI is easy and clear to follow.	22.7	Yes	Positive Side
45	Evaluation done at the end of the topic profit and loss is not suitable measure to know my Understanding about that topic.	6.42	No	-
46	Interaction with mathematics teacher is not possible while using this CAI (no face to face interaction).	2.25	No	-
47	To get the correct answer I had to go back to the slide/s many times for topic simple interest.	3.92	No	-
48	To get the correct answer I had to go back to the slide/s many times for topic Compound interest.	3.50	No	-
49	To get the correct answer I had to go back to the slide/s many times for topic profit and loss.	3.08	No	-
50	Scores obtained by me at the end of each exercise gives me feedback about my learning in each topic through CAI.	10.6	Yes	Positive Side
51	Discussion with mathematics teacher is needed along with CAI.	5.58	No	-
52	Evaluation done at the end of the topic profit and loss is suitable measure to know my understanding about that topic.	16.4	Yes	Neutral
53	Evaluation done at the end of the topic "simple interest" is suitable measure to know my understanding about that topic.	13.1	Yes	Positive Side
54	Evaluation done at the end of the topic compound interest is suitable measure to know my understanding about that topic.	12.7	Yes	Positive Side

Findings of the Study

The findings are listed below first for Experimental Group A and then for Experimental Group B.

Experimental Group A

Out of total *fifty four* statements bearing positive as well as negative nature, the computed chi-square values of *twenty six* statements were found to have statistically significant *higher values than the tabulated value of chi-square* at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have positive reaction and favorable attitude towards the statements carrying such higher values.*

The computed chi-square values in *twenty four* statements were *not found to be significant* at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is *uniformly distributed* in the 5-point scale.

The computed chi-square values of remaining *four statements* were found to have statistically significant higher values than the chi-square table value at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have neutral attitude* towards the statements carrying such higher values.

Experimental Group B

Out of total *fifty four* statements bearing positive as well as negative nature, *the computed chi-square values of twenty five* statements were found to have statistically significant higher values than the chi-square table values at 4 degrees of freedom and

at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students were found to have positive reaction and favorable attitude towards the statements carrying such higher values.

The computed chi-square values in *twenty four* statements were *not found to be significant* at 4 degrees of freedom and at .05 level of significance which shows that there was no significant difference between the observed frequency and expected frequency therefore null hypothesis is not rejected. This reveals that reaction is uniformly distributed in the 5-point scale.

The computed chi-square values of remaining *five statements* were found to have statistically significant higher values than the chi-square table values 9.49 at 4 degrees of freedom and at .05 level of significance which shows that there was a significant difference between the observed and expected frequencies and the students *were found to have neutral attitude* towards the statements carrying such higher values.

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, the Experimental Group A shows twenty six responses towards positive side while that of Group B twenty five towards positive side. Thus clearly shows almost 50% of the statements show positive responses in both the groups. It should be also noted that in Experimental Group A four responses are neutral while in Experimental Group B five responses are neutral towards statements four and five respectively. Also in Experimental Group A for twenty four statements the responses were uniformly distributed while in Experimental Group B responses to the twenty five statements were found to be uniformly distributed. *Hence it can be concluded that overall reaction of the students of both the groups toward CAI developed by the investigators for teaching of arithmetic is effective.*

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