

CHAPTER - 1

Conceptual Frame Work

1.1 Introduction

Conceptual framework is the structure of the content that the researcher is researching. It implies the research's understanding of the concept, the relevant information and other aspects of the content accumulated and created by the researcher for providing lucid content clarity.

1.2 Importance of Sanskrit Education

संस्कृत नाम दैवी वागन्वाख्याता महर्षिभिः ॥

Sanskrit is the divine speech set forth by the great sages.

Dr. Lidwrick Sternback – Sanskrit literature although a symbol of Indian Culture is much more than this, it is universal and belongs to the world.

K.M.Munshi- For over 3500 years it has been the language of India's religion, philosophy and culture, the source of inspiration for the intellectual and aesthetic achievements , the great instrument of establishing unity throughout the land.

Sanskrit is the language of India's religions, philosophy and culture and the eternal source of inspiration for her intellectual, emotional, spiritual and aesthetic achievement. It has literary intellectual, culture, vocational, artistic and anthropological importance.

Sardar K.M.Panikkar- Sanskrit is a language of international culture and civilization which spread beyond the boundaries of India.

Dr. Rajendra Pasad- Our whole culture, literature and life would remain incomplete. So long as our scholars, our thinkers and our leaders and our educationists remain ignorant of Sanskrit.

Place of Sanskrit language and education in contemporary Indian Education has hardly been overemphasized. As a language of cultural heritage. Sanskrit has a wide scientific literature and it is considered as an instrument of national integration. So teaching of Sanskrit is necessary for the cultural unity of the country. It is also a language of philosophy, Sociology, Economic, politics, linguistics, criticism, mathematics, Astronomy and medicine.

Sanskrit is useful for all-round development of the individual, which is the aim of education. The vedantic and upnishadic study develops our power of thinking and changes our attitude towards life. Books like panchtantra, hitopadesh create and cultivate many good qualities. Classical literature of Sanskrit is called the garden of wisdom. It is by now amply proved that the study of Sanskrit language helps the study of modern Indian languages because most of the words, phrases, grammatical terms we find in the regional language have been directly derived from Sanskrit language.

Sanskrit education, which occupied very respectable place in the traditional Indian society, have lost much of its popularity in recent years, especially with the availability of other possible courses of education that seem to make greater economic promises to the larger section of the Indian population .

During the last few years, the government of India has felt a need for the revival of Indian traditional knowledge and wisdom in relation to Sanskrit. There are certain areas of knowledge where a mutual interaction and dialogue between traditional scholars and modern scientists is seemingly possible. Several new scientific areas are being indentified where traditional and modern scholars can together make significant contributions. Sanskrit teachers in higher education level, who have the

great responsibility of breeding such a generation, need to review their academic methods and strategies in this view.

1.3 Methods of Teaching Sanskrit Grammar

From Guru-sishya parasparya way of teaching to the present system of teaching the methodological aspect of Sanskrit education has also changed a lot. Different portions required different style of teaching and learning. Any enquiry regarding the constructs of language education needs to take the stock of existing popular methods.

(A)Lecture Method

For many years, the lecture method was the most widely used instructional strategy in college classroom. Although the usefulness of other teaching strategies is being widely examined today, the lecture method still remains an important way to communicate information. The advantages of the lecture method are that:

- It provides a way to communicate large amount of information to a larger number of audience
- It maximizes instructor control
- It is Non-threatening to students

The disadvantages are that lecturing:

- Minimizes feedback from students
- Assumes an unrealistic level of student understanding and comprehension
- Often disengages students from the learning process causing information to be quickly forgotten

(B)Direct Method

Direct Method is a method of teaching a classical or foreign language through conversation, discussion and reading in the language itself, without the use of Vernacular; without translation and without the study of formal grammar. But, popularly direct method is applied during classroom lectures. The advantages of this method are:

- The student think in Sanskrit itself
- Least or no use of local language
- Adequate emphasis on pronunciation

This method requires high level of preparation from the part of the teacher

(C)Classical Method

The use of mother tongue is the most prominent aspect of this method. Teachers need to be good translators. This is a word- by –word and sentence –by-sentence approach. The advantages are:

- Grammar teaching gets enough emphasis
- Comparatively this method is easy to handle

This is one of the ancient methods and do not encourage the thinking process in Sanskrit.

(D)Combined Method

This method tries to combine the advantages of direct method and translation method and minimizes their disadvantages.

(E)Inductive Method

Inductive method is used for teaching grammar. Attention of students is drawn from common examples to corresponding rules.

(F)Deductive Method

This method follows the reverse procedure of Inductive method. Rule is explained first followed by examples. Examples are observed leading to generalization and hence the conviction of the rule.

1.4 Sanskrit and Technology

This is testimonial to the fact that this classical language is not far removed from technology. Hence it was hardly surprising when German scientists declared that Sanskrit with its rich vocabulary of more than two thousand root words with trice as many multiple derivative words using suffixes and prefixes, could be the best language for computer.

So far as teachers training are concerned it seems no attempts are made. Some attention is given o language learning at the school level. The present study proposed to contribute some knowledge in Sanskrit grammar learning through Computer Assisted Instruction.

The main purpose of computer Assisted Instruction is to deliver the content of the course through computer and relative instruction Endeavour through the help of computer application. In this respect several software program with different specification might be used to deliver the Subject matter. It can deal the problem of quality in education more effectively. Possibly the greatest strength of the computer Assisted Instruction is that enables high degree of learner participation to be built in to the instructional process.

1.5 CAI A Brief Overview

CAI as the name suggests is the use of a computer to provide instruction. It refers to the application of computer software to address student needs. CAI is a type of educational program designed to serve as a teaching tool. By abbreviation it is a computer Assisted Instruction. It can be immensely useful in providing individualized, repetitive or analogous practice to learner in problem solving exercise as well as activities for developing varieties of skills. Here the learner interacts with the computer rather than with a text besides proceeding at his/her own pace. It is a flexible as well as power device which can cater to these needs by storing processing and retrieving information. The format can be from a simple program to teach a typing to a complex system that uses the latest technologies that teach a new keyhole surgery. CAI draws on knowledge from the field of learning, cognition, Human computer Interaction.

- **The Origin of CAI**

The concept of CAI is not new. According to Wang and Sleeman (1993) the origin of CAI can be traced back to the invention of small multiple choice item scoring machine by Sidney L. Pressy in 1924 and B. F. Skinner's work to improve and expand the concept of Programmed Instruction started in late 1960s. The first true CAI system, the "IBM Inquiry Station," was developed at IBM by the "Teaching Machine Project" in the late 1950s. Two major developments occurred in the early 1960s. The IBM 1500 and PLATO were developed. These were developed specifically for CAI and both greatly contributed to its development.

The Greek philosopher Socrates is also said to be the first programmer who developed a program in Geometry which was recorded by his disciple Plato in the dialogue Meno.

- **Historic Overview of CAI**

CAI started in late 1950 (Suppes & Macken, 1978) mainly in the USA. The first true CAI system, the "IBM Inquiry Station," was developed at IBM by the "Teaching Machine Project" in the late 1950s. This machine, which taught binary arithmetic, consisted of a typewriter and console capable of transmitting typed information to a computer, and receiving information from the computer. In 1963, the Institute for Mathematic Studies in the Social Sciences (IMSSS), under the direction of Patrick Suppes, Richard Atkinson, and IBM Corporation, developed the IBM-1300 Instructional System. Professor Patrick Suppes led an extensive research and developed CAI at Stanford University in 1966. Suppes predicted that this technology would transform education. Pioneers such as Kemeny and Kurtz for BASIC-1960s and Don Bitzer for PLATO-1965 University of Illinois were among the first to use a computer as part of the learning process. The Early CAI programs were rudimentary by today's standards, with mainly text based interfaces. Bitzer was one of the first to realise the importance of graphics and sound in the learning process. Initially, CAI programs simply tried to teach a particular topic without a basis on any particular educational philosophy.

In 1970, CAI was used to teach chemistry (Castleberry & Lagowski, 1970), pre calculus mathematics (Judd, Bunderson, & Bessent, 1970, cited in Suppes & Macken, 1978), and computer programming (Homeyer, 1970) at the University of Texas. In 1972, C. V. Bunderson and the MITRE foundation began development of TICCIT (Time-shared, Interactive, Computer-controlled Information Television) at Brigham Young University. TICCIT was a CAI system on a 32-terminal minicomputer. Also developed in the early 1970s was CARE (Cartwright, Cartwright, & Robine, 1972) which identified children with mental handicaps. Beginning in 1977, fully assembled microcomputers appeared on the market such portable units greatly promoted CBE both directly and indirectly.

This thunderstorm strike Indian education system in 1984 with the generosity of BBC microcomputer. Which in turn with the time resulted into CLASS project and many such and globalization changed the entire phase of the Computer Instruction in India.

- **Types of Computer Assisted Instruction**

There are many types of Computer Assisted Programs. Each of the CAI program is appropriate under different instructional circumstances and therefore takes a different pedagogical approach.

Although the beginning of CAI was presentation of programmed instruction through compute and initial forms of CAI i.e. tutorials, drill and practice and games were oriented to behaviourist theories of learning. But with the advancement of the computer technology and software no type of CAI solely associated with the specific learning theory. Geisert and Futrell (1995), Maddux, Johnson and Willis (1997) and Bitter and Pierson (1999) have mentioned and explained the following types of CAI

- Drill and Practice
- Tutorials
- Instructional Games
- Simulation
- Microcomputer based Laboratories
- Integrated Learning System
- Problem Solving
- Reference Software

A table given below is summarizing the functions/uses and theoretical foundations of various common type of CAI as mentioned above.

Table 1.1

Summary of types of CAI with functions/uses and theoretical foundations

Program	Functions/Uses	Theoretical Foundation
Drill and Practice	➤ Provide repetitive exercise for rote skills. ➤ Provide reviews of basic content. ➤ Provide feedback on accuracy of answer. ➤ Useful for sustaining, refining and perfecting performance of certain task.	Behaviorist
Instructional Games	➤ Increase learners' motivation by adding game rules to learning activity. ➤ Provide learning in a competitive environment. ➤ Provide opportunities to user to compete each other or against the computer.	Behaviorist
Tutorials	➤ Deliver instructional activities, quiz and feedback. ➤ Allow learner to actively interact with the program. ➤ Tutorial are categorized as linear and branching. ➤ Incorporates graphics animation to illustrate	Behaviorist Cognitive Constructivist

	concepts.	
Problem Solving Software	➤ Present problems relevant to learning objectives. ➤ Provide necessary directions, hints and assistance to solve problem according to the learners' need. ➤ Promote a reflective learning environment, stress thinking process by encouraging learners to think about various options to solving the problem. ➤ Let student work together in pairs or small groups.	Cognitive
Simulation	➤ Present a computerised model of a real or imagined system to teach how a system works. ➤ Give a clear instruction how to proceed with simulation. ➤ Learner can manipulate parameters of the simulated environment, make choice and see consequences.	Cognitive Constructivist

Integrated learning system	➤ ILS is a network, a combination of instruction and management system. ➤ Provide a multilayer comprehensive collection of CAI. ➤ An ILS is a combination of Drill and Practice, tutorial, Simulation and problem solving. ➤ It can collect and record results of student progress	Behaviorist Cognitive Constructivist
Micro computer Based Laboratories	➤ Enable the experimenters to automate the process of gathering data from experiment conduct relevant analysis and produce meaningful reports. ➤ Enhance speed and ensure precision of data collection. ➤ Quick processing and analysis of data save time.	Cognitive Constructivist

Chambers and Sprecher (1983) examined the major theoretical representations of learning, ranging from low-level to high-level learning. They noted that conditions agreed by most theorists as necessary for learning to occur are contiguity, reinforcement, and repetition. Regarding contiguity and reinforcement, most theorists agree on the importance of reward (i.e., positive reinforcement) immediately following a student's correct response to a problem in a learning situation. Regarding repetition, theorists generally agree that repeated occurrences of the response followed by reinforcement are necessary for learning and retention. Apart from

knowing where common ground exists, it is also important to understand the different perspectives of these theories that have produced the schism in educational research. The behaviorist, cognitive or higher order thinking skill is the theories that work in CAI.

- **Characteristics of CAI**

Computer Assisted Instruction can be characterized by many attributes suitable to enhance learning. Some of the special characteristics of the Computer Assisted Instruction include: Individualization: A computer can provide multiple paths to proceed; every student proceeds according to their needs i.e. according to previous knowledge of the subject, ability, interest and intellectual capacity. Concept can be presented in tutorials with the aid of illustrative animation, dynamically creating illustration and interesting verbal explanations. Simulation can provide new insights into relationship, or experiences that would otherwise not be possible. Flexibility: Flexibility means access to teaching material at a wide range of time or locations. Computer offer great flexibility in type of resources available to a student as well as increasing flexibility of access to information. Greater flexibility in education is one strategy for dealing with increased number and diversity of students. A student who does not learn with a particular approach can be presented with material using an entirely different and unique approach. Self-Pacing: Self pacing lets students proceed at a pace appropriate for their individual learning levels. Self pacing can help to individualise instruction for those students who have used the program before or have prior knowledge of the subject. Students own pace helping them to meet personal learning objectives. Imparted knowledge prolong when students move with their pace.

Graphics and Sound: Graphic representation plays an important role in instruction. In addition to picture, computer graphics also include the use of screen formatting feature such as arrows, boxes and illustration to emphasize the concept. This nonverbal mode of instruction helps to build comprehension in areas that are difficult to teach by other instructional techniques. Sound can prompt, focus or reinforce

students and thus enhance instruction. Computer graphics and sound infuse movement, excitement and animation into a program.

- **Advantages and Disadvantages of CAI**

Perhaps the most widely accepted value of CAI is that it involves the individual actively in the learning process. It is impossible for the student to be a totally passive member of the situation, and this very activity and involvement facilitate learning (McKenzie, J., Elton, L., and Lewis, R. 1978). Another much touted value is the ability of the learner to proceed at his own pace, which has strong implications for both the slow learner and the gifted person. Reinforcement of learning in such situations is immediate and systematized, which should result in more effective learning, according to established theories of instruction. In addition, the computer in a simulation mode permits students to explore time and space, to mix explosive chemicals together in a simulated laboratory without destroying themselves and the lab, and to investigate complex problems using instruments and methodology which would be excessively costly or not possible at all without the computer. In addition, the use of computers in this manner frees faculty members or training coordinators to devote more time to the personal, human considerations of their students. Time thus spent with students has been found in a nationwide study of university faculty and students to be the most important factor, in students' opinions, in the development of their creative abilities. Thus the use of the computer in these modes should result in an educational environment in which individuals learn more and in which their potential for innovative and creative professional work is more fully developed. Similarly, there should be a greater acceptance of the computer as a helpful tool after the student has used simulations, games, or tutorials. A final comment regarding the benefits of CAI relates to remedial education. The problems of handling remedial training for students have increased, because the problems of bilingual and disadvantaged students are being recognized. Computer tutorials, especially in these areas, appear to be both educationally sound and reasonable in cost, if approached in an appropriate manner. Similar cases can be made for the use of CAI to support

continuing education and in industrial training programs. The disadvantages of using CAI in the learning process can be divided into three main categories. In order of importance, these are: (1) the need for teachers and training directors to move from accepted methods that work to a new and relatively untried method in which most individuals have little expertise and which arouses considerable fear and antipathy owing to its heavy technological base; (2) the primitive state of the art, in which a diversity of computing hardware and CAI languages compete with little apparent coordination from professionals in the educational world; in which the majority of available CAI course materials are poorly constructed, largely undocumented, and able to be run on only select computers for which they were written; and in which there are relatively few "experts" to whom CAI users can turn for assistance; and (3) the cost of hardware, CAI course materials (courseware), and individuals to help implement the process--especially since computer vendors initially touted CAI as an ultimate cost saving device. When used as a substitute or replacement method for learning, CAI can be cost saving; however, in actuality CAI is used today mainly as a supplement to enrich learning in the educational scene, and therefore costs should be considered as add-ons.

- **Scope of CAI In Future**

India shows enormous geographic and demographic disparity in ICT use. India has one of the largest ICT workforces in the world. One can find intense ICT use in technology clusters such as Bangalore and Gurgaon or amongst the upper middle brackets of incomes. The other side of the story is that large parts of the country lack even telephone connectivity

Shah and Agrawal (2008) reviewed that approximately 33% of the monthly income of the 300mn-strong Indian middle class is spent on the education of their children. One-third of this amount is spent on school education while the balance two-thirds is spent outside the school for private tutoring.

Sooner or later everyone have to walk on the path of advance technology. Recently Government of Gujarat in contract with EDUCOMP start to install a computer program for standard 8, 9 and 10 at cost of 27,000/-rupees. Central government has been funding this initiative under the Sarva Shiksha Abhiyaan (SSA) and ICT@Schools programmes. In the past three years, some 16,000 schools have become involved. With planned government outlay for education expected to increase substantially in the next five years (per Planning Commission data), it is expected that by March 2020 about 200,000 public schools will offer computer training to a material number of students.

Above efforts are all in the direction to provide education through Multi Media technology. Predictions of the future of CAI have become optimistic, the cost reduction due to mass production and consumption for learning will permit cost effective uses of CAI in traditional classroom and in other settings.

1.6 Rationale of the Study

Most of the commissions have stressed the urgent need of imparting the quality of education. In order to make teaching exciting, motivating and challenging, a well prepared suitable module is necessary taking all the steps seriously.

As in other languages, many of the problems before Sanskrit educator today is particularly with regard to the need for teaching method that stimulates interest in Sanskrit language and its scientific wisdom. This should answer a few other questions like:

How does a Sanskrit teacher teach the various subjects at present? What are the methods they use? Are they using definite method? Are their classes motivating the students? How can they attract the attention of the students? Is there any difference in the approach if teaching Sanskrit grammar? What are the steps to be followed in teaching grammar? How can the classes be integrated with better practices, tools and technology?

These and many such questions can be answered only through a scientific and systematic study. The researcher has selected this topic because she has studied Sanskrit till P G Level. She has come across many students who have faced various problems in learning Sanskrit Grammar. Students who are introvert cannot share their doubts with the teachers and this creates hindrance to understand the next concept. CAI is a technique in which students learn as per their understanding. CAI is beneficial for all students i.e. average learner, slow learner and for the gifted students also. So the investigator has selected the present problem in this background.

More over a few studies are carried out in the subject of Sanskrit grammar at B.Ed level. An incompetent teacher often leave student in such a drastic condition that they ever lived in dilemma. So to find out the effectiveness of teaching Sanskrit grammar with the help of computer this research work is under taken.

1.7 Title of the Study

The statement of the problem is stated as

“Effectiveness of Computer Assisted Instruction to Teach Sanskrit Grammar at B.Ed Level”

The Statement of the problem selected by the researcher indicates the clear concept of the study problem. This experimental study was designed to check effectiveness of learning through CAI programme in Sanskrit. Development of computer Assisted Instructional programme was also a pre-requisite part of the study.

1.8 Operationalization of Terms

Each word has meaning, but in study it is necessary to mention meaning of every word. Due to which meaning become clear and understanding become easier. Thus the researcher decided to give classical and operational definition of the terms used in the title of the study.

CAI in Sanskrit: CAI in Sanskrit in the present study refers to the Computer Assisted Instructional Programme developed by the researcher using various softwares to teach Sanskrit grammar to student-teachers.

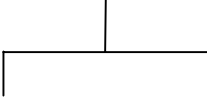
Effectiveness of CAI: Here, Effectiveness of CAI has been studied in terms of the significance of difference of mean achievement score of the student-teachers obtained on the post –test only and their reaction on the developed CAI.

1.9 Objectives

Objectives of the present study are considered as follows:

1. To test student-teachers' knowledge of Sanskrit grammar.
2. To develop CAI programme to teach selected topics of Sanskrit grammar.
3. To implement the programme on both control and experimental group
4. To Study the difference in mean scores of pre-test and post-test of control group.
5. To Study the difference in mean scores of pre-test and post-test of experimental group.
6. To study the effectiveness of the CAI teaching programme in terms of achievement of the student-teachers of experimental group.
7. To study the difference of mean scores of control and experimental group in post-test.
8. To study the reaction of Student-teachers towards learning through CAI Programme by reaction scale.

1.10 Variables

Type of Variable	Level of Variable
Independent variable	Method of Teaching  CAI Conventional
Dependent	-Achievement of Student-teachers -Reaction of Student-teachers

1.11 Hypotheses

A Hypothesis is shrewd guess of inference or superposition or tentative generalization as to the existence of some facts, condition or relationship relative to some phenomenon which serve to explain such facts as already are known to exist in a given area of study and to guide the search for new truth.

In this experimental type of study, the researcher has formulated following null hypotheses.

H₀₁: There will be no significant difference between mean achievement scores of control group and experimental group in Pre –test.

H₀₂: There will be no significant difference between mean achievement scores of control group and experimental group in post –test.

H₀₃: There will be no significant difference between mean achievement scores of pre –test and post –test of control group.

H₀₄: There will be no significant difference between mean achievement scores of pre –test and post –test of experimental group.

H₀₅: There will be no significant difference between the observed frequencies and expected frequencies in the reaction scale.

1.12 Limitations and Delimitation

- The Study is limited to selected topics of Sanskrit grammar only.

1.13 Scheme of Chapterization

The study is taken for construction of Computer assisted instruction material and to use in class room, a care should be taken right from planning to the end. As far as procedure is concerned, the entire work has been reported in the form of chapterization.

Chapter – 1 Conceptual Framework

The first chapter concerns with the conceptual frame work or theoretical back ground of the study. It consists of the details of various aspects on CAI like history, perspectives, definition, concepts, principles, importance, and needs that were already reported. It includes statement of the problem, objectives, hypotheses, variables. The rationale/significance of the study as provided by the researcher has been described.

Chapter – 2 Review of Related Literature.

Second Chapter includes the review of related previous researches carried out in the field of education and Technology.

Chapter – 3 Research Methodologies

This chapter focuses on the methodology adopted in the present study. It describes in detail the research design selected for the present study. It also lists tools used for data collected and data analysis and the research procedure adopted for the present study.

Chapter – 4 Data Analysis and Interpretation

In this chapter collected data has been analyzed and interpreted based on the calculated scores of pre-test and post-test and also reaction scale.

Chapter – 5 Findings, Implications, and Suggestions

This chapter consists of the findings of the study, its implications and recommendation. It also presents some suggestions for future studies that can be undertaken in the field.

1.14 Conclusion

This chapter mentions all important aspects related to the research. The researcher presented information about the research problem, delimitation and operationalization terms, objectives, rationale of the study and chapterization.

The next chapter is about the Review of the Related Literature.

CHAPTER - 2

Review of Related Literatures

2.1 Review of Related Literature

“The Literature in any field forms the foundation upon which all future work be built”*
-P.R.Borg

Review of related literature is systematic identification, location, analysis and report of documents containing information related to research topic. Theoretical and research based reviews provide the researcher valuable guidance and suggestion for conducting the research. They also serve as a solid foundation for the study. A review of related literature is a must in research. It helps the researcher in understanding and defining the problem accurately and systematically. This review help the researcher to proceed in one’s study and also helps to prepare a proper design for the study.

Review of related literature is one of the significant aspects of research. It enables the researcher to get acquainted with the work done in the concerned area. It also helps to explore the needs of research in unknown and unexplored areas. It develops insights into the methodological aspects of the research.

2.2 Importance of Review of Related Literature

The review of the related literature is an important requirement of actual planning on the bases of which the execution of any research work can be done.

The review of related literature becomes a friend, philosopher and guide for the researchers. Researcher should study the research literature as a step in identifying &

* ઉચાટ,ડી .એ.સંશોધન વિમર્શ .રાજકોટ :૧૯૯૮, પૃ .૨૧

pinning down a good problem. The search for the reference material is a time consuming but very fruitful phase of research program. It helps the researcher to avoid useless repetition in their research work. Every researcher must know what sources are available in the field of study, which of them, researcher is likely to use & where & how to find them. In short, it enables the researcher to get insight into the problem on hand. The study of related literature also gives an idea about the different approaches, methods, tools and equipments, selection of samples, statistical techniques, evaluation and measurement of the research work already done and major findings of the previous research work. Thus, the review of related literature provides some insight regarding strong points and limitations of the previous studies. It enables the researcher to improve their own research work.

The reviews are the Gita for the researcher. It guides the researcher in their study. It's main objectives are as follows:

- (1) To gather general information from the past reviews on the Computer Assisted instruction Programme.
- (2) The researcher feels at ease and becomes clear in taking decision for the present study from the past research.
- (3) The researchers can find the untouched areas for the further study, which will direct the researcher in the study.
- (4) The lists of the reference books help the researcher to get success.

Moreover, the researcher comes to know about the delimitations of the previous studies. In other words, review of related literatures work as a lighthouse for the researchers. Hence, the researcher has made a humble attempt to present the review of related literature in two parts.

- (1) Review of related studies conducted in India.

(2) Review of related studies conducted Abroad.

2.2.1 Review of Related Studies Conducted In India

Educational technology brings super power in the field of Education which is very precious of the research used by various universities of India. Here the researcher is going to give the history of the past research work conducted in India.

Gadhavi, H. (2011) conducted a study on “Development and Effectiveness of Multimedia program in Sanskrit grammar for standard IX student” The Objectives of the study were to develop multimedia program on Sanskrit grammar for standard IX students, to study the effectiveness of the multimedia program in terms of achievements of standard IX students on Sanskrit grammar, to study the reaction of the standard IX students on the multimedia program developed by the investigator. All the standard IX students of Gujarati medium secondary schools of Baroda city in Gujarat state followed GSHEB syllabus was the target population of the study. One school selected as the sample for the present study. Pre- test and Post- test were used to collect the data .Data were analyzed by statistics techniques. To study the effectiveness of developed multimedia program, Mean, Standard Deviation, Standard Error of difference and ‘t’ value were calculated. To study the reaction of the students toward developed multimedia program χ^2 was calculated .The study found that multimedia program can use very well for remediation purpose; prepared multimedia program in Sanskrit was found effective in teaching Sanskrit to standard- IX students as the post-test score was found significantly.

Mehta Harshad. (2007) conducted a study on “Development and Effectiveness of Computer Assisted Instruction Programme for Teaching of Adjective in English Language” The objectives of the study were to develop a Computer Assisted Instruction package to teach Adjective of English Grammar, to test the effectiveness of the Computer Assisted Instruction Package in terms of achievement scores obtained by the students on the teacher made achievement test, to study students’

reactions towards learning through Computer Assisted Instruction package. The experiment was conducted by 'Two equal groups only post –test design.' 46 students were selected as sample for the experiment and 48 students of grade IX were selected as sample for the replication of the experiment. A teacher made unit test was administered as post-test. The scores obtained on the test were analyzed by t-test. Students' reactions were obtained on opinionnaire developed by Ambasana (2002) and analyzed employing Chi-square technique. The CAI Package developed to teach Adjective in English grammar to the students of grade IX was effective with respect to the students' academic achievement. The students responded favourably towards learning through CIA Package.

Patel, J. A. (2009) conducted a study on “Development and Implementation of CAI to teach English grammar to standard VIII student in different modes” The objectives of the study were 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), to study the effectiveness of the developed CAI in different modes in terms of students' achievement in English Grammar, to study the effectiveness of the developed CAI in terms of the reactions of students, 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. 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-teat 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 administrated 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. The achievement of the students in English Grammar taught through CAI was found significantly higher than that of the students taught through traditional method. 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. 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. 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. CAI was also found to be effective in terms of the students.

Rathod, Rajendrasinh. P. (2000) conducted a study on “Preparation and try-out of programme learning of selected topic of std-IX in English grammar” The objectives of the study were to Prepare and try-out branching programme in ‘Active – Passive Voice’ for the Students of Std.-IX, to compare the achievement of the students learning through conventional method and the branching programme material in active-passive voice, to study the achievement of 90 students who have studied through conventional method and branching programme Material controlling IQ of the students. The study was conducted on ninety students of class-IX. The students of experimental and controlled group were given IQ test and pre-test. There after the experimental group was given the branching programme and the controlled group was taught through the conventional method. Then both the groups were given post-test. The significance of the difference between the achievements on the criterion test was investigated through ANCOVA. The Branching programme was found more effective than the conventional method in producing learning effect as measured in terms of gained scores. The branching programme was found to be superior to the

conventional method so far as comprehension and application of knowledge was concerned. The branching programme took less time than the conventional method.

R. B. Sakhiya. (2006) conducted a study on “Effectiveness work-card and programmed learning as a self learning techniques with reference to teaching of English grammar” The objectives of the study were to prepare the work card material and programmed learning material on the three units of English grammar like Active and Passive Voice, Tenses and Clauses, to prepare the teacher made test as a research tool, to study the effectiveness of the work card material and the programmed learning material on English grammar with reference to achievement level and gender of the students. The students of the IX standard of Gujarati medium schools of Rajkot city were considered as the population for the present study. The total sample of 294 students of standard IX was selected purposely from the two schools. A sample of 144 boys from Virani High School and 150 girls from K. J. Kotecha girl’s high school was selected in the present study. The researcher had constructed three unit test of English grammar and used to measure English grammar achievement. Using experimental research method carried out the present study. T-test and other relevant statistical techniques were used for analysis of the data. In teaching of English grammar, the work card material was more effective than the programmed learning method the lecture method for the boys having high achievement level and low achievement level in English. The programmed learning method was more effective than the lecture method for the boys having high achievement level in English. Whereas the programmed learning method and the lecture method were found equally effective for the boys having low achievement level in English. Identical results were found for the girls having high achievement level and low achievement level.

M. S. Chaudhary. (2007) conducted a study on “A Comparative Study of Programmed Learning and Computer Assisted learning on ‘Direct-Indirect Speech’ for the Students of Std- IX in English” The objectives of the study were to construct programmed learning for the students of std- IX on the topic of ‘Direct-Indirect

Speech' in English grammar, to construct computer assisted learning for the students of std- IX on the topic of 'Direct-Indirect Speech' in English grammar, to tryout programmed learning for the students of std- IX on the topic of 'Direct-Indirect Speech' in English grammar, to tryout computer assisted learning for the students of std- IX on the topic of 'Direct-indirect Speech' in English grammar, to compare learning by programmed learning and computer assisted learning and conventional method. Researcher had selected three schools purposively of Mehsana district and students of those schools were selected via cluster sampling method. Total 270 students of IX standard was taken as the sample of the study. Desai Verbal - non verbal Group Intelligence test and teacher made test were administered as tools. The design was 'randomized group only post-test deign'. The one way analysis of variance (ANOVA) was used for data analysis. The result shows that the Conventional method was more effective than the computer Assisted Learning for the topic of 'direct- indirect speech' of std. – IX. It is also resulted that computer Assisted Learning was more effective than the programmed learning for the topic of 'direct-indirect speech' of std. – IX.

D. M. Dadhania. (2004) conducted a study on “Development and Effectiveness of Computer Aided Instruction (CAI) Programme for Teaching the Unit ‘Pressure’ (Gujarati) in Science of Standard VIII” The objectives of the study were to develop a Computer Aided Instruction (CAI) Programme for Teaching the Unit 'Pressure' (Gujarati) in Science of Standard VIII, to try-out the effectiveness of the package in the context of the academic achievement of the students, to study students' reactions towards learning through the package. The present research was of experimental type. The design was 'Two groups randomized subjects' only post-test designs'. Total 61 students from standard VIIIth were selected randomly form a purposively selected school namely Shri Kadvibai Kanya Vinay Mandir. The experiment and replication both were carried out. The data for analysis were collected by teacher made unit test and opinionnaire. Mann-Whitney U-test and Chi-square technique of statistics were used for analysis. There was no significant difference between the scores of subjects

of two groups. So, both CAI programme and traditional method of teaching were equally effective with reference to the achievement of the students. The students expressed favourable opinions towards CAI programme.

T. R. Hirani. (2007) conducted a study on “Development and Try-out of Computer Based Multimedia Package for Instruction in Gujarati Language” The objectives of the study were to develop a Computer Aided Multimedia Package for teaching a unit ‘Light: Reflection and Refraction’ of the subject Science and Technology for standard 10th in secondary school in Gujarati Language, to try-out the effectiveness of the package in the context of the academic achievement of the students, to study students’ reactions towards learning through the package. The present research was of experimental type. The experiment was conducted by ‘Two groups’ randomized subjects’ only post-test design’. 102 girls were selected as sample for the experiment and 80 boys were selected as sample for the replication of the experiment. A teacher made unit test was administered as post-test. The scores obtained on the test were analyzed by t-test. Students’ reactions were obtained on opinionnaire developed by Ambasana (2002) and analyzed employing Chi-square technique. The students of Computer Aided Multimedia Package group scored significantly higher on post-test than the students of traditional method group. Students opined favourably for learning through Computer Aided Multimedia Package.

Suwana, R. (2004) conducted a study on “Effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental study” The objectives of the study were to know the effectiveness of Computer Assisted Instruction developed by ONPEC for primary school students to learn English language, to develop Computer Assisted Instruction for primary student to learn Thai language, to know the effectiveness of Computer Assisted Instruction in learning Thai language developed by the investigator for primary school students, to know the relative effectiveness of Computer Assisted Instruction developed by ONPEC and by the investigator, to evaluate the both types of Computer Assisted Instruction on the basis of the collected opinion of experts and primary school students, to provide suggestion

to ONPEC for improving Computer Assisted Instruction Program on the basis of obtained data. In the present research, researcher used multistage sampling technique. The investigator selected two cities by purposive sampling technique. Next, the students from standard XI from each school were selected by simple random sampling technique. In each school two groups, each of 30 students were formed. In this way, total 120 students were selected from two schools. The statistical technique t test was used to find out whether the mean scores of each group differ significantly or not. For the analysis and interpretation of data obtained from opinionnaire, mean and standard deviation were employed. The study has resulted in the development of Computer Assisted Instructional Program on selected five units of Thai language learning for the students of Pratom-3 and five units of Thai language learning for the students of Pratom-6. The Computer Assisted Instruction developed by the investigator was found significantly effective in learning five topics of Thai subject to the student of Pratom-3 of experimental group – I belong to Buriram Kindergarten (t-value 8.62) The Computer Assisted Instruction developed by ONPEC was also found significantly effective in learning five topics of English subject to the students of Pratom – 3 of Experimental group – I belong to Buriram Kindergarten (t- value 8.60). On comparison of mean gain scores obtained for CAI developed by ONPEC in English language with CAI developed by the investigator in Thai language, the obtained t-value is 1.18. The Computer Assisted Instruction developed by the investigator was found significantly effective in learning five topics of Thai subject to the students of Pratom-6 of experimental group-II belong to Buriram Kindergarten. It was evaluated by teacher as a successful attempt. Opinion of students was found effective in presenting all the five topics of English and Thai language.

Joy, B.H.H. and Shaiju, S.L. (2004) conducted a study on “Development of Computer Assisted Teaching Material in History at Higher Secondary Level and its effectiveness” The objectives of the study were to develop Computer Assisted Lesson on the topic - UNO in History at higher secondary level, to test the effectiveness of the Computer Assisted teaching and lecture method of the lesson on

the topic - UNO in History at Higher Secondary level, to verify the impact of gender, domicile and type of school on the effectiveness of Computer Assisted teaching method. The sample consisted of 162 (72 males and 90 females) eleventh standard student from 3 higher secondary schools of Thiruvananthpuram district 42 randomly selected based on locality of the schools and management of schools. The mean age of the group was 16.54. Out of 162 students 113 were from rural area and 49 were from urban area. 106 students were from government schools and 56 were from a private school in rural area. A pre and post test design was used in the study. Computer Assisted Lesson on the topic UNO in History for higher secondary students and achievement test in History developed by the investigator were used for data collections. The data was analyzed with the help of mean, S.D. and t test of significance. While both the methods led effective learning, the CAT method was found superior to the lecture method. It is interesting to note that there is no gender difference in the scores obtained.

Zyoud, M. (1999) conducted a study on “Development of Computer Assisted English Language Teaching for VIII standard students” The objectives of the study were to develop a Computer Assisted English language teaching program for standard VIII Gujarati medium students, 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 covariate., to study the effectiveness of the Computer Assisted English language teaching program on the experimental group students’ achievement of all above mentioned with respect to their intelligence, motivation and attitude. For the development of the software package four lessons were selected based on opinion of teachers and students regarding difficulty level of these lessons and the difficulty of teaching them. After selecting lessons, content analysis was carried out. 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 student of the other school i.e. GEB school, Baroda formed the control group. The

tools used in the pilot study were also used in the final experiment namely pre test, Raven's progressive matrices sets A, B, C, D and E (Raven, 1960). Junior Index of motivation by Frimer (1970) and translated into Gujarati by Dr. Desai (1970) and post test. To study attitude of the students towards the package the researcher developed and administrated an attitude scale on the experimental group only after the final experiment. The findings show that 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. The computerized exercise can help the student become familiar with significant amount of vocabulary, grammar and comprehension because it provides effective individualized instruction.

Das A. (1998) conducted a study on "Exploring effectiveness of Computer Assisted Learning Materials on Rhymes in different Mode" The objectives of the study were to develop computer software on rhymes in text, text music, Graphics text, Graphic text music and graphics text music recitation modes, to study the effectiveness of CALM prepared in different modes for learning the rhymes in terms of word meaning of the students, to study the effectiveness of CALM prepared in different modes for learning the rhymes in terms of analytical understanding of the students, to study the effectiveness of CALM prepared in different modes for learning the rhymes in terms of comprehensive understanding of the students, to study the effectiveness of CALM prepared in different modes for learning the rhymes in terms of writing ability of the students, to study the effectiveness of CALM prepared in different modes for learning the rhymes in terms of recitation ability of the students. Seven different rhymes were selected for the present study. The Baroda High school Bagikahna, an English medium school was selected purposively for the study. Five different groups of pupils of standard 2nd for five different modes of rhyme from the sections were taken on basis of systematic random sampling. Two types of tools were used. One is treatment tool and other is testing tool. A treatment tool was the CALM on rhymes developed by researcher in different modes. The testing tool was an achievement test which was administrated to pupils after they were exposed to CALM on rhymes in different

modes. The collected data were analyzed statistically using analysis of covariance (ANCOVA). Graphics text mode has been found comparatively weaker than the other modes in learning word meaning on rhymes in different modes. The one of the seven rhymes text mode has been found most effective in developing language ability. In the same rhymes, Graphics text music and graphics text mode in developing language abilities of the pupils has been used. In five out of seven rhymes no significant difference has been found in different modes for developing language ability of the pupils. In three out of seven rhymes text mode largely has been found comparatively weaker than other modes for comprehensive understanding, where as in one rhymes text mode has been found most effective for comprehensive understanding.

Badiyani Ishita M. (2008) conducted a study on “Development and Comparison of the Effectiveness of Computer Assisted English Language Learning Package and Computer Aided English Language Learning Package” The objectives of the study were to develop a Computer Aided English Language Learning (CAiLL) Package to teach action verbs in English language, to develop a Computer Assisted English Language Learning (CAsLL) Package to teach action verbs in English language, to try-out the Computer Aided English Language Learning Package as compared to the Computer Assisted English Language Learning Package, to compare the relative effectiveness of the Computer Aided English Language Learning Package and the Computer Assisted English Language Learning Package in terms of scores obtained by students on the teacher’s made achievement test, to compare the level of attainment of a group of students that has not received any instruction with the students of Computer Aided English Language Learning (CAiLL) Package group and Computer Assisted (CAsLL) English Language Learning Package group, to study students’ reactions towards learning through the Computer Aided English Language Learning Package and the Computer Assisted English Language Learning Package. The population of the study comprised of computer acquainted students studying in standard VIII of Gujarati medium schools of Gujarat State. Total 282 students of grade VIII from four schools were selected as sample. The research was of

experimental type. The research design was ‘Three equivalent groups only posttest design’. Three groups were experimental group I (CAiLL Package group), experimental group II (CAsLL Package group) and control group (No instruction group). The groups were made equivalent by the students’ previous achievement in English and their teachers’ rating. An achievement test of fifty marks was constructed by the researcher on the basis of the objectives, analysis of the content and the blueprint. In order to measure the opinions of the students towards the CAiLL Package and the CAsLL Package, the opinionnaire developed by Ambasana (2002) was adapted. The data obtained were analyzed using one way ANOVA, Tuckey test and Chi-square techniques of statistics. CAiLL Package and the CAsLL Package each was found effective in raising students’ achievement in unit ‘Action Verbs’ of English grammar. Compared both the Packages with each other the CAsLL Package proved to be more effective than the CAiLL Package in terms of the achievement scores of the students of grade VIII for learning ‘Action Verbs’ of English grammar. The CAiLL Package and the CAsLL Package were also effective in evoking positive reactions towards the use of them in learning English grammar especially ‘Action Verbs’.

Vij, Sanjana. (2003) conducted a study on “A comparative study of the Effectiveness of Computer Assisted Instruction (CAI) and Computer Managed Instruction (CMI) on Pupil’s Achievement in Science, their Self -Concept and Study Involvement” The objectives of the study were to design and develop instructional plan for Teaching selected unit in Science amongst the prescribed course of study at class VII stage based on Computer Aided Instructions (CAI) & Computer Managed Instructions (CMI), to construct and standardize Achievement test in selected units of Science for class VII, to study individual Effectiveness of CAI on Self - concept; study involvement; and Academic Achievement, to study individual effectiveness of CMI on Self -concept; study involvement; and Academic Achievement, to compare the effectiveness of CAI and CMI instructions on Self – concept of students, to compare the effectiveness of CAI and CMI instructions on study involvement of students, to compare the effectiveness of CAI and CMI

instructions on Academic Achievement of students. The present study was conducted on a sample of 90 Pupils studying in three sections of the Class VII of Evergreen Public School, New Delhi. From each section 30 students were selected purposively. Two sections formed the two Experimental Groups (E1 and E2) and one section formed the Control Group (C).

The following tools were used:

- (1) Socioeconomic Status Scale developed by Kulshreshtha;
- (2) Raven's Progressive Matrices developed by Raven;
- (3) Self –Concept Questionnaire (SCQ) a test of Self -concept developed by Sherry and Verma;
- (4) Study Involvement Inventory developed by Asha Bhatnagar; and
- (5) Science Achievement Test developed by investigator. The data were analysed with the help of t-test.

At the end of the experiment, it was found that the group of Pupils taught Science through Computer Assisted Instructions was effective in raising the Self -concept of the Pupils. The post-test mean scores of the Pupils taught Science through Computer Assisted Instructions increased significantly which indicates that Computer Assisted Instructions enhanced study involvement of the Pupils. The group of Pupils taught Science through Computer Assisted Instructions showed significantly higher post-test mean score on Achievement in Science in comparison to pre-test mean Achievement score. At the completion of experiment, it was found that the group of Pupils taught Science through Computer Managed Instructions was effective in raising the study involvement of the Pupils

The post-test meanscore of the Pupils taught Science through Computer Assisted Instructions was found to be significantly higher on increasing the study

involvement in comparison to pre-test score. The group of Pupils taught Science through Computer Managed Instructions showed significantly higher post-test mean scores on Achievement in Science in comparison to pre-test score. The group of Pupils taught Science through Computer Managed Instructions achieved significantly higher mean score on the test of Self - concept than the Pupils taught Science through Computer Assisted Instructions. At the post-test mean score of the group of Pupils taught Science through Computer Managed Instructions was significantly higher on the test of self -concept than the group of Pupils taught Science through traditional method. There was no significant difference in Self -concept between the group of Pupils taught Science through Computer Assisted Instructions and the group of Pupils taught Science through traditional method. The mean gain score of the group of Pupils taught Science through Computer Managed Instructions was found to be significantly higher on the test of self -concept, than the group of Pupils taught Science through Computer Assisted Instructions. The group of Pupils taught Science through Computer Managed Instructions showed significantly higher mean gain score on the test of self -concept than the group of Pupils taught Science through traditional method. There was no significant difference between the group of Pupils taught Science through Computer Assisted Instructions and the group of Pupils taught Science through traditional method on the mean gain score of Self -concept. The post-test mean score of study involvement of the group of Pupils taught Science through Computer Assisted Instructions was significantly higher than the group of Pupils taught Science through Traditional Method. The group of Pupils taught Science through Computer Managed Instructions achieved higher mean score on study involvement than the group of Pupils taught Science through Traditional Method. There was no significant difference in the post-test mean score of study involvement between the group of Pupils taught Science through Computer Managed Instructions and the group of Pupils taught Science through Computer Assisted Instructions. The group of Pupils taught Science through Computer Assisted Instructions showed significantly higher mean gain score on study involvement than the group of Pupils taught Science through traditional method. The mean gain score on study involvement

of the group of Pupils taught Science through Computer Managed Instructions was found to be significantly higher than the group of Pupils taught Science through traditional method. There was no significant difference in the mean gain score of study involvement between the group of Pupils taught Science through Computer Managed Instructions and the group of Pupils taught Science through Computer Assisted Instructions. The post-test Achievement mean score of the group of Pupils taught Science through Computer Managed Instructions was significantly higher than the group of Pupils taught Science through Computer Assisted Instructions. The group of Pupils taught Science through Computer Assisted Instructions showed significantly higher gain in mean Achievement score than the group of Pupils taught Science through traditional method. Group of Pupils taught Science through Computer Managed Instructions achieved significantly higher mean score on Achievement than the group of Pupils taught Science through traditional method. The mean gain score of the group of Pupils taught Science through Computer Managed Instructions was found to be significantly higher on Achievement than the group of Pupils taught Science through Computer Assisted Instructions. The group of Pupils taught Science through Computer Assisted Instructions showed significantly higher mean gain score on Achievement than the group of Pupils taught Science through traditional method. The mean gain score of the group of Pupils taught Science through Computer Managed Instructions was found to be significantly higher in Achievement than the group of Pupils taught Science through traditional method.

Gupta, Madhu. (1987) conducted a study on “Computer assisted instruction in chemistry” The objectives of the study were to design two strategies of computer assisted instruction (CAI) in chemistry, to study the relative effectiveness of the strategies of CAI in chemistry, to compare the mean retention score of two strategies of CAI in chemistry, to know the opinion of students towards CAI. Students of Strategy-1 scored significantly higher than the students of strategy -2 in terms of their mean gain scores and mean retention scores on the criterion tests. Girls of both the strategies scored significantly higher than the boys of both the strategies in terms of

their mean gain scores and mean retention scores on the criterion tests. Students of both the strategies revealed highly favourable opinion towards CAI in terms of the percentage of favourable responses.

Nagar, N. (1988) conducted a study on “Effectiveness of computers in teaching Mathematics in schools” The study attempts to ascertain how best a teacher can use the computer to improve learning in the classroom. The objectives of the study were to examine the usefulness of the computer in teaching Mathematics, to examine areas/aspects of Mathematics which can be more effectively taught with the help of computers, and to examine the trends regarding the use of computer-aided teaching of Mathematics. Methodology: This study is based on a survey of studies, which include, mainly, three projects and ten research studies conducted independently. Computer Assisted Teaching (CAT) of Mathematics benefited both the teacher and the learner. CAT encouraged individualization and practice without burdening the teacher with repetitive and monotonous activity. CAT helped the learners to use their creativity by exploring new areas not covered by the syllabus. Computer awareness was not sufficient in schools for CAT. In India, we have gone in for the theoretical rather than the practical aspects of computer based education. Project CLASS was not able to reach the child especially. There were 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 mistrust of the computers and perceived it as an inconvenience rather than as an aid. Their negative attitude was a great hindrance in popularizing the use of computer literacy in the educational system, especially at the secondary level of education.

Kaul, Indu. (1990) conducted a study on “Micro computerd in Language Teaching” The objectives of the study were to Know the effectiveness of computer assisted instruction for teaching English, to study relative effectiveness of two methods ,i.e. traditional and computer assisted language teaching, to have the opinion of the students towards using the computer in learning English in classrooms. The effectiveness of computer assisted language teaching programme was there. The

students of experimental group scored higher than the students of controlled group in terms of the mean gain scores on the criterion tests. The students of experimental group presented a favorable opinion towards using microcomputer in language teaching as an aid, in terms of the percentage of the favourable responses.

2.2.2 Review of Related Studies conducted Abroad

Mevarech Z. R. (1985) conducted a study on “Effects of Computer Assisted Mathematics Instruction on Disadvantaged Pupil’s Cognitive and Affective Development” Mevarech conducted a study to investigate the impact of CAI on the Mathematical achievement & self-concept as well as perception of the quality of school life among disadvantaged boys & girls in third, fourth & fifth grades (N=376). Results indicated that in a combine CAI traditional program, as opposed to only traditional instruction, students consistently scored higher on both cognitive and affective measures while grade level & gender were generally non-significant. Differences between this study & previous researchers are discussed as well as the differential influence of CAI & traditional instruction on disadvantaged pupils.

Josefina Barnacha Janier et.al., (2008) conducted a study on “The effectiveness of Multimedia Courseware as an alternative for tutoring Application of Integration” The objective of this paper was to evaluate the effectiveness of developed multimedia courseware as an alternative tool in tutoring the Application of Integration. The sample was divided in two groups group A (experimental) and group B (control). Pre-test was given to students from group A and B. after the four hour sessions on area and volume, the students from both groups were given the post-test. The study indicated that students had understood the application of integration better after the tutorial session. This also implied that tutorial sessions are helpful and beneficial to student regardless of the tutoring method employed. The result of this study implies that students in the experimental group perform as well as those in the control group. This indicates that the interactive multimedia courseware is as effective as the traditional chalk and board method in tutoring the students on this topic. This also

suggests that the students can do independent study using the multimedia courseware during tutorial session. The study further highlighted that the multimedia courseware could be considered as an alternative method for tutoring the topic thus helping to ease the workload of the instructors and the use of graduate assistant.

Hsu Yung-Chen. (2003) conducted a study on “The effectiveness of Computer Assisted Instruction in Statistics education: A meta-analysis” The purpose of this study was to investigate the effectiveness of Computer Assisted Instruction (CAI) in Statistics education at the college level in the United States. This study employed meta-analysis to integrate the findings from 25 primary studies, which met a specific set of criteria. The primary studies were selected from journal articles, ERIC documents, and dissertations. Results of the meta-analysis indicate a small to medium positive effect of applying CAI in teaching college-level introductory Statistics on students’ achievement. The results of the analogous analysis of variance showed that different modes of CAI programs produced significantly different effects on students’ achievement in learning Statistics. Expert systems and drill-and-practice programs were the most effective modes and were followed by multimedia, tutorials and simulations. Computational statistical packages and web-based programs were the least effective modes. The teacher-made CAI programs were significantly more effective than the commercially developed CAI programs. The effectiveness of CAI program in teaching Statistics did not differ significantly according to the study characteristics of the publication year, the publication score, the educational level of participants, the level of interactivity of CAI program, the instructional role of CAI program, and the sample size.

Arbuckle W. J. (2005). conducted a study on “Conceptual understanding in a Computer Assisted Algebra 1 Classroom” This study explored this influence on algebra 1 students utilizing the CAI program Cognitive Tutor with those in a traditional direct instruction class. The students were tested pre and post for achievement and a subset of the sample, six from the control (direct instruction) group and six from the treatment (Cognitive Tutor) group, constructed concept maps

throughout the study to be used as a measure of the conceptual understandings. The six students from the treatment group (Cognitive Tutor) went through an interview to attempt to understand what aspects of the Cognitive Tutor program they felt had the most influence on their sense making and understanding. The analysis indicated that Cognitive Tutor, as a complete program, increases student achievement, deepens understanding and connectedness of concepts, and left them with a feeling that Cognitive Tutor had many characteristics that their best math teacher would possess. Although these analyses answered the questions of this study, further research is needed.

Lamazares and Ivonne Mercedes. (1991) conducted a study on “The effects of Computer-Assisted Instruction on the writing performance and writing anxiety of Community College Developmental Students (Community College Students)”

Researchers have only begun to ascertain the effects of computer aids on the behaviours and attitudes of writing students, particularly those in developmental college classrooms. This study set out to investigate whether the writing performance and writing anxiety of developmental community college students could be significantly affected by the use of computers in a networked environment. The CAI and the comparison groups were administered pre-test essays and the Writing Apprehension Test by Daly and Miller (1974). After a semester of process-based writing instruction utilizing the same materials and syllabus, both groups produced paper-and-pencil post-test essays and took the Writing Apprehension Test again. In addition, handwritten posttest essays by the CAI group were compared to post-test essays produced by the same group on the computer. A statistical analysis of holistic scores revealed no significant differences between the CAI and comparison groups in writing performance, and no significant differences in the overall performance of the CAI group when writing on the computer as opposed to using paper and pencil. Analytical scores revealed that the content of the computer essays produced by the CAI group was rated significantly higher than the content of paper-and-pencil essays produced by the same group. Analysis of grammar and spelling, diction, organization

and sentence structure did not yield significant differences between the handwritten and computer essays. The CAI group's writing anxiety became significantly lower than that of the comparison group. Observations by the researcher indicated positive student retention and attitudes toward the computer, and limitations in the study due to lack of technological training and resources. Developmental students did not seem overwhelmed by the new technology or unable to benefit from it, as demonstrated by the significantly reduced writing anxiety of the CAI group, and the significantly higher rated content of the computer essays. These results, though limited in generalizability, warrant further experimentation with developmental writing instruction that integrates computer networks.

Toet, Joyce Anne. (1991) conducted a study on “A Comparative study of two instructional modalities on the achievement level of under prepared Community College Students (CAI)” This study was undertaken to determine if an Integrated Computer Assisted Instructional system would show superior results measured by increased cognitive gain, when compared to Traditional Instruction methodologies. A determination of the successful student based on gender, ethnicity, age and prior special education history was undertaken to develop a profile of the successful student in each modality. The method used was a pre/post protocol with experimental and control groups. The sample was randomly selected from a population of nearly four thousand students who took Mott Community College's placement tests. The sample was chosen from those students who were recommended to take remedial/developmental classes in the areas of math, English or reading improvement. Students were pre-tested with standardized instruments (Nelson Denny Reading or T.A.B.E., as appropriate). Demographic variables were examined to determine a profile of the successful student. The study extended over two full semesters and students in the control and experimental classes were assigned equivalent assignments based on time for completion; control from the textbook and experimental classes from work in the Computer Assisted Instructional laboratory. Equivalency of the groups was tested prior to the beginning of the experiment. Analysis of final data

showed that the experimental groups achieved greater cognitive gains, only Math 021 (basic math) showed differences of a statistically significant level. The analysis showed no possibility of developing a prescriptive instrument for use as a guide for future students to choose either ICAI or traditional classroom instruction based on demographic information and resulting mean cognitive gains. No trends are evident from the analysis of these data. One finding of significant import is the retention rates for ICAI and Traditional classroom methodologies. The results show that students remain in the Computer Assisted Instructional methodology at an increased number to a statistically significant level of alpha .05 in all classes studied (Math 101, beginning algebra, English 098, basic writing, English 020, reading improvement) with the exception of Math 021, basic math.

Haley, Mary Lewis Purnell. (1991) conducted a study on “Effects of Computer-Assisted Instruction in Macroeconomics Education: An Experimental Course Design” The objectives of the study were –to determine the effectiveness of using computer-assisted tutorials and examinations as supplements to the basic lecture and discussion course in macroeconomics, Secondary considerations included college grade point averages, scores on the American College Test and sex as possible determinants of student learning. The research study was conducted at Cumberland University, Lebanon, Tennessee during the fall semester of 1990. Two sections of Principles of Macroeconomics were used with forty-one students participating. One section performed as the control group and the other section as the experimental group. The computer assisted instructional materials used were prepared to be used in conjunction with Economics, 11th edition by Campbell R. McConnell and Stanley L. Brue. Six graphics based tutorials and seventeen exams were completed by students in the experimental group. Students received an on-screen evaluation of their performance showing the percent correct and page references for questions missed. Effectiveness of computer-assisted instructional materials on macroeconomic understanding was measured by administering four instructor-generated examinations and the "Revised Test of Understanding in College Economics, Macro Form B"

prepared by the Committee for a College-Level Test of Economic Understanding of the Joint Council on Economic Education which was used as both a pre test and a post test. Secondary data were collected by administering a student questionnaire. The Ordinary Least Squares Regression model was used to determine the relationship between the independent and dependent variables. The t-statistic was calculated and tested at the .05 and .01 levels of significance. Results of the regression analysis showed no significant positive relationship between students' cognitive achievement in Principles of Macroeconomics and their use of computer-assisted instruction. The only independent variable that was consistently positively related to students' cognitive achievement in Principles of Macroeconomics was college grade point average. Males were shown to be superior to females in terms of cognitive achievement in macroeconomics.

Gao, Yong Qiang, (1992) conducted a study on “Factors affecting use of Computer-Assisted Instruction by selected Chinese University educators” The objectives of the study were to examine whether identified factors have an effect on use of CAI by selected Chinese university educators. These five factors were investigated: Attitudes toward CAI; language factor; lack of adequate CAI courseware; lack of availability of CAI educators training; and lack of availability of computer systems. The study also sought to identify the current status and attitudes toward the use of CAI and the relationship between the use of CAI and educators' gender, age, university rank, computer experience, and English level. Subjects were 124 Chinese university educators from 24 different institutions. Among them, 35 attended 1991 Beijing Workshop on CAI in Beijing, China. The remaining 89 subjects attended the 5th National CAI Conference, Nanjing, China. A questionnaire was developed and translated into Chinese in order to collect data from China. Collected data were analyzed through conducting analyses of frequency, percentage distribution, means, General Linear Model (GLM), analysis of variance (ANOVA), analysis of matrix of correlation coefficients, and Scheffe test. Significance was accepted at the .05 alpha level. Results of this study indicated a significant development of CAI in China in

recent years. Most educators had positive attitudes toward CAI and more than half of them used CAI in their teaching. The study also found statistically significant differences between use of CAI and age and English level; age, rank, and computer experience were also correlated to use of CAI; all 5 factors examined in this study were statistically significant related to use of CAI. Based on the findings of the study, recommendations were made for improvement and future research on CAI in China.

Park, Insun Hwang. (1993) conducted a study on “Co-operative Learning and Individual Learning with Computer Assisted Instruction in an introductory University level Chemistry course” The objectives of the study were to assess the effects of cooperative learning and individual learning with Computer Assisted Instruction (CAI) in a university-level introductory chemistry course, to assess the cooperation on group work and positive attitude toward using computers in the classroom. The sample consisted of 109 students who enrolled in an introductory chemistry course (CH 301). These subjects were assigned to one of four cells in a two factor experimental design. The two factors were learning group and learning ability level. Within the learning group factor, there were the two groups: cooperative working groups and individual working groups with a computer. Subjects in cooperative learning groups worked in dyads and individuals worked alone with a computer. Within the ability level factor, there were the two levels: the high-ability groups and the low-ability level groups. All participants worked a minimum for one hour per week. They attended a lecture class first, and then worked with chemistry computer programs in the computer lab. Subjects who participated in cooperative learning performed their achievement better than subjects in the individual learning groups with Computer Assisted Instruction (CAI) in an introductory university-level chemistry course. High ability level students and low-ability level students in cooperative learning group improved their performance more than high-ability or low-ability level individuals who worked alone with a computer in an introductory university level chemistry course. There was no significant difference on students' attitude between students who worked in the group use of computers and individual

use of computers in an introductory university-level chemistry course. The majority of the students in the university level class showed positive co-operation on group work and positive attitude toward using computers in the classroom.

Barnett, L. (2006) conducted a study on “The Effect of Computer Assisted Instruction on the reading skills of emergent readers” The objectives of the study were to examine the effect of Computer Assisted Instruction (CAI) in the reading skill of emergent readers in Kindergarten classes at select Reading First schools in the School District of Palm Beach Country, Florida, to analyzed teacher attitude towards the computer affected student reading achievement. The measure used to compare treatment and non treatment schools were the Dynamic Indicators of Basic Literacy Skills (DIBELS), which tested letter naming ability, initial sound identification, phoneme segmentation ability and nonsense word decoding. The Word Recognition and Reading Running Record assessments form the School District of Palm Beach Country Reading and Writing Assessment System Grades K-1 protocol booklet tested identification of 25 sight words and ability to read continuous text. Students using Destination Reading (Riverdeep, 2001) did not benefit significantly from the use of the program compared to nonuser. The CAI group scored significantly lower on the initial sound fluency measure. Factorial ANOVA were used to compare DIBELS scores for effectiveness of the treatment, pre and post test comparisons and interaction of treatment with test scores for the CAI compared with the nonuser group. T distributions were used to analyze data from the Reading Running Record and Word Recognition assessments. There were no significant differences between the CAI and comparison schools on these two measures. Teacher attitude toward computer did not affect students’ acquisitions of reading skills, as survey responses were in the positive range for all participants.

Deck, Alan.Collins, David and McCrickard, Myra. (2008) conducted a study on “Computer Aided Instruction: A Study of Student Evaluations and Academic Performance” This paper describes the educational use of CAI in two different courses at a small, private university and the implementation and use experiences of

the instructors. The objectives of the study were to study the impact of using CAI on student evaluations of both the course and the instructor and on student grades, to evaluate, mean responses compared on questions influenced by the switch from traditional homework assignments to CAI-based homework assignments. Data was obtained from student course evaluations, homework scores, and final exam scores for the principles of microeconomics and the principles of financial accounting courses. The total number of number of microeconomics sections in the data set was 17 (6 sections before CAI and 11 after CAI). The total number of accounting sections in the data set was 6 (2 sections before CAI and 4 after CAI). The sample size was 311 for the microeconomics course and 95 for the accounting course. CAI represents the homework score achieved by the students in each of the courses. SPRING controls for possible differences in final exam scores between fall and spring semesters that might result because weaker students often are advised to take these courses in the spring semester. Because CAI was used in the microeconomics course for two years, a TIME variable was included to examine whether the use of CAI is more effective over time. The effect of CAI on final exam scores is expected to be positive and was examined by regressing the final exam scores on the homework scores (the Aplia score in the microeconomics course and the Homework Manager score in the financial accounting course), while controlling for SPRING (both courses) and TIME (the microeconomics course only). The means of the variables used in the regressions for the final exam score (FINAL EXAM). Of interest in this study, while the average FINAL EXAM scores are quite different (67.09 for microeconomics vs. 49.28 for financial accounting), the average CAI scores are almost identical (74.33 for microeconomics and 74.97 for financial accounting). This may suggest that the mechanics of using a CAI tool does not significantly impact the outcomes achieved by students. With the exception of SPRING, all of the variables tested are significant at the 0.01% level. The intercept terms for both courses (21.901 and 25.438) are consistent. The results for the CAI variable are, as expected, both positive and significant and indicate that the use of CAI improves final exam scores. For the microeconomics course only, the TIME variable is both positive and

significant and added 4.846 points to the final exam score in year two compared to year one. This indicates that with instructor experience, the use of CAI may be more effective over time. Regression results indicate that CAI was not significant in explaining the responses to any of the 10 student evaluation questions chosen. This suggests that the use of CAI, in and of itself, does not impact student perceptions of course quality. Alternatively, this may be due to the fact that the responses are not identified by student, so the aggregated data masks any effect of CAI on student perceptions of course quality. While the response differences are not large enough to be significant, at least for the microeconomics course, they generally are positive indicating a possible improvement from the use of CAI in student perceptions of course quality.

2.3 Significance of the Study

The present study is related to development of computer assisted instruction programme and its implementation. Also, study is related to check effect of CAI on achievement of students. Since people believe that Sanskrit Grammar is one of the most difficult subjects, there are so many reasons for this but the abstract nature of subject and a lack of proper teaching methodology are main CAI helps to reduce these difficulties. Now a days, many computer programmes are available readymade. Courseware can be bought as a fully developed Programme from a software company, but the programme provided this way may not suit the particular needs of the individual class or curriculum .So the software should be developed which is exactly tailored according to the needs of the students. Hence, the present study has been carried out to develop CAI programme and to check the effectiveness of such programme. It is important that such programme be time-saving, interesting, need-based, and effective. A successful experiment is a source of joy and encouragement to the learner. So the present study is very needful.

Due to the less research work in this area, investigator decided to review experimental researches on different strategies in teaching methodology of Sanskrit Grammar. This

helped investigator in development of CAI, in planning of implementation, in construction of hypothesis also in selection of proper statistics.

All studies which are reviewed are related to experimental research in different Subjects. So selection of tools depends upon variables. In these entire studies sample was divided into two equal groups. Some researcher considered previous year result of students as criteria for equal groups. In some studies pre-test, post-test and ANCOVA were used for analysis. But in present study t-test and correlation were used for same. In the abroad studies variables are few but in present study two independent variables and two dependent variables were taken to check its effects. Also main and interaction effects of these variables were tested. In present study the graphical analysis also considered as part of analysis.

In this study the CAI programme was developed in such a way that it can be implemented in normal classroom. CAI contained topics from one branches of Sanskrit Grammar. CAI included Concepts & examples of different topics of Sanskrit Grammar of B.Ed. The review of the related literature helped investigator to select variable and a research method pertaining to the problem in hand.

2.4 Conclusion

In the present chapter importance of review of related literature, review of related studies conducted in India and abroad and significance of the present study are discussed.

The next chapter devotes itself to the Research Methodology.

CHAPTER - 3

Research Methodology

3.1 Introduction

Planning is a necessary aspect even of ordinary day-to-day work. It is an essential step in any kind of research without that the satisfactory result would not be possible. It is often at this stage of planning that decisions are made that will make the difference between a sound study and a faulty one.

Research design is a mapping strategy like the architect's plan. The researcher must consider certain fundamental steps those are essentially the same regardless of the type of research design. Borg (1963) stated very important point that the factor that most often differentiate between good and poor research is not the funds available, the size of the sample or sophistication of the statistics, it is the care and thought that goes into research plan.

Thus, planning is an essential step in the process of research. In other words, planning is a mapping strategy. As McGrath (1970) puts it as the activities related to design in research are comparable to those of the architect in designing an intricate structure. As the architect does his designing before construction activities get underway, so should the researcher do his designing, before he gets his project underway.

The present world and its affairs have become extremely complex. If any work is to be carried out and completed meaningful it needs to be well planned, and more so when its execution time spans over a longer period. Without careful planning much damage has been done to and loss incurred by nations.

A good research work cannot just happen. It includes a number of operations carried out with patience and accuracy. For such a serious work, planning requires almost care and insight.

The title of the present study is **“Effectiveness of Computer Assisted Instruction to teach Sanskrit Grammar at B.Ed Level”**

The study has two parts:

- (1) The construction of computer assisted teaching programme in Sanskrit for B.Ed students.
- (2) To study the effect of program on achievement of students.

3.2 Research Type

The present research is experimental in nature .It follows two group pre-test, post – test experimental design. The research is mainly quantitative in nature but the researcher also took reaction scale the Student-teachers which were also quantitatively analyzed. The researcher used t-test to calculate the difference of means of the group in pre-test and post-test and chi square test to check the reaction of student-teachers towards programme.

3.3 Design of the Study

The experimental study was conducted utilizing two group pre-test and post-test design.

Table-3.2

Two group Pre-Test Post Test design

Group	Pre-Test	Treatment	Post-Test
Control Group	T _{1C}	Conventional Method	T _{2C}
Experimental Group	T _{1E}	CAI Programme	T _{2E}

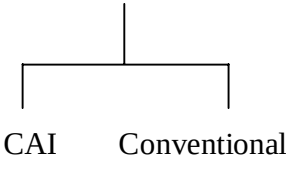
It can be seen that the experimental group received instruction through CAI Programme and the control group received instruction through traditional class room teaching. The data were collected by administering post-test (T2) on both the groups. After the treatment phase the scores of the students obtained on the post-test were analysed by employing t-test as statistical technique. Effectiveness of the CAI Programme was worked out by testing the null hypotheses.

3.4 Population

The population of the study comprised of the Gujarati-Sanskrit method student - teachers of B.Ed level of Anand district of the academic year 2014-15.

3.5 Variable

This study is undertaken with some variables. In present study the independent variables and dependent variables are as follows.

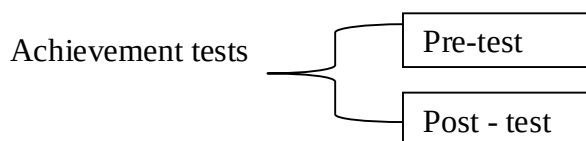
Type of Variable	Level of Variable
Independent variable	Method of Teaching 
Dependent variable	-Achievement of Student-teachers - Reaction of Student-teachers

3.6 Sample and Sampling Technique

The sample is the working unit of the research. It is a group of subjects that the researcher works and interacts with. The sample of the present study comprised 30 Student-teachers of Gujarati-Sanskrit method of Shri I. J. Patel B.Ed College, Mogari and 30 Student-teachers of Gujarati-Sanskrit method of Shri P.K.Inamdar College. The sampling technique was convenient sampling as the researcher selected the B.Ed colleges in which she got permission to conduct her experiment. The data was collected from the Student-teachers of B.Ed by using the following tools.

3.7 Data Collection Tools

Tools help the researcher to interact with the subject and get their responses in the present study; the researcher used two major tools. An achievement tests for collecting the data (pre-test and post-test) A reaction scale to find the reactions of the Student-teachers about the CAI to teach Sanskrit grammar.



Achievement test was developed by the researcher served as pre test, post test.

(2) Reaction scale.

3.8 Procedure for Construction of Tools

The Procedure followed for preparing each tools is mentioned below.

3.8.1 Preparation and Validation of Achievement Test

The researcher constructed achievement test on the basis of the content undertaken. The researcher also took care of mental level of the Student-teachers. The researcher took the help of experts and subject teachers in constructing the tool. The pre-test was administrated before the completion of teaching and post-test was administrated after the completion of teaching on both the group.

- **Preparation and validation of pre-test and post test**

The researcher prepared the test and got it modified and corrected by the guide. The researcher incorporated the changes and got it checked by the experts in the field of Sanskrit language. She modified the test according to their suggestions.

3.8.2 Preparation and Validation of Reaction Scale

In order to triangulate the data the researcher prepared the reaction scale. The researcher prepared the reaction scale to get the Student-teachers reaction about the programme. The researcher wanted to check the effectiveness of the programme and how did the programme help the student-teachers to develop their Sanskrit grammar competencies. Researcher has taken 32 statements and asked the Student-teachers to answer in 5 point scale (Likerts Scale).The researcher took help of experts and guide and then modified according to their suggestions. The purpose of

the reaction scale was to know whether the Student-teachers found teaching through CAI interesting and motivation.

3.9 Data Collection

The present study is based on development and implementation of CAI Programme on teaching Sanskrit grammar at B.Ed level. this required preparation of CAI Programme by the researcher. After preparing the CAI Programme it was implemented and then its effectiveness was measured. In the third stage reaction of the students was taken.

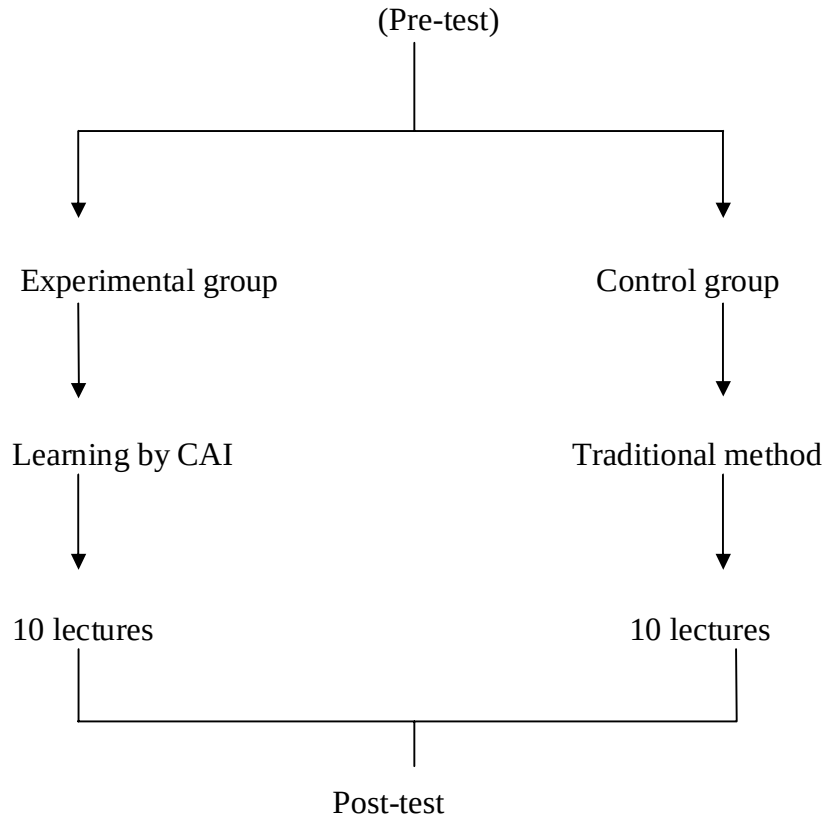
For data collection, the researcher took the permission from two B.Ed Colleges titled P.K.Inamdar College of education and Shri I. J. Pated B.Ed College. One college was taken as control group and one as an Experimental group.

3.10 Topics of CAI

The investigator prepared computer assisted teaching programme for five topics relating Sanskrit Grammar. These programmes consists Softwares like power point presentation slides, Java, html, Audacity and Sanskrit Software. The topics of CAI are given below.

1. Dhaturup parichay (धातुरूप परिचय)
2. Krudant (कृदन्त)
3. Samas (समास)
4. Avyay & Upsarg (अव्यय & उपसर्ग)
5. 1 - 100 Samkhya (१-१०० संख्या)

3.11 The Experiment and Schedule



The group receiving instruction through the CAI Programme was labelled as experimental group and the group receiving instruction through traditional class room teaching was labelled as control group. The L.C.D. Projector, a screen and a CPU with installed the CAI Programme was used. The experiment lasted for 10 days.

The detailed description about the process of data collection is mentioned clearly stage wise.

Stage 1: (i) During the first stage the researcher referred the Sanskrit grammar book of B.Ed and selected the topics .When selecting the topics, the researcher focused more in the area of Sanskrit grammar where the Student-teachers faced problems in grammar. Then the researcher prepared the CAI related to the topics were the Student-teachers understand deeply.

(ii) The researcher has collected marks of semester-I in Sanskrit method from respective method masters of both the colleges. The researcher carefully examined the marks of both groups' Student-teachers. This examination suggests that some students were above average level where as some are at average level and very few were at below average. After that researcher conducted pre-test. This has helped to form the two groups. i. e. Control and Experimental Group .Both the group were almost similar in pre-test.

Stage 2: The researcher prepared CAI with the help and guidance of the guide. This was evaluated by the experts and modifications were made accordingly. The researcher simultaneously prepared the tools namely post-test and Reaction Scale and got them validated from experts.

Stage 3: The researcher conducted the experiment then the program was followed by post –test and Reaction scale.

Stage 4: Data analysis and Interpretation was done using t-teat and chi-square.

Stage 5: Documentation of the research work.

However, the following table mentions the details of the implementation of the experimental Sessions.

Table 3.2
Implementation of Program Day-Wise

Date & Time	Experimental group (CAI Programme)	Date & Time	Control group (Traditional Teaching)
8/01/2015	Pre-test	7/01/2015	Pre-test

19/01/2015 11:00 a.m. (45 min)	Future tense (Parsmay pad)	19/01/2015 3:30 p.m. (45 min)	Future tense (Parsmay pad)
20/01/2015 11:00 a.m. (45 min)	Future tense (Atmane pad)	20/01/2015 3:30 p.m. (45 min)	Future tense (Atmane pad)
21/01/2015 11:00 a.m. (45 min)	Agnarth(Parsmay pad)	21/01/2015 3:30 p.m. (45 min)	Agnarth(Parsmay pad)
22/01/2015 11:00 a.m. (45 min)	Agnarth(Atmane pad)	22/01/2015 3:30 p.m. (45 min)	Agnarth(Atmane pad)
23/01/2015 11:00 a.m. (45 min)	Past tense(Parsmay pad)	23/01/2015 3:30 p.m. (45 min)	Past tense(Parsmay pad)
24/01/2015	Past tense (Atmane pad)	24/01/2015	Past tense (Atmane pad)

11:00 a.m. (45 min)		3:30 p.m. (45 min)	
26/01/2015 11:30a.m. (45 min)	Avyay & Upsarg	26/01/2015 3:30 p.m. (45 min)	Avyay & Upsarg
27/01/2015 11:30a.m. (45 min)	Krudant 1- 100 Samkhya	27/01/2015 3:30 p.m. (45 min)	Krudant 1- 100 Samkhya
28/01/2015 11:30a.m. (45 min)	Samas	28/01/2015 3:30 p.m. (45 min)	Samas
29/01/2015 11:30a.m (45 min)	Samas	29/01/2015 3:30 p.m. (45 min)	Samas
30/01/2015	Post-test	30/01/2015	Post-test
30/01/2015	Reaction Scale		

3.12 Techniques of Data Analysis

Analysis of data means studying the organized material in order to discover inherent facts. The data are studied from as many angles as possible to explore the new facts. The present data was analyzed quantitatively as the researcher used statistical techniques like mean, S.D. and t-test to analyze it. The Reaction Scale of the students was analyzed through chi- square.

3.13 Conclusion

This chapter is the scaffolding of the research. It discussed the systematic details of the research work carried out by the researcher. The details of research design, population, sample, tools for data collection and data analysis and the research procedure are the main points discussed in this chapter.

The next chapter deals with the actual analysis and interpretation of the data collection.

CHAPTER - 4

Data Analysis and Interpretation

“Analysis and Interpretation of the collected data is the most important stage in the research process. This process requires alert, flexible and open mind.”*

4.1. Introduction

In Chapter three, researcher had discussed the research design and methodology, origin of the research, design of the research, variable of the research, population and sample of the research, tools for data collection, development stage of the CAI Programme, procedure for data collection, statistical analysis done in research work.

Data analysis is considered to be an important step and heart of the research in research work. After collection of data with the help of relevant tools and techniques, the next logical step, is to analyze and interpret data with a view to arriving at empirical solution to the problem. The data analysis for the present research was done quantitatively with the help of descriptive statistics. The descriptive statistical techniques like mean, standard deviation were used during data analysis. For the analysis of reaction scale Chi square test was used.

4.2. Data Analysis and Interpretation

The studies were conducted keeping in view the objectives described in the first chapter. The researcher calculated t-test to test the null hypotheses formulated for the research purpose the calculation and description of the hypotheses are presented below:

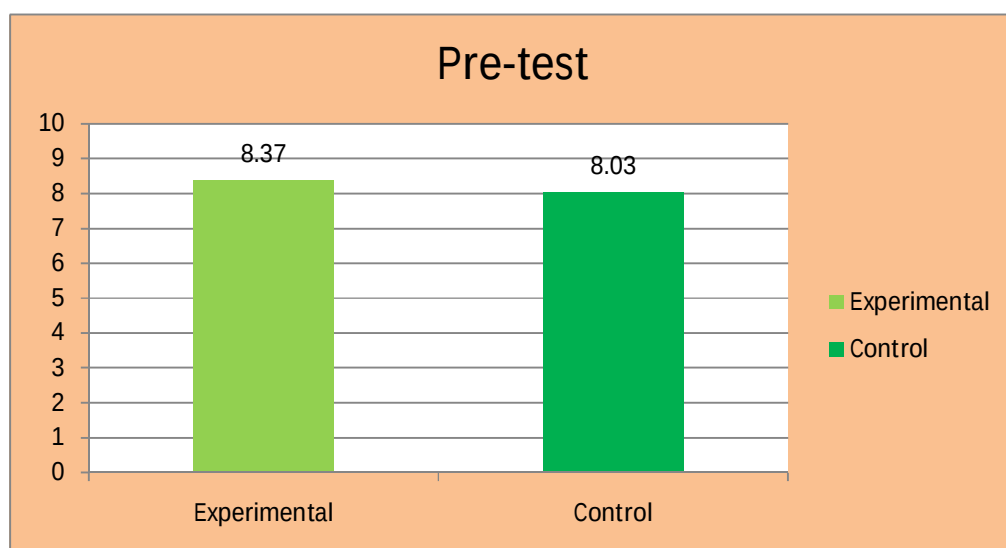
* ચોવટિયા, એસ.એન. (૨૦૦૯). વાણીજ્યમાં કમ્પ્યુટર આધારિત અધ્યયન કાર્યક્રમની રચના અને અજમાયશ. અપ્રકાશિત પી.એચ.ડી.મહાશોધ નિબંધ ,સરદાર પટેલ યુનિ. વિદ્યાનગર.

4.2.1 To test the H_{01} : There will be no significant difference between mean achievement scores of control group and experimental group in pre –test.

The analyzed data has been presented through Table- 4.2.1

Table- 4.2.1 Mean,SD,SE_m,df and ‘t’ value

Group	No.of students	Mean Scores	SD	SE _m	df	t-value and Significance level
Experimental	30	8.37	2.24	0.41	58	0.60 (0.01)
Control	30	8.03	2.13	0.39		



The calculated ‘t’ value of 0.60 is less than the table ‘t’ value of 2.66 at 0.01 level for 58 degree of freedom.

Therefore, Null Hypothesis that there will be no significant difference between mean achievement scores of control group and experimental group on pre –test is not rejected.

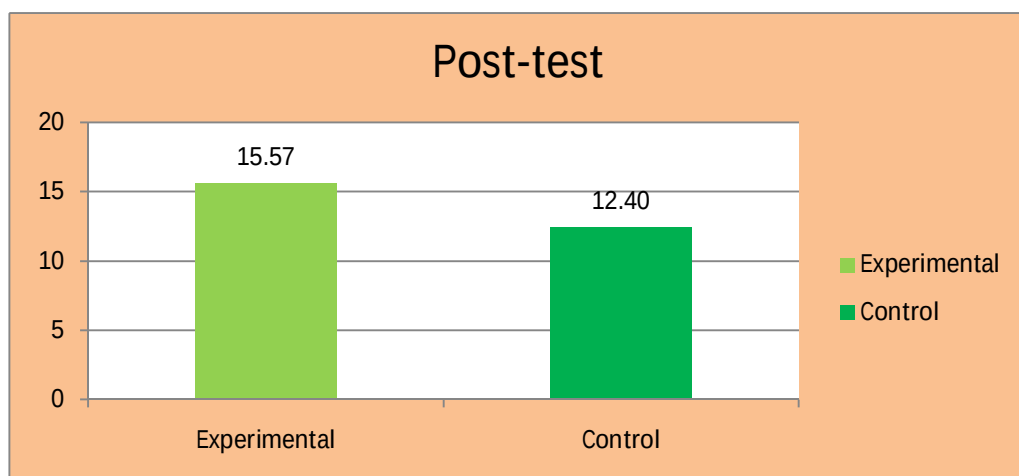
It means, there is no significant difference between the mean achievement scores of control group and experimental group on pre-test. Both groups are almost equal in achievement.

4.2.2 To test the H_{02} : There will be no significant difference between mean achievement scores of control group and experimental group in post –test.

The analyzed data has been presented through Table- 4.2.2

Table- 4.2.2 Mean, SD, SE_m , df and ‘t’value

Group	No.of students	Mean Scores	SD	SEm	df	t-value and Significance level
Experimental	30	15.57	3.47	0.63	58	3.96 (0.01)
Control	30	12.40	2.68	0.49		



The calculated 't' value of 3.96 is greater than the table 't' value of 2.66 at 0.01 level for 58 degree of freedom.

Therefore, Null Hypothesis that there will be no significant difference between mean achievement scores of control group and experimental group on post –test is rejected.

It means, there is significant difference between the mean achievement scores of control group and experimental group on post-test, in favour of experimental group, which shows effectiveness of the development of CAI Programme.

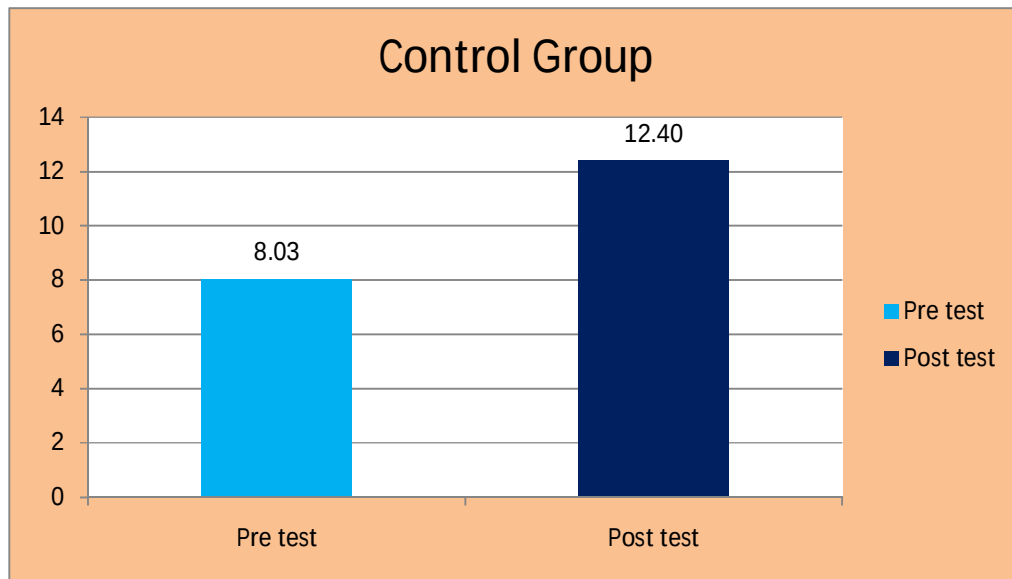
So, the treatment is found to be effective as evident through the analyzed data.

4.2.3 To test the H_{03} : There will be no significant difference between mean achievement scores of pre –test and post –test of control group.

The analyzed data has been presented through Table- 4.2.3

Table- 4.2.3 Mean, SD, SEm, df, r and 't' value

Control Group	No. of students	Mean Scores	SD	SEm	r	Df	t-value and Significance level
post–test	30	12.40	2.68	0.49	0.40	29	8.92 (0.01)
pre–test	30	8.03	2.13	0.39			



The calculated 't' value of 8.92 is greater than the table 't' value of 2.66 at 0.01 level for 29 degree of freedom.

Therefore, Null Hypothesis that there will be no significant difference between mean achievement scores of pre –test and post –test of control group is rejected.

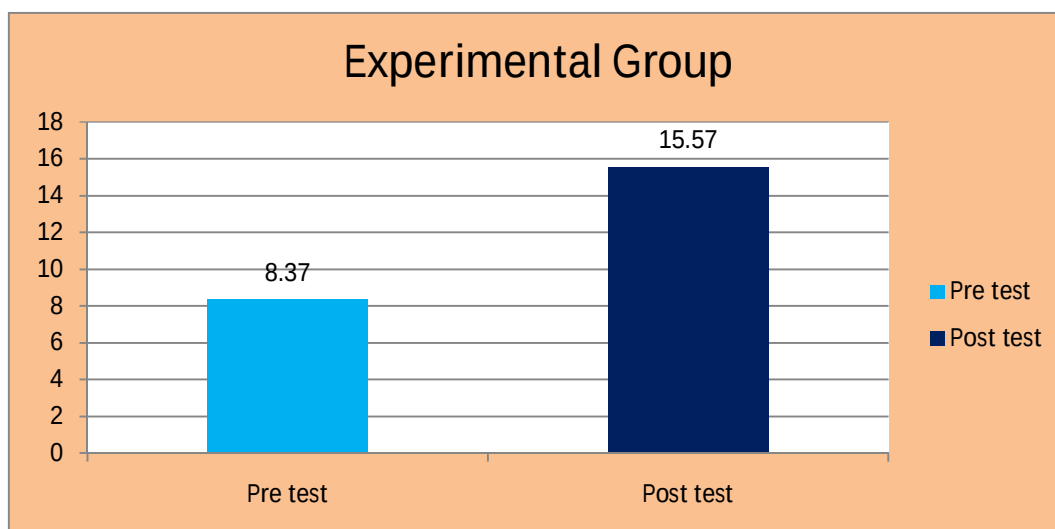
It means, there is significant difference between the mean achievement scores of pre – test and post –test of control group. It means that there is some improvement in the achievement of control group.

4.2.4 To test the H_{04} : There will be no significant difference between mean achievement scores of pre –test and post –test of experimental group.

The analyzed data has been presented through Table- 4.2.4

Table- 4.2.4 Mean, SD, SEm, df, r and 't' value

Experimental Group	No. of students	Mean Scores	SD	SEm	r	Df	t-value and Significance level
post –test	30	15.57	3.47	0.63	0.07	29	9.86 (0.01)
pre –test	30	8.37	2.24	0.40			



The calculated 't' value of 9.86 is greater than the table 't' value of 2.66 at 0.01 levels for 29 degree of freedom.

Therefore, Null Hypothesis that there will be no significant difference between mean achievement scores of pre –test and post –test of Experimental group is rejected.

It means, there is significant difference in the mean achievement scores of pre –test and post –test of experimental group.

The Computer Assisted Instruction programme in teaching Sanskrit at B.Ed level has been found effective as evident through the significant difference in Mean achievement scores of experimental group and control group.

According to the 5th hypothesis the reaction of the students were analyzed and converted into the percentage. The interpretation of students' reactions has been presented below:

4.3 Interpretation of Students' Reaction through Reaction Scale

The researcher formulated null hypothesis, H_{05} : There will be no significant difference between the observed frequencies and expected frequencies in the reaction scale.

To test the hypothesis on each statement frequencies and χ^2 was calculated and then % analysis was done to get better picture of responses.

Reaction Scale was developed with 32 statements those representing different components like content presentation, questioning, individualization and self pacing of CAI software. Out of these 32 statements 9 statements were having negative meaning and 24 statements were positive.

The data related to the Reaction Scale is analyzed with χ^2 test which is given in table 4.3.1 which are followed by discussion.

The five point Likert type scale Reaction Scale ranging from strongly agree to strongly disagree was constructed. To find merit number the five point scale were given the weightage as below.

Strongly agree: +2
Agree: +1
Neutral: 0
Disagree: -1
Strongly Disagree: -2

Reactions of the students were analyzed in terms of frequencies responses and χ^2 presented below, statements wise.

Table: 4.3.1

Calculation of chi square test of Reaction Scale

Sr.No ક્રમ	Statement વિધાન	Nature of Statement	Strongly Agree સંપૂર્ણ સંમત	Agree સંમત	Neutral તટસ્થ	Disagree અસંમત	Strongly Disagree સંપૂર્ણ અસંમત	Total score	Chi(χ^2) square Value
૧	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા અમને સંસ્કૃત વિષય શીખવાનો ગમ્યો. We liked to learn Sanskrit Subject through this CAI programme	Positive	18 (60%)	11 (36.67%)	1 (3.33%)	0 (0%)	0 (0%)	47	44.34

૨	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં અવાજ અમને યોગ્ય રીતે સંભળાય તેવો હતો. Voice in programme was audible	Positive	22 (73.33%)	6 (20%)	2 (6.67%)	0 (0%)	0 (0%)	50	57.32
૩	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શિક્ષણ માં અમે ધ્યાન કેન્દ્રિત કરી શક્યા હતા. Concentration increased by	Positive	24 (80%)	6 (20%)	0 (0%)	0 (0%)	0 (0%)	54	72

	learning through this method.								
૪	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં વિષયવસ્તુને સરળ રીતે રજૂ કરવામાં આવ્યું હતું. The Content presented was very interesting and easily understandable.	Positive	18 (60%)	10 (33.33%)	2 (6.67%)	0 (0%)	0 (0%)	46	41.32
૫	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા સંસ્કૃત વિષય માં ઊડાણપૂર્વક નું જ્ઞાન	Positive	22 (73.33%)	5 (16.67%)	3 (10%)	0 (0%)	0 (0%)	49	56.32

	મેળવી શક્યા. With the CAI programme, in-depth knowledge of Sanskrit subject can be provided.								
૬	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શિક્ષણ કાર્યક્રમ ખુબ લાંબો હતો. It was very long programme.	Negative	2 (6.67%)	2 (6.67%)	12 (40%)	4 (13.33%)	10 (33.33%)	18	56.64
૭	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા અમે શિક્ષકની ગેરહાજરીમાં પણ	Positive	6 (20%)	12 (40%)	2 (6.67%)	8 (26.67%)	2 (6.66%)	12	11.98

	સંસ્કૃત વ્યાકરણનો અભ્યાસ કરી શકીએ તેમ છીએ. Even self-learning is possible through this method.								
૮	સંસ્કૃત વિષયના અન્ય એકમો કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શીખવાના ગમશે. We would like to learn other topics of the Sanskrit language also with this kind of CAI.	Positive	10 (33.33%)	18 (60%)	0 (0%)	0 (0%)	2 (6.67%)	38	41.32

૯	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ કાર્યક્રમ ખુબ રસ પ્રદ હતો. It was interesting to learn Sanskrit through CAI programme.	Positive	22 (73.33%)	8 (26.67%)	0 (0%)	0 (0%)	0 (0%)	52	61.32
૧૦	એનિમેશનચિત્રો , અને કોઠા ના ઉપયોગ દ્વારા સંસ્કૃત વિષયની રજૂઆત .અમને ખુબ ગમી The pictures, charts, and tale were properly explained.	Positive	22 (73.33%)	7 (23.33%)	1 (3.33%)	0 (0%)	0 (0%)	51	58.98

૧૧	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શિક્ષણ મેળવવાથી અમે થાક અનુભવતા હતા. It was tiring and exhausting to learn through CAI programme	Negative	0 (0%)	8 (26.67%)	2 (6.66%)	8 (26.67%)	12 (40%)	24	15.98
૧૨	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ મદદથી બીજા વિષયો પણ શીખવાના ગમશે. We would like to learn other Subjects with this kind of	Positive	20 (66.67%)	8 (26.67%)	2 (6.66%)	0 (0%)	0 (0%)	48	47.98

	CAI.								
૧૩	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટની ભાષા સરળ હતી. The language used in the CAI programme was easy.	Positive	17 (56.67%)	11 (36.67%)	2 (6.66%)	0 (0%)	0 (0%)	45	38.98
૧૪	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં વિષયવસ્તુની રજૂઆતની ઝડપ વધારે હતી. Content of the CAI programme was presented in fast speed.	Negative	4 (13.33%)	10 (33.33%)	6 (20%)	0 (0%)	10 (33.33%)	2	17.32

૧૫	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં વિષયવસ્તુની કમિક રજૂઆત થઇ નથી. Presentation of CAI programme was not systematic.	Negative	2 (6.67%)	8 (26.67%)	0 (0%)	2 (6.66%)	18 (60%)	26	35.98
૧૬	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં પ્રશ્નોત્તરી રસપ્રદ હતી. Questions asked in CAI were interesting.	Positive	26 (86.67%)	4 (13.33%)	0 (0%)	0 (0%)	0 (0%)	56	85.32
૧૭	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટનો	Positive	16 (53.33%)	12 (40%)	2 (6.67%)	0 (0%)	0 (0%)	44	37.32

	ઉપયોગ સરળ રીતે કરી શકાય છે. CAI programme can be used easily in teaching.								
૧૮	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં પ્રશ્નો વિષયવસ્તુ સાથે સુસંગત હતા. Questions asked were not related with the content of CAI programme.	Positive	27 (90%)	3 (10%)	0 (0%)	0 (0%)	0 (0%)	57	93
૧૯	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શીખવાની સાથે	Positive	26 (86.67%)	3 (10%)	1 (3.33%)	0 (0%)	0 (0%)	55	84.32

	મનોરંજન પણ મળે છે. This programme provided knowledge with enjoyment.								
૨૦	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં (સ્લાઈડ) બેક ગ્રાઉન્ડનો કલર વધુ આકર્ષક હોવાની જરૂર હતી. Colours used in programme would have been more attractive.	Negative	3 (10%)	8 (26.67%)	8 (26.67%)	5 (16.66%)	6 (20%)	3	2.98
૨૧	એનીમેટેડ રંગીન	Positive	15	10	5	0	0	40	28.32

	ચિત્રોની મદદથી સંસ્કૃત શિક્ષણ રસપ્રદ બને છે. Use of animated pictures made Sanskrit teaching entertaining.		(50%)	(33.33%)	(16.67%)	(0%)	(0%)		
૨૨	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં મળતા પ્રશ્નો અંગેના પ્રતીપોષણ થી આગળ વધવાની પ્રેરણા મળે છે. Learning through CAI programme motivated to know more about the	Positive	12 (40%)	16 (53.33%)	1 (3.33%)	1 (3.33%)	0 (0%)	39	36.98

	subject.								
૨૩	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં કેટલાક પ્રશ્નો સ્પષ્ટ નહીં હતા. Some questions asked in this programme were not clear.	Negative	2 (6.67%)	6 (20%)	4 (13.33%)	6 (20%)	12 (40%)	20	9.32
૨૪	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શીખેલું યાદ રાખવું સરળ બને છે. Use of CAI programme made the learning easy.	Positive	20 (66.67%)	7 (23.33%)	1 (3.33%)	0 (0%)	2 (6.67%)	43	45.64

૨૫	આ પ્રકારની શિક્ષણ પદ્ધતિ રૂઢિગત શિક્ષણ પદ્ધતિ કરતા અલગ હતી. This method of teaching learning was more interesting than the ordinary learning method.	Positive	20 (66.67%)	6 (20%)	0 (0%)	4 (13.33%)	0 (0%)	42	79.32
૨૬	સમય મર્યાદા વિષય વસ્તુના પ્રમાણમાં યોગ્ય ન હતી. Time was not managed properly in teaching the content.	Negative	6 (20%)	2 (6.66%)	6 (20%)	8 (26.67%)	8 (26.67%)	10	3.98

૨૭	શરૂઆત થી અંત સુંધી જકડી રાખ્યા હતા. The CAI programme was interesting from beginning to end.	Positive	14 (46.67%)	4 (13.33%)	0 (0%)	6 (20%)	6 (20%)	14	17.32
૨૮	આ કાર્યક્રમથી અધ્યયનની ગંભીરતા ઓછી થાય છે. This CAI programme reduced seriousness of the study.	Negative	1 (3.33%)	4 (13.33%)	9 (30%)	10 (33.33%)	6 (20%)	16	13.48
૨૯	મુદ્દાની પ્રયોગાત્મક રજૂઆત simulatio	Positive	15 (50%)	9 (30%)	3 (10%)	2 (6.67%)	1 (3.33%)	35	23.32

	ઊડાણપૂર્વક સમજ આપતી હતી Simulation helped me to understand the depth of the Topic.								
૩૦	કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં કેટલીક માહિતી ગુંચવણ ઉત્પન્ન કરે તેવી હતી. Some information provided in the programme seemed to be confusing.	Negative	8 (26.67%)	4 (13.33%)	4 (13.33%)	2 (6.67%)	12 (40%)	6	10.64
૩૧	આ પ્રકારની પ્રયુક્તિ	Positive	20	6	1	1	2	41	77.64

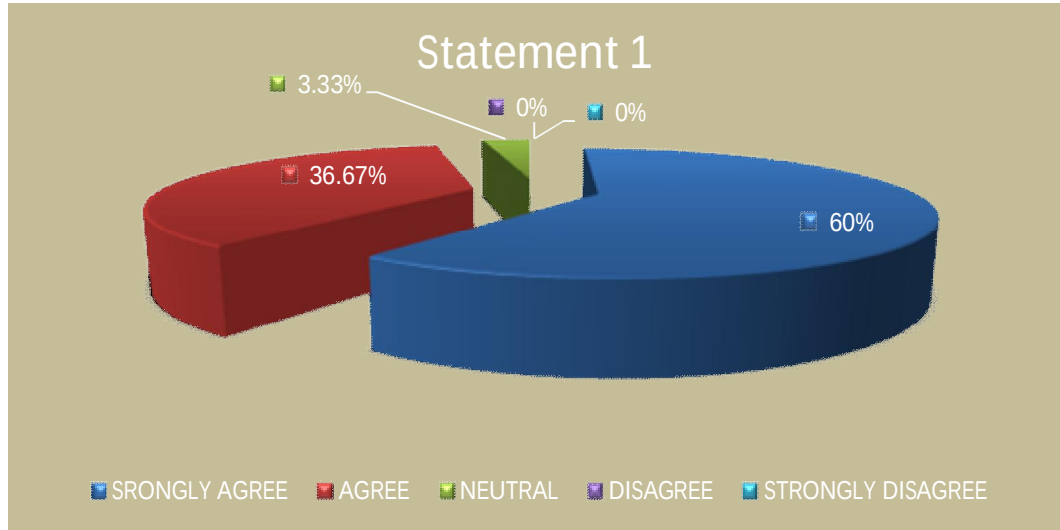
	દ્વારા વ્યાકરણ નું ભારણ ઘટાડી શકાય છે. This programme reduced difficulty in teaching grammar.		(66.67%)	(20%)	(3.33%)	(3.33%)	(6.67%)		
૩૨	વિષય વસ્તુ તાર્કિક ક્રમ માં ગોઠવેલ હોવાથી સમજવામાં સરળ હતી. Content was presented logically so it was easy to understand.	Positive	26 (86.67%)	2 (6.67%)	1 (3.33%)	1 (3.33%)	0 (0%)	53	83.64

STATEMENT: 1 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા અમને સંસ્કૃત વિષય શીખવાનો ગમ્યો.

Table: 4.3.2 Analysis of response of students on Statement – 1

We liked to learn Sanskrit Subject through this CAI programme

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	18 (60%)	11 (36.67%)	1 (3.33%)	0 (0%)	0 (0%)	44.34 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 44.34. Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

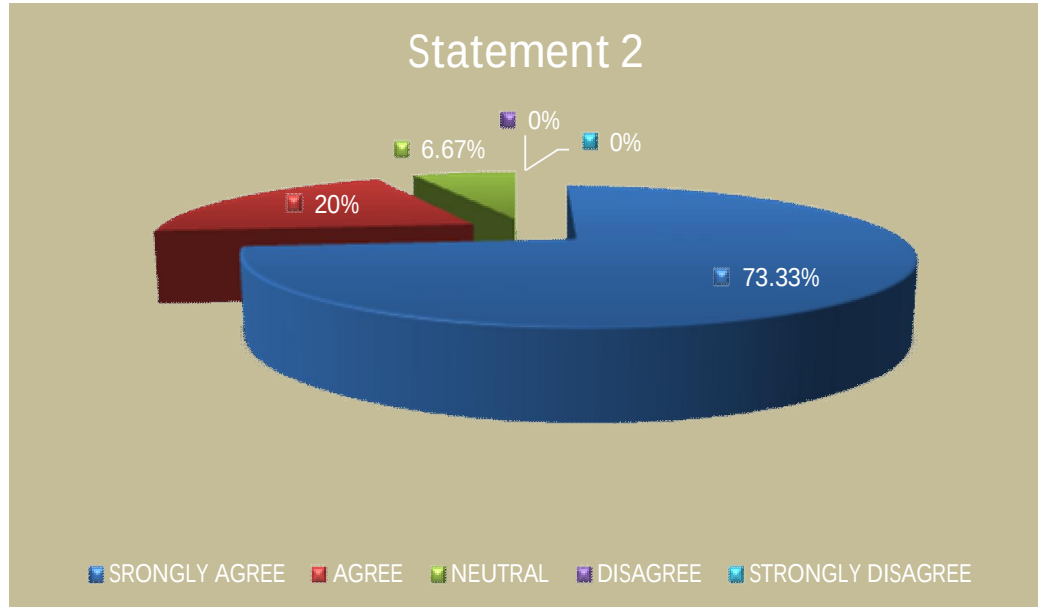
A large majority of respondents i.e. 60% strongly agreed with the statement we liked to learn Sanskrit subject through this programme whereas 36.67% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

STATEMENT: 2 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં અવાજ અમને યોગ્ય રીતે સંભળાય તેવો હતો.

Table: 4.3.3 Analysis of response of students on Statement – 2

Voice in programme was audible

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	22 (73.33%)	6 (20%)	2 (6.67%)	0 (0%)	0 (0%)	57.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 57.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

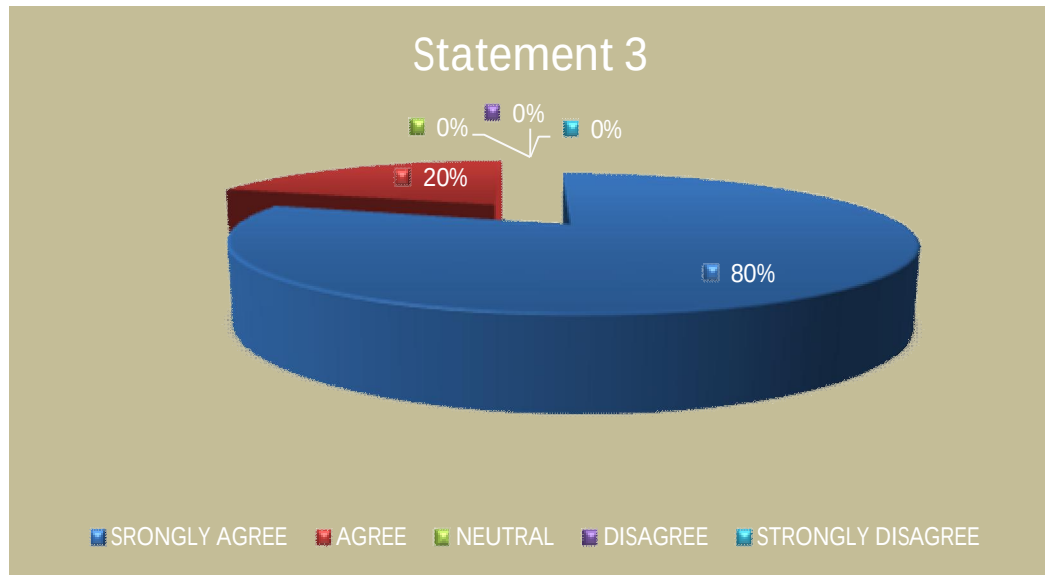
A large majority of respondents i.e. 73.33% strongly agreed with the statement voice in programme was audible whereas 20% student-teachers agreed with this statement and 6.67% student-teachers remained undecided.

STATEMENT: ૩ કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શિક્ષણ માં અમે ધ્યાન કેન્દ્રિત કરી શક્યા હતા.

Table: 4.3.4 Analysis of response of students on Statement – 3

Concentration increases by learning through this method

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	24 (80%)	6 (20%)	0 (0%)	0 (0%)	0 (0%)	72 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 72 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

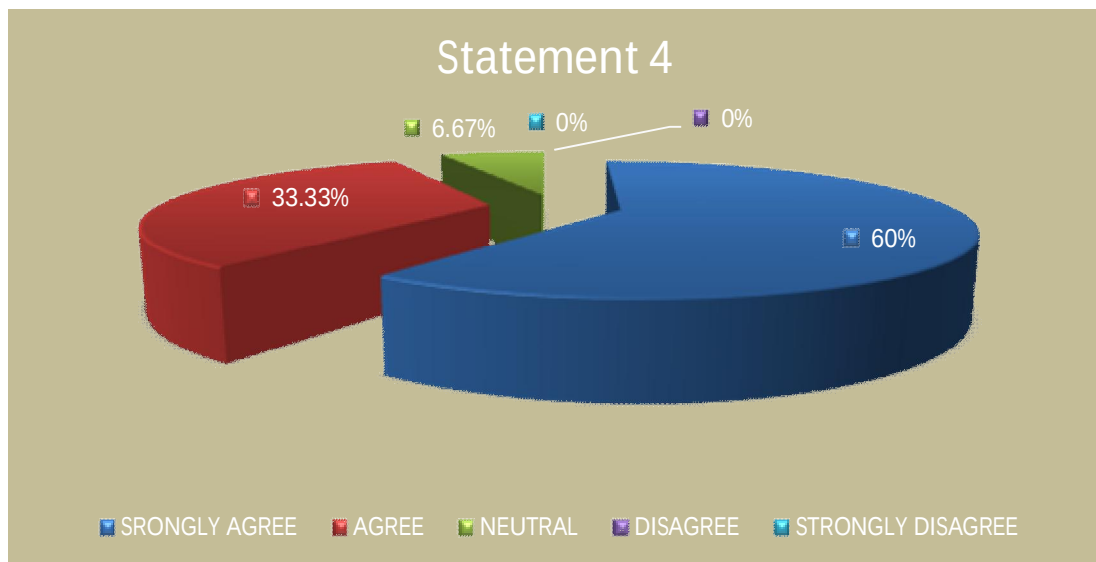
A large majority of respondents i.e.80% strongly agreed with the statement concentration increased by learning through this method whereas 20% student-teachers agreed with this statement.

STATEMENT: 4 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં વિષયવસ્તુને સરળ રીતે રજૂ કરવામાં આવ્યું હતું.

Table: 4.3.5 Analysis of response of students on Statement – 4

The content presented was very interesting and easily understandable

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	18 (60%)	10 (33.33%)	2 (6.67%)	0 (0%)	0 (0%)	41.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 41.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

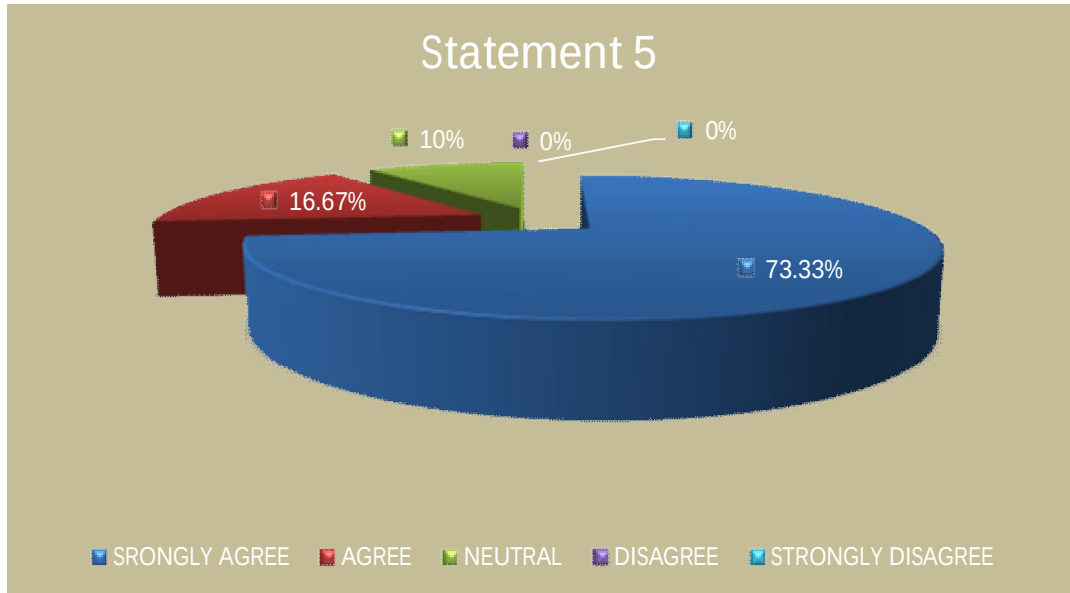
A large majority of respondents i.e. 60% strongly agreed with the statement the content presented in CAI Programme was very interesting and easily understandable whereas 33.33% student-teachers agreed with this statement and 6.67% student-teachers remained undecided.

STATEMENT: 5 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા સંસ્કૃત વિષય માં ઊડાણપૂર્વક નું જ્ઞાન મેળવી શક્યા.

Table: 4.3.6 Analysis of response of students on Statement – 5

With the CAI programme, in-depth knowledge of Sanskrit subject can be provided.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	22 (73.33%)	5 (16.67%)	3 (10%)	0 (0%)	0 (0%)	56.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 56.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

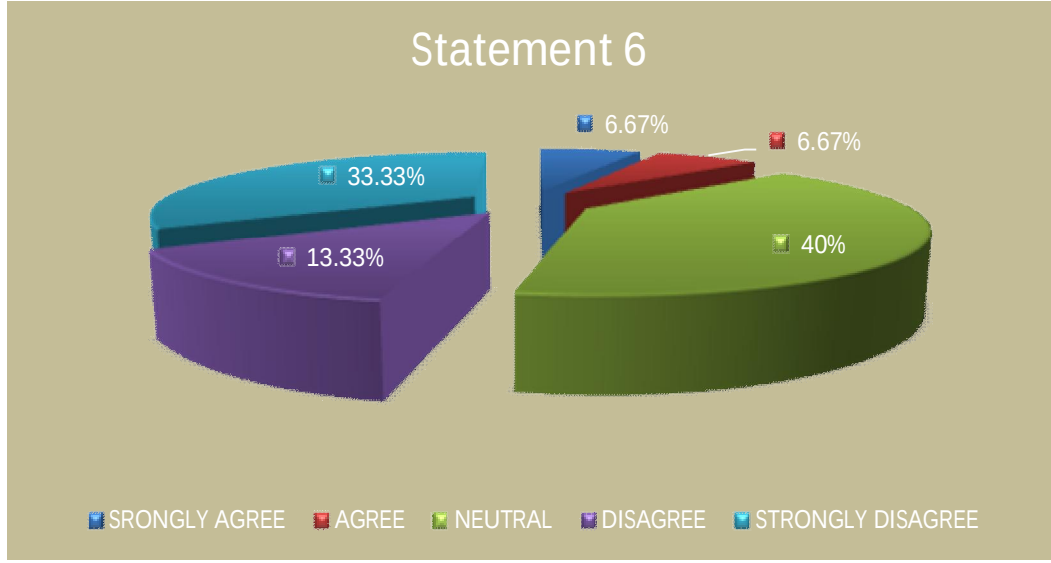
A large majority of respondents i.e. 73.33% strongly agreed with the statement in-depth knowledge of Sanskrit subject can be provided. Whereas 16.67% student-teachers agreed with this statement and 10% student-teachers remained undecided.

STATEMENT: 6 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શિક્ષણ કાર્યક્રમ ખુબ લાંબો હતો.

Table: 4.3.7 Analysis of response of students on Statement – 6

It was very long programme.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	2 (6.67%)	2 (6.67%)	12 (40%)	4 (13.33%)	10 (33.33%)	56.64 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 56.64 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

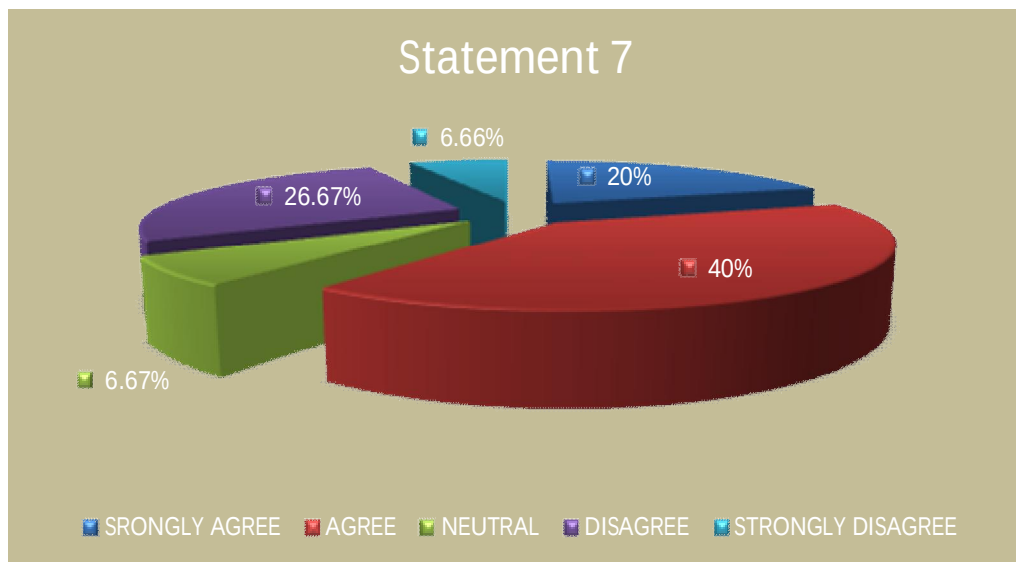
A large majority of respondents i.e. 33.33% strongly disagreed with the statement it was very long programme whereas 40% student-teachers remained undecided. It means the program was not so long.

STATEMENT: 7 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા અમે શિક્ષકની ગેરહાજરીમાં પણ સંસ્કૃત વ્યાકરણનો અભ્યાસ કરી શકીએ તેમ છીએ.

Table: 4.3.8 Analysis of response of students on Statement – 7

Even self-learning is possible through this method.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	6 (20%)	12 (40%)	2 (6.67%)	8 (26.67%)	2 (6.66%)	11.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 11.98 Thus calculated value of χ^2 is less than the table value of χ^2 so the null hypothesis is not rejected.

Therefore there is no significant difference between expected and observed frequencies.

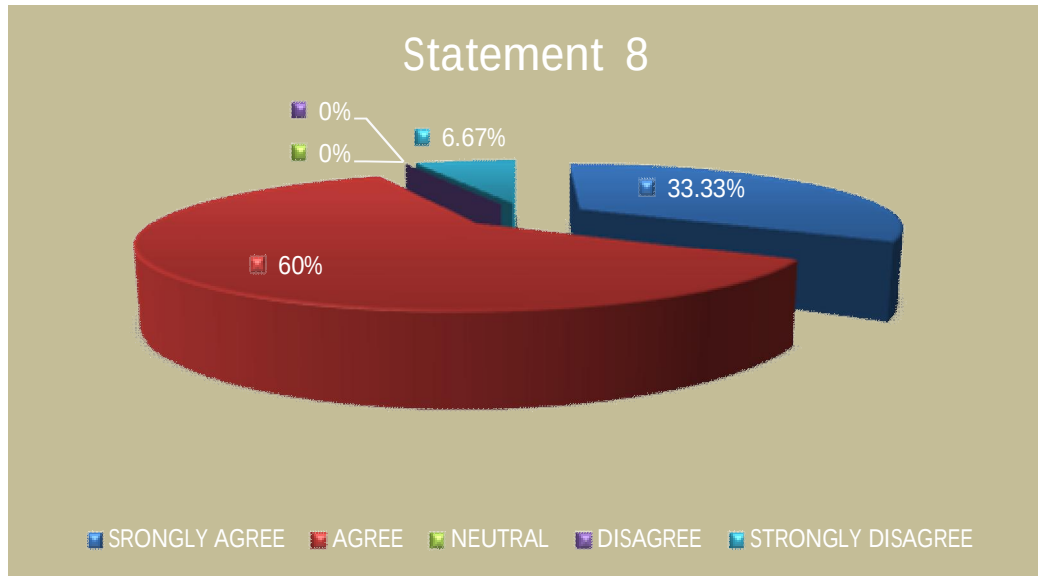
A large majority of respondents i.e. 40% agreed with the statement self learning is possible through this programme whereas 20% student-teachers strongly agreed and 6.67% student-teachers remained undecided.

STATEMENT: 8 સંસ્કૃત વિષયના અન્ય એકમો કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શીખવાના ગમશે.

Table: 4.3.9 Analysis of response of students on Statement – 8

We would like to learn other topics of the Sanskrit language also with this kind of CAI programme.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	10 (33.33%)	18 (60%)	0 (0%)	0 (0%)	2 (6.67%)	41.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 41.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

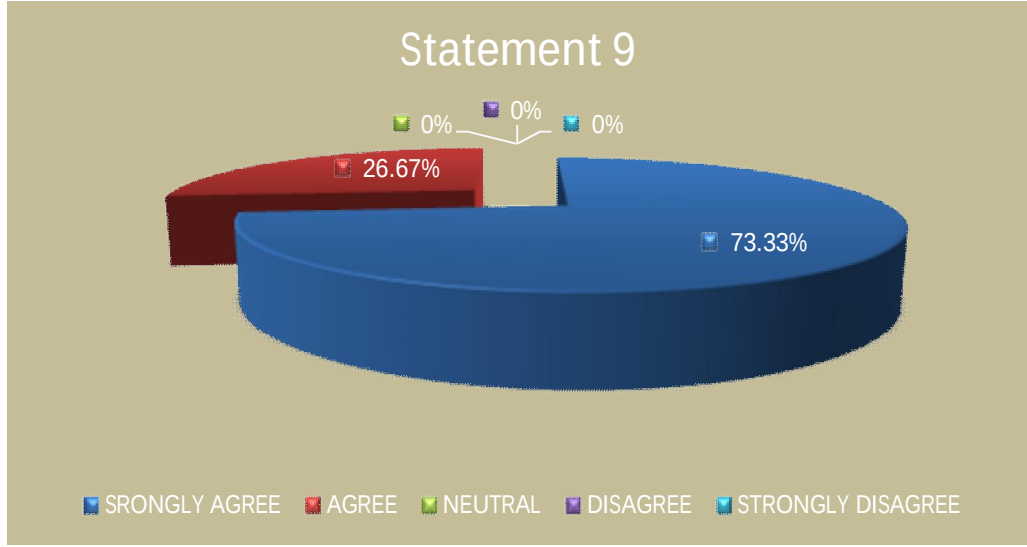
A large majority of respondents i.e. 60% agreed with the statement we would like to learn other topics of Sanskrit language with this kind of CAI Programme whereas 33.33% student-teachers strongly agreed with this statement.

STATEMENT: 9 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ કાર્યક્રમ ખુબ રસ પ્રદ હતો.

Table: 4.3.10 Analysis of response of students on Statement – 9

It was interesting to learn Sanskrit through CAI programme.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	22 (73.33%)	8 (26.67%)	0 (0%)	0 (0%)	0 (0%)	61.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 61.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

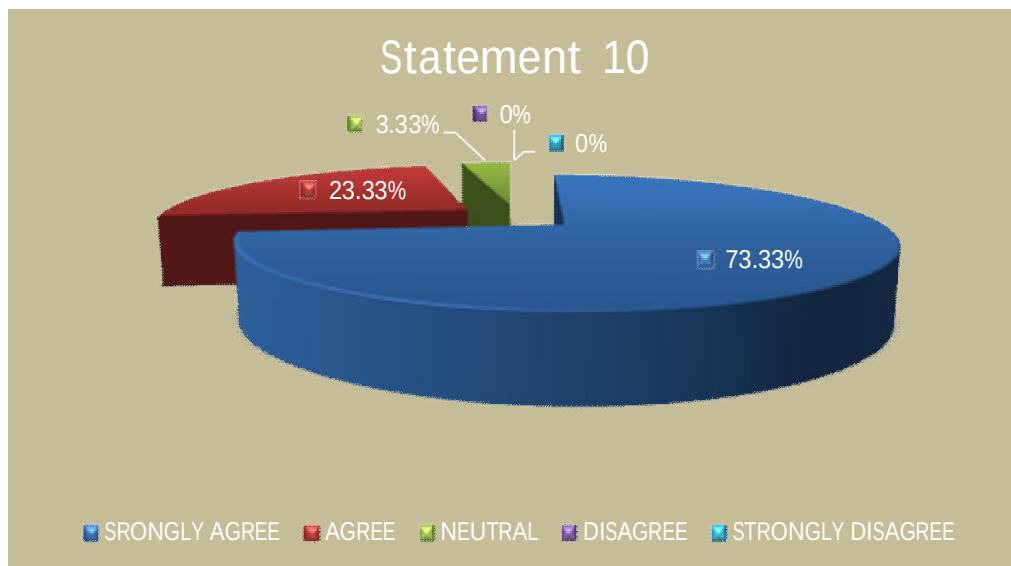
A large majority of respondents i.e. 73.33% strongly agreed with the statement it was interesting to learn Sanskrit through CAI Programme whereas 26.67% student-teachers agreed with this statement.

STATEMENT: 10 એનિમેશનચિત્રો, અને કોઠા ના ઉપયોગ દ્વારા સંસ્કૃત વિષયની રજૂઆત અમને ખુબ ગમી.

Table: 4.3.11 Analysis of response of students on Statement – 10

The pictures, charts, and tale were properly explained.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	22 (73.33%)	7 (23.33%)	1 (3.33%)	0 (0%)	0 (0%)	58.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 58.98 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

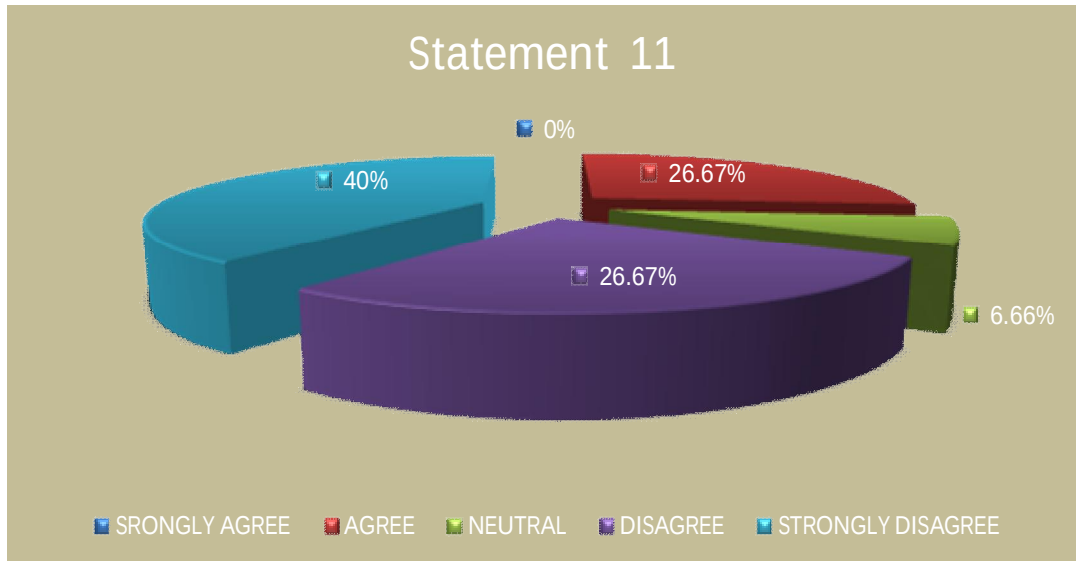
A large majority of respondents i.e. 73.33% strongly agreed with the statement the pictures, charts and tables were properly explained whereas 23.33% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

STATEMENT: 11 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શિક્ષણ મેળવવાથી અમે થાક અનુભવતા હતા.

Table: 4.3.12 Analysis of response of students on Statement – 11

It was tiring and exhausting to learn through CAI programme.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	0 (0%)	8 (26.67%)	2 (6.66%)	8 (26.67%)	12 (40%)	15.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 15.98 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

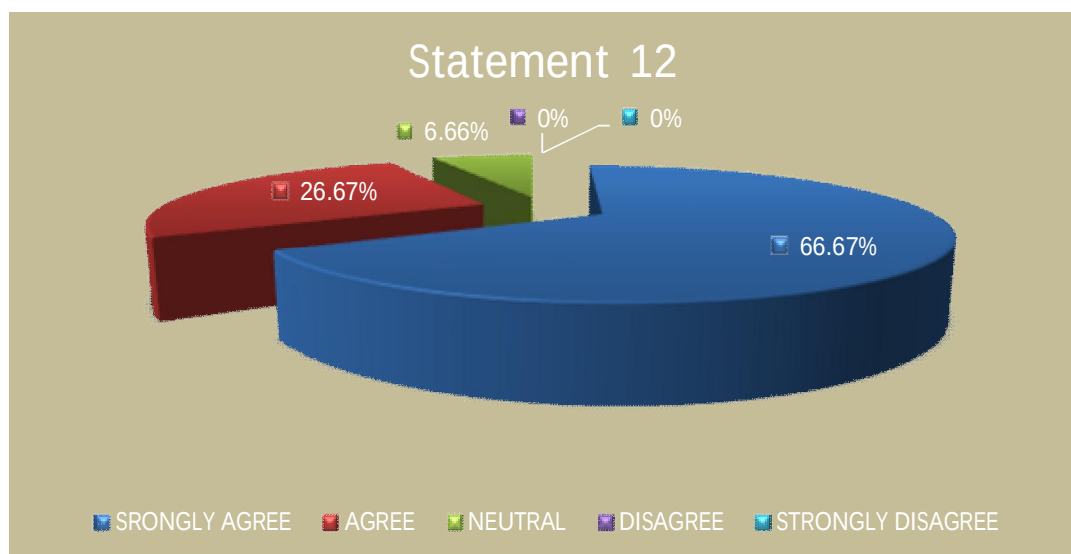
A large majority of respondents i.e. 40% strongly disagreed with the statement it was tiring and exhausting to learning through CAI Programme whereas 26.67% student-teachers disagreed with this statement and 6.66% student-teachers remained undecided. It means the program was joyful.

STATEMENT: 12 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ મદદથી બીજા વિષયો પણ શીખવાના ગમશે.

Table: 4.3.13 Analysis of response of students on Statement – 12

We would like to learn other Subjects with this kind of CAI.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	20 (66.67%)	8 (26.67%)	2 (6.66%)	0 (0%)	0 (0%)	47.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 47.98 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

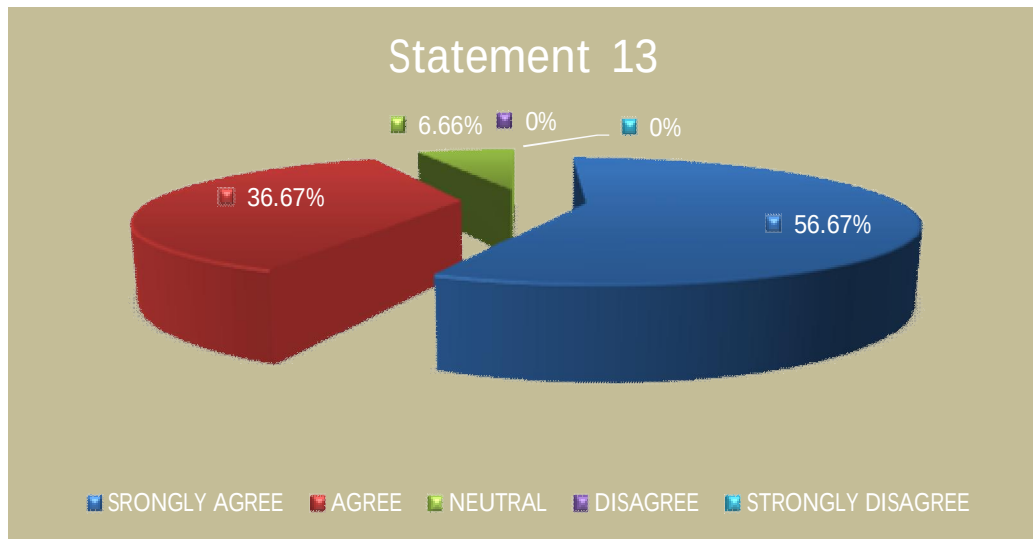
A large majority of respondents i.e. 66.67% strongly agreed with the statement we would like to learn other subjects with this kind of CAI Programme whereas 26.67% student-teachers agreed with this statement and 6.66% student-teachers remained undecided.

STATEMENT: 13 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટની ભાષા સરળ હતી.

Table: 4.3.14 Analysis of response of students on Statement – 13

The language used in the CAI programme was easy.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	17 (56.67%)	11 (36.67%)	2 (6.66%)	0 (0%)	0 (0%)	38.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 38.98 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

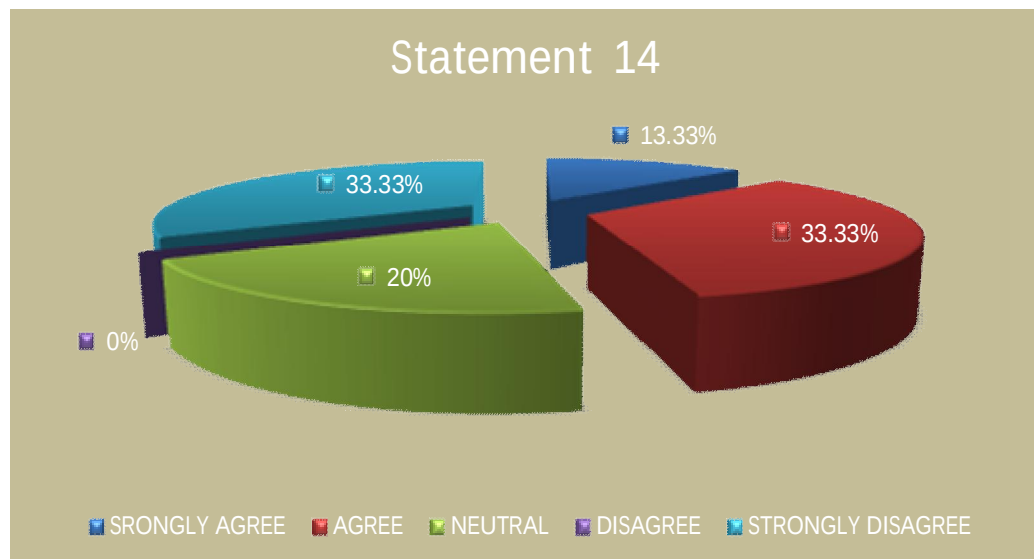
A large majority of respondents i.e. 56.67% strongly agreed with the statement the language used in the CAI Programme was easy to understand whereas 36.67% student-teachers agreed with this statement and 6.66% student-teachers remained undecided.

STATEMENT: 14 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં વિષયવસ્તુની રજૂઆતની ઝડપ વધારે હતી.

Table: 4.3.15 Analysis of response of students on Statement – 14

Content of the CAI programme was presented in fast speed.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	4 (13.33%)	10 (33.33%)	6 (20%)	0 (0%)	10 (33.33%)	17.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 17.32 .Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

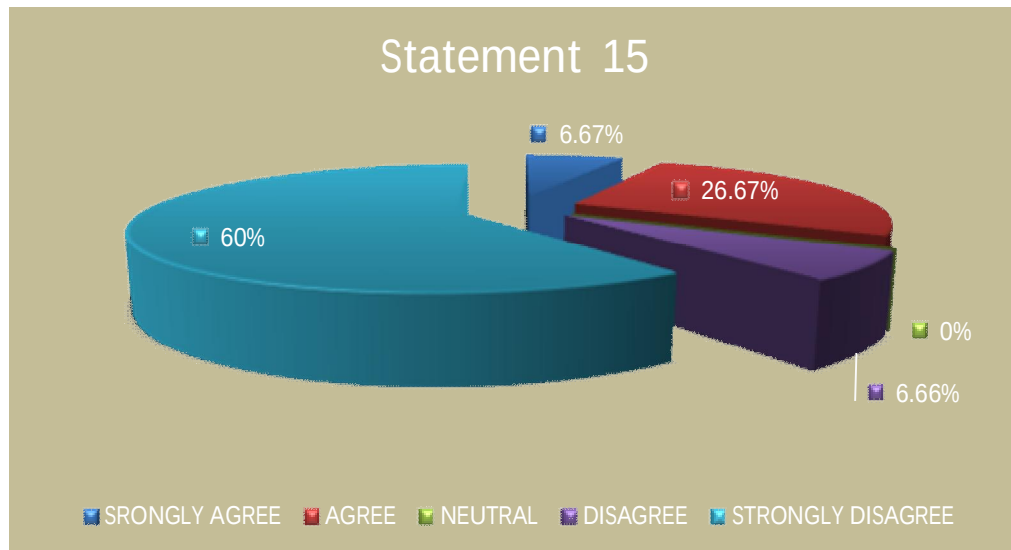
A large majority of respondents i.e. 33.33% strongly disagreed with the statement content of the CAI programme was presented in fast speed whereas 20% student-teachers remained undecided. It means that the content presented in CAI was not so speedy.

STATEMENT: 15 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં વિષયવસ્તુની ક્રમિક રજૂઆત થઇ નથી.

Table: 4.3.16 Analysis of response of students on Statement – 15

Presentation of CAI programme was not systematic.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	2 (6.67%)	8 (26.67%)	0 (0%)	2 (6.66%)	18 (60%)	35.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 35.98 .Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

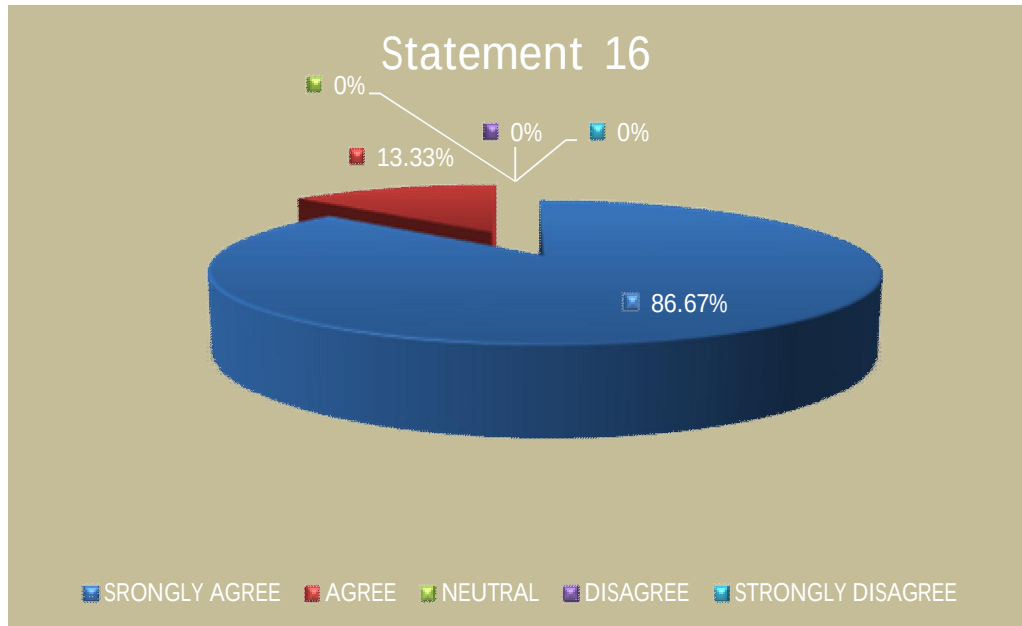
A large majority of respondents i.e. 60% strongly disagreed with the statement presentation of CAI programme was not systematic whereas 6.66% student-teachers agreed with this statement. It means the content presented in CAI was systematic.

STATEMENT: 16 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં પ્રશ્નોત્તરી રસપ્રદ હતી.

Table: 4.3.17 Analysis of response of students on Statement – 16

Questions asked in CAI were interesting.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	26 (86.67%)	4 (13.33%)	0 (0%)	0 (0%)	0 (0%)	85.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 85.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

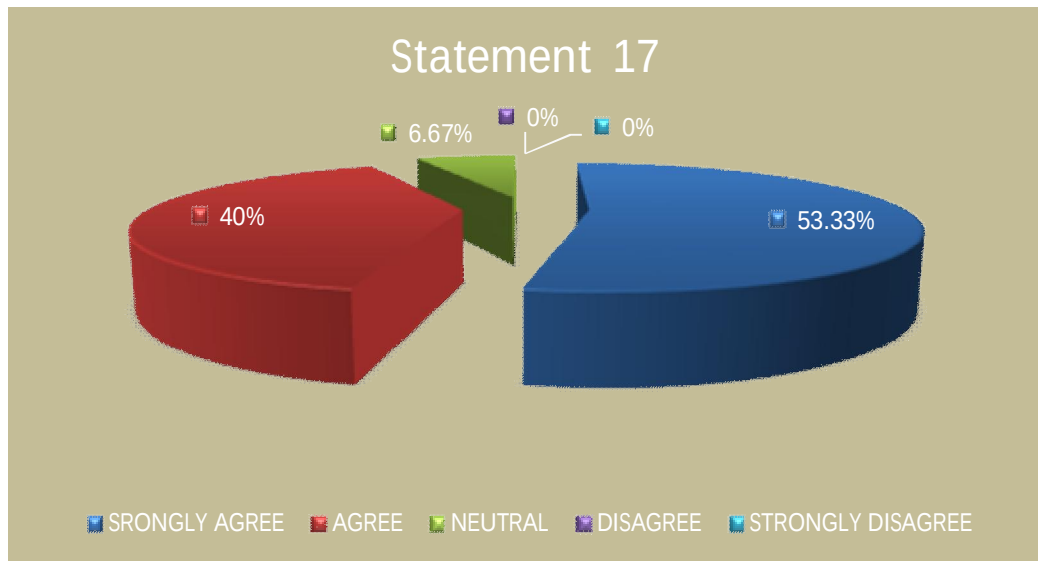
A large majority of respondents i.e. 86.67% strongly agreed with the statement questions asked in CAI were interesting whereas 13.33% student-teachers agreed with this statement.

STATEMENT: 17 કમ્પ્યુટર સહાયક શિક્ષણ સંપૂર્ણ ઉપયોગ સરળ રીતે કરી શકાય છે.

Table: 4.3.18 Analysis of response of students on Statement – 17

CAI programme can be used easily in teaching.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	16 (53.33%)	12 (40%)	2 (6.67%)	0 (0%)	0 (0%)	37.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 37.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

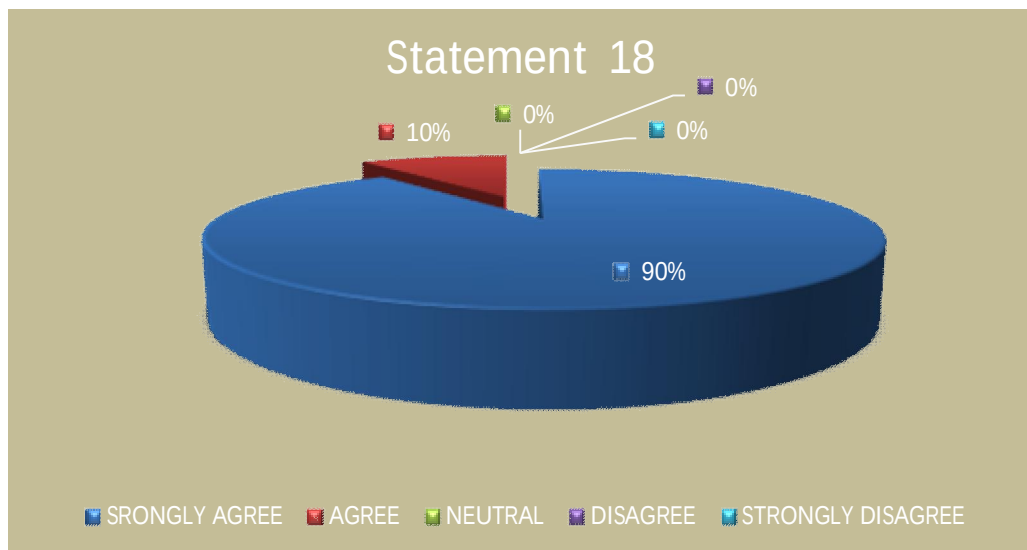
A large majority of respondents i.e. 53.33% strongly agreed with the statement CAI Programme can be used easily in teaching whereas 40% student-teachers agreed with this statement and 6.67% student-teachers remained undecided.

STATEMENT: 18 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં પ્રશ્નો વિષયવસ્તુ સાથે સુસંગત હતા.

Table: 4.3.19 Analysis of response of students on Statement – 18

Questions asked were not related with the content of CAI programme.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	27 (90%)	3 (10%)	0 (0%)	0 (0%)	0 (0%)	93 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 93 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

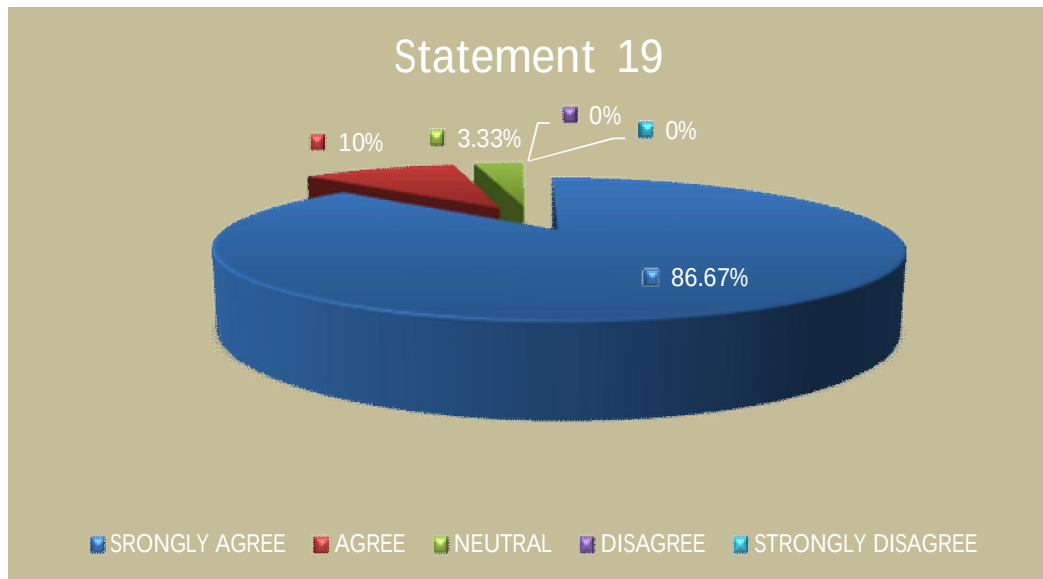
A large majority of respondents i.e. 90% strongly agreed with the statement questions asked in CAI Programme were related to content whereas 10% student-teachers agreed with this statement.

STATEMENT: 19 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શીખવાની સાથે મનોરંજન પણ મળે છે.

Table: 4.3.20 Analysis of response of students on Statement – 19

This programme provided knowledge with enjoyment.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	26 (86.67%)	3 (10%)	1 (3.33%)	0 (0%)	0 (0%)	84.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 84.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

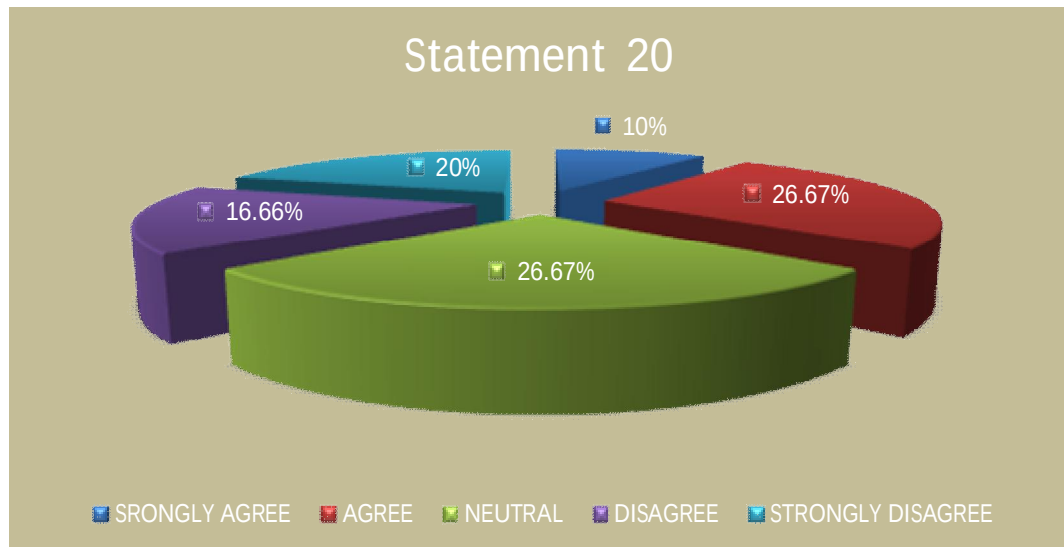
A large majority of respondents i.e. 86.67% strongly agreed with the statement this programme provided knowledge with enjoyment whereas 10% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

STATEMENT: 20 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ કલર વધુ આકર્ષક માં બેક ગ્રાઉન્ડનો(સ્લાઈડ) હોવાની જરૂર હતી.

Table: 4.3.21 Analysis of response of students on Statement – 20

Colours used in programme would have been more attractive.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	3 (10%)	8 (26.67%)	8 (26.67%)	5 (16.66%)	6 (20%)	2.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 2.98 Thus calculated value of χ^2 is less than the table value of χ^2 so the null hypothesis is not rejected.

Therefore there is no significant difference between expected and observed frequencies.

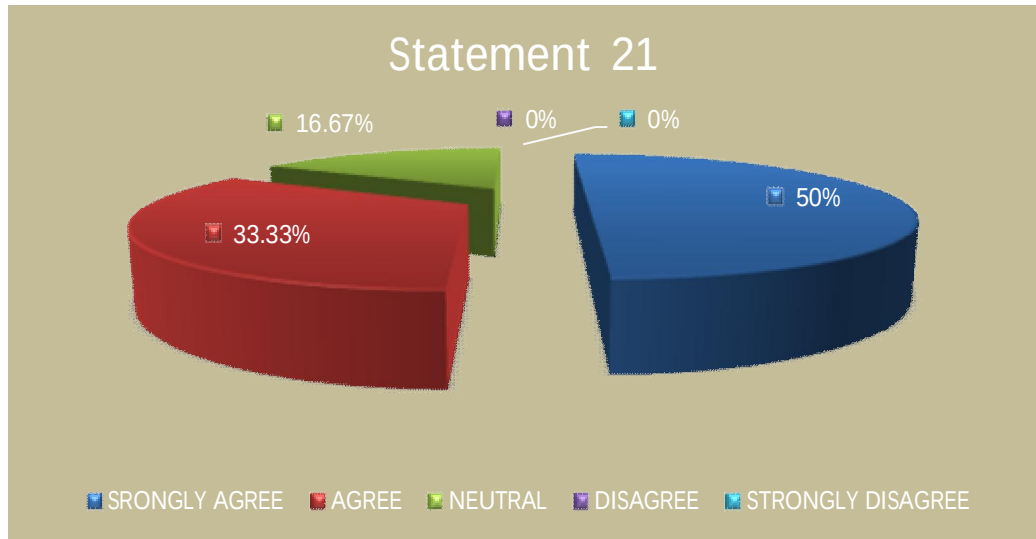
A large majority of respondents i.e. 20 % strongly disagreed with the statement colour used in the programme would have been more attractive whereas 26.67% student-teachers remained undecided

STATEMENT: 21 એનીમેટેડ રંગીન ચિત્રોની મદદથી સંસ્કૃત શિક્ષણ રસપ્રદ બને છે.

Table: 4.3.22 Analysis of response of students on Statement – 21

Use of animated pictures made Sanskrit teaching learning entertaining.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	15 (50%)	10 (33.33%)	5 (16.67%)	0 (0%)	0 (0%)	28.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 28.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

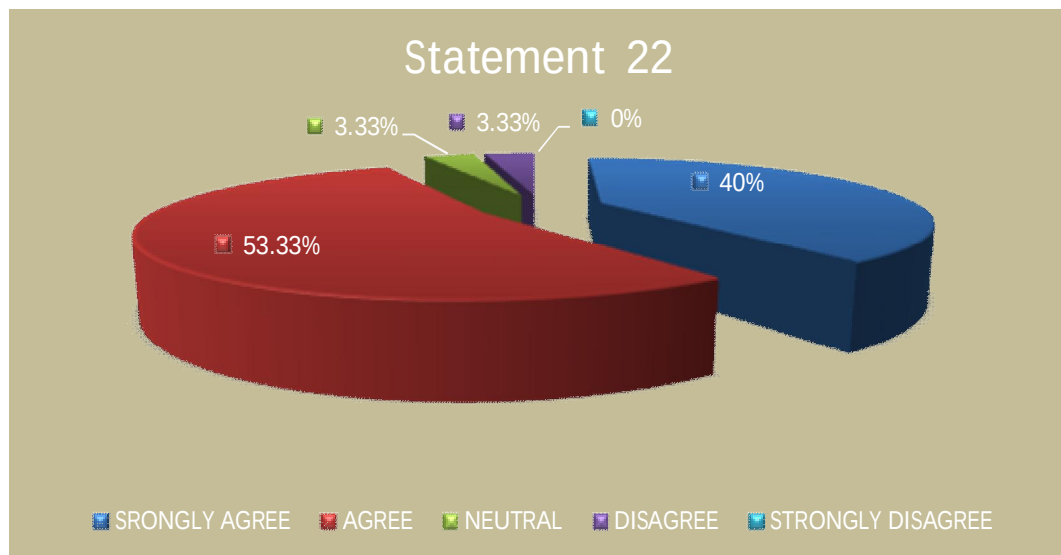
A large majority of respondents i.e. 50% strongly agreed with the statement use of animated pictures presented in CAI made teaching learning entertaining whereas 33.33% student-teachers agreed with this statement and 16.67% student-teachers remained undecided.

STATEMENT: 22 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં મળતા પ્રશ્નો અંગેના પ્રતીપોષણ થી આગળ વધવાની પ્રેરણા મળે છે.

Table: 4.3.23 Analysis of response of students on Statement – 22

Learning through CAI programme motivated to know more about the subject.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	12 (40%)	16 (53.33%)	1 (3.33%)	1 (3.33%)	0 (0%)	36.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 36.98 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

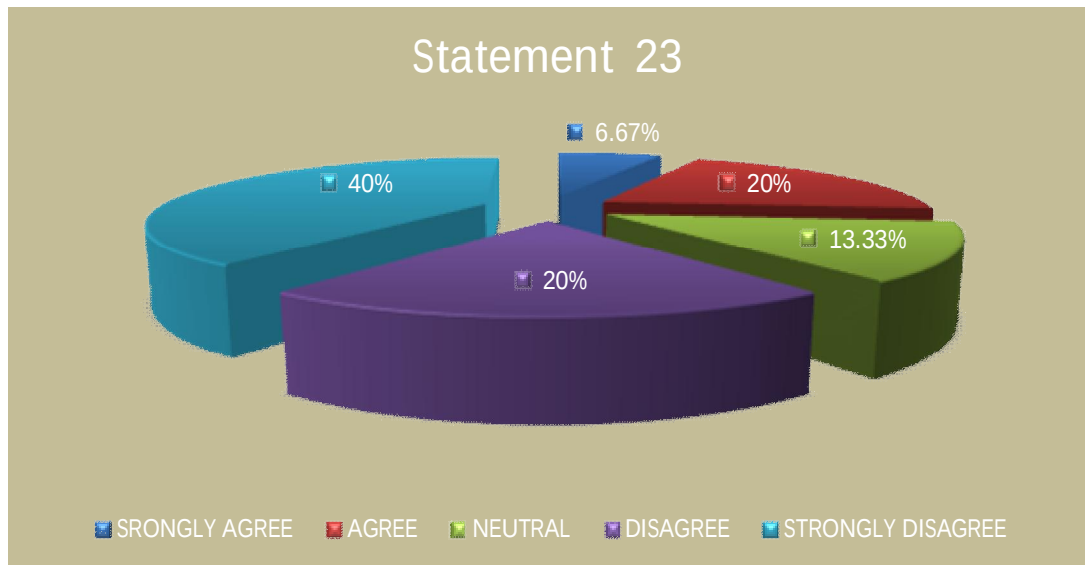
A large majority of respondents i.e.40% strongly agreed with the statement learning through CAI Programme motivated to know more about the subject whereas 53.33% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

STATEMENT: 23 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં કેટલાક પ્રશ્નો સ્પષ્ટ ના હતા.

Table: 4.3.24 Analysis of response of students on Statement – 23

Some questions asked in this programme were not clear.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	2 (6.67%)	6 (20%)	4 (13.33%)	6 (20%)	12 (40%)	9.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 9.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is not rejected.

Therefore there is no significant difference between expected and observed frequencies.

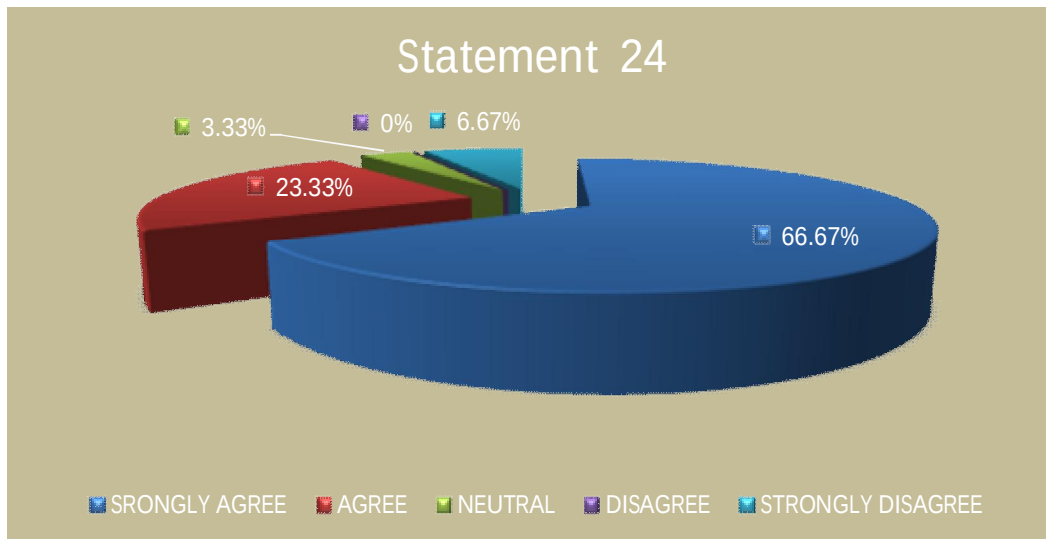
A large majority of respondents i.e. 40% strongly disagreed with the statement Some questions asked in this programme were not clear It means the questions asked in CAI were clear. Whereas 20% student-teachers disagreed with this statement and 13.33% student-teachers remained undecided.

STATEMENT: 24 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટ દ્વારા શીખેલું યાદ રાખવું સરળ બને છે.

Table: 4.3.25 Analysis of response of students on Statement – 24

Use of CAI programme made the learning easy.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	20 (66.67%)	7 (23.33%)	1 (3.33%)	0 (0%)	2 (6.67%)	45.64 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 45.64 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

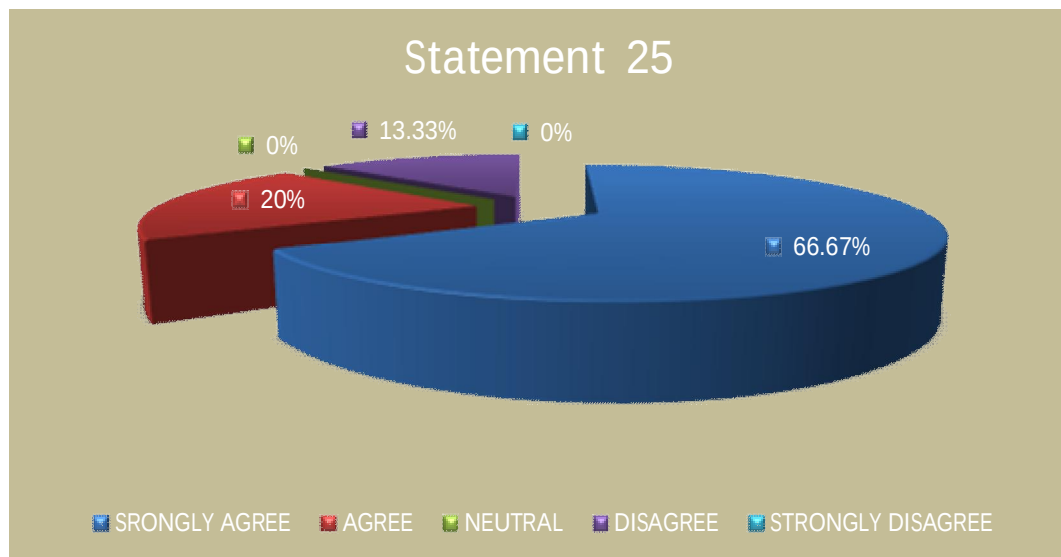
A large majority of respondents i.e. 66.67% strongly agreed with the statement use of CAI programme made the learning easy whereas 23.33% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

STATEMENT: 25 આ પ્રકારની શિક્ષણ પદ્ધતિ રૂઢિગત શિક્ષણ પદ્ધતિ કરતા અલગ હતી.

Table: 4.3.26 Analysis of response of students on Statement – 25

This method of teaching learning was more interesting than the ordinary learning method.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	20 (66.67%)	6 (20%)	0 (0%)	4 (13.33%)	0 (0%)	79.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 79.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

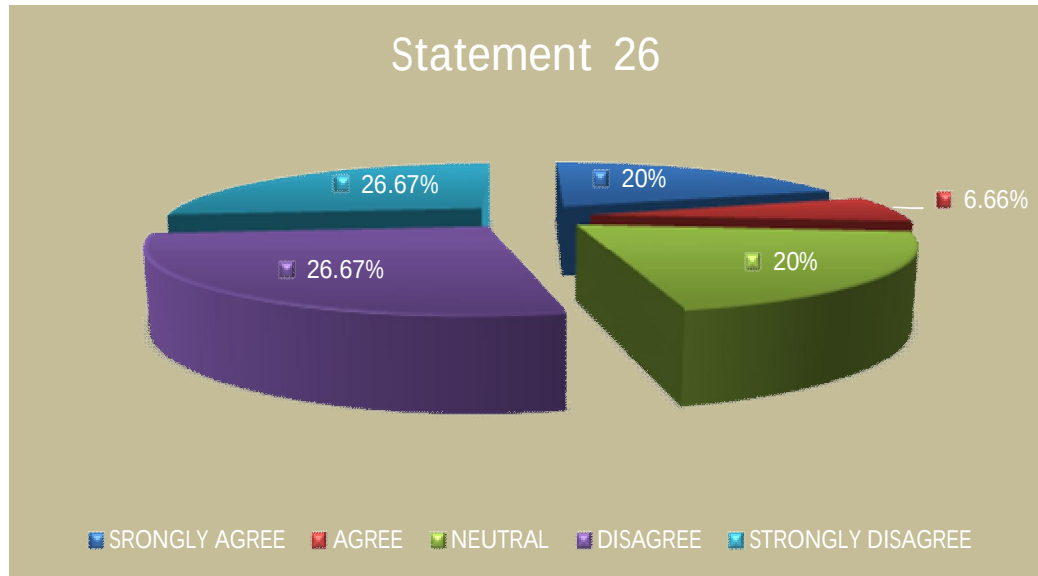
A large majority of respondents i.e. 66.67% strongly agreed with the statement this method of teaching learning was more interesting than the ordinary learning method whereas 20% student-teachers agreed with this statement.

STATEMENT: 26 સમય મર્યાદા વિષય વસ્તુના પ્રમાણમાં યોગ્ય ન હતી.

Table: 4.3.27 Analysis of response of students on Statement – 26

Time was not managed properly in teaching the content.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	6 (20%)	2 (6.66%)	6 (20%)	8 (26.67%)	8 (26.67%)	3.98 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 3.98 Thus calculated value of χ^2 is less than the table value of χ^2 so the null hypothesis is not rejected.

Therefore there is no significant difference between expected and observed frequencies.

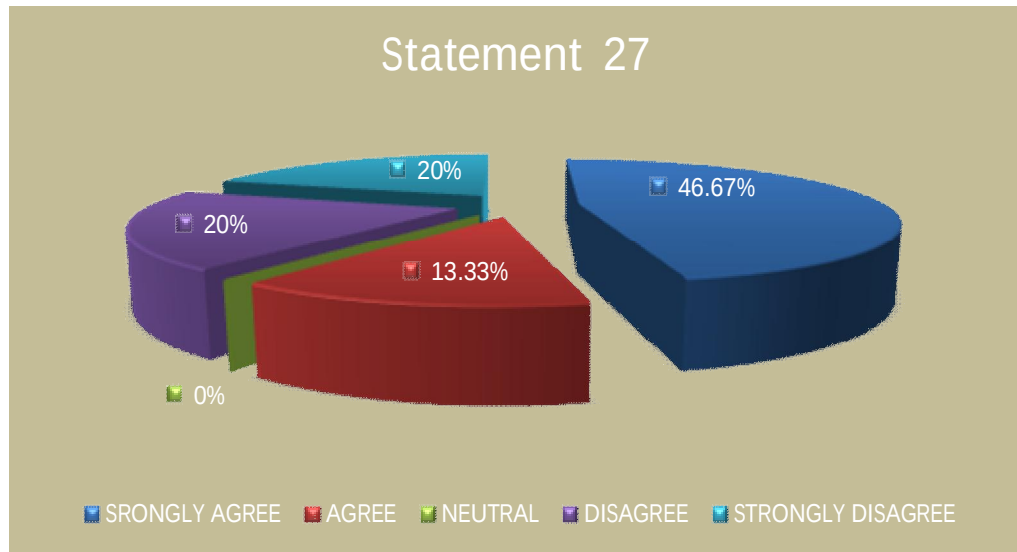
A large majority of respondents i.e. 26.67% strongly disagreed with the statement time was not managed properly in teaching the content whereas 26.67% student-teachers disagreed with this statement and 20% student-teachers remained undecided. It means time management was appropriate.

STATEMENT: 27 શરૂઆત થી અંત સુધી જકડી રાખ્યા હતા.

Table: 4.3.28 Analysis of response of students on Statement – 27

The CAI programme was interesting from beginning to end.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	14 (46.67%)	4 (13.33%)	0 (0%)	6 (20%)	6 (20%)	17.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 17.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

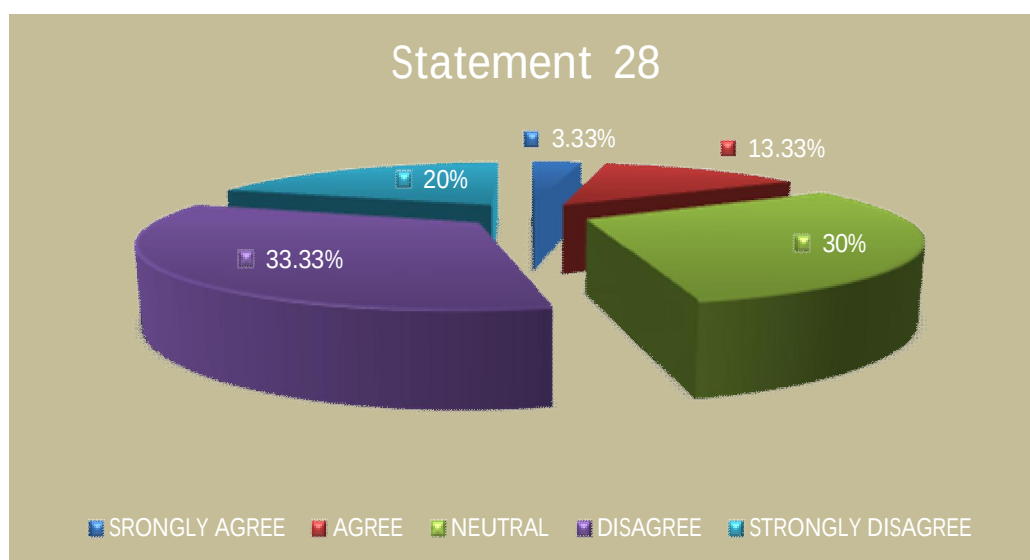
A large majority of respondents i.e. 46.67% strongly agreed with the statement the CAI programme was interesting from beginning to end whereas 13.33% student-teachers agreed with this statement. The program braced them staring to end point.

STATEMENT: 28 આ કાર્યક્રમથી અધ્યયનની ગંભીરતા ઓછી થાય છે.

Table: 4.3.29 Analysis of response of students on Statement – 28

This CAI programme reduced seriousness of the study.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	1 (3.33%)	4 (13.33%)	9 (30%)	10 (33.33%)	6 (20%)	13.48 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 13.48 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

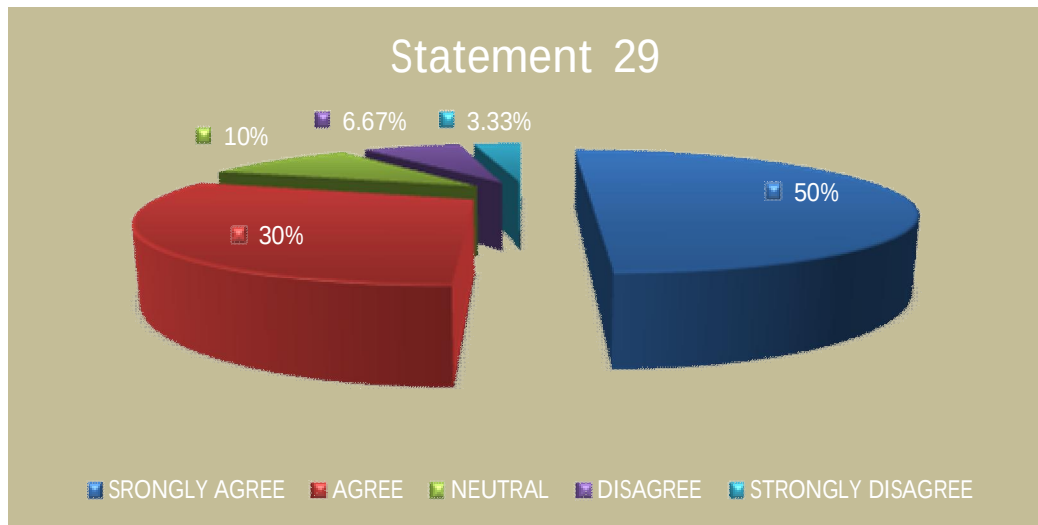
A large majority of respondents i.e. 33.33% disagreed with the statement this CAI programme reduced seriousness of study whereas 20% student-teachers strongly disagreed with this statement and 30% student-teachers remained undecided.

STATEMENT: 29 મુદ્દાની પ્રયોગાત્મક ઊંડાણપૂર્વક સમજ (simulation)આપતી.હતી

Table: 4.3.30 Analysis of response of students on Statement – 29

Simulation helped me to understand the depth of the Topic.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	15 (50%)	9 (30%)	3 (10%)	2 (6.67%)	1 (3.33%)	23.32 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 23.32 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

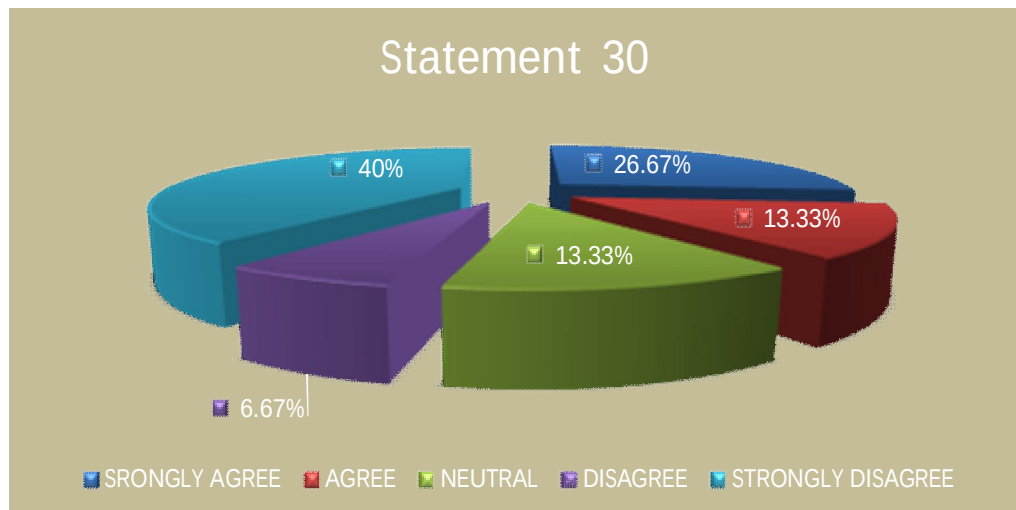
A large majority of respondents i.e. 50% strongly agreed with the statement simulation helped me understand the depth of the topic whereas 30% student-teachers agreed with this statement and 10% student-teachers remained undecided.

STATEMENT: 30 કમ્પ્યુટર સહાયક શિક્ષણ સંપુટમાં કેટલીક માહિતી ગુંચવણ ઉત્પન્ન કરે તેવી હતી.

Table: 4.3.31 Analysis of response of students on Statement –30

Some information provided in the programme seemed to be more confusing.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	8 (26.67%)	4 (13.33%)	4 (13.33%)	2 (6.67%)	12 (40%)	10.64 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 10.64 Thus calculated value of χ^2 is less than the table value of χ^2 so the null hypothesis is not rejected.

Therefore there is no significant difference between expected and observed frequencies.

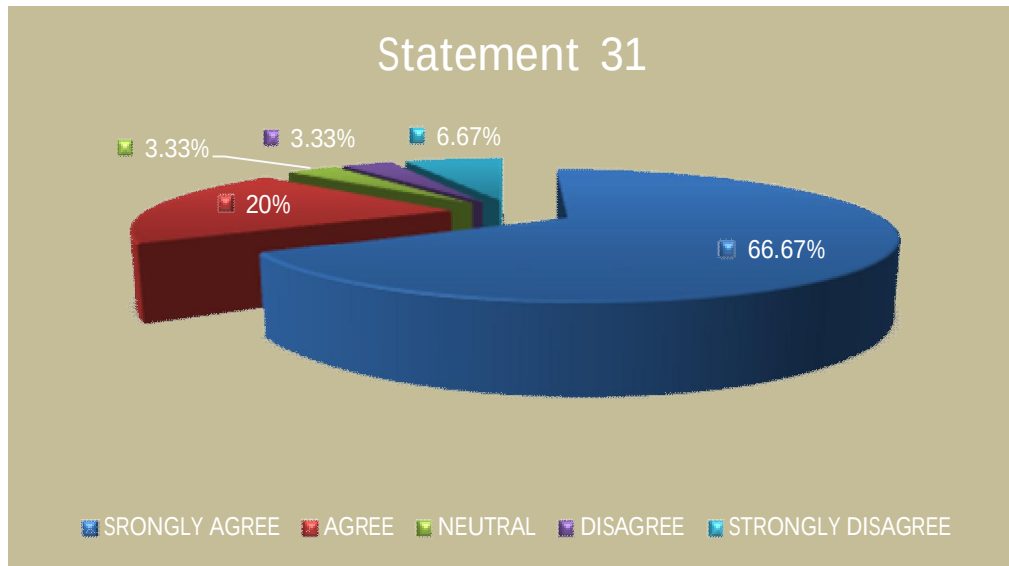
A large majority of respondents i.e. 40% strongly disagreed with the statement some information provided in the programme seemed to be more confusing it means some information was not confusing whereas 6.67% student-teachers disagreed with this statement and 13.33% student-teachers remained undecided.

STATEMENT: 31 આ પ્રકારની પ્રયુક્તિ દ્વારા વ્યાકરણ નું ભારણ ઘટાડી શકાય છે.

Table: 4.3.32 Analysis of response of students on Statement – 31

This programme reduced difficulty in teaching grammar.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	20 (66.67%)	6 (20%)	1 (3.33%)	1 (3.33%)	2 (6.67%)	77.64 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 77.64 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

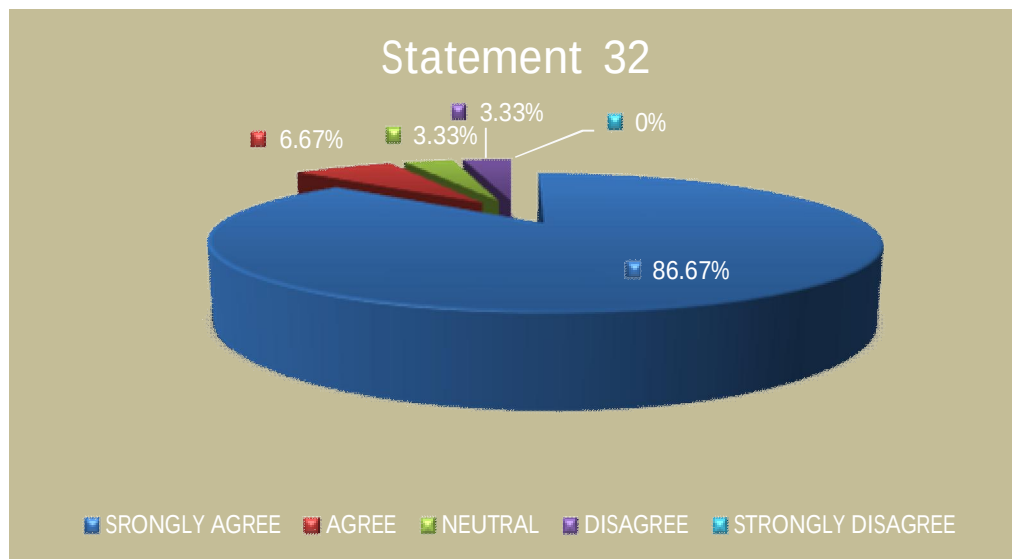
A large majority of respondents i.e. 66.67% strongly agreed with the statement this programme reduced difficulty in teaching grammar whereas 20% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

STATEMENT: 32 વિષય વસ્તુ તાર્કિક ક્રમ માં ગોઠવેલ હોવાથી સમજવામાં સરળ હતી.

Table: 4.3.33 Analysis of response of students on Statement – 32

Content was presented logically so it was easy to understand.

	SA	A	N	DA	SD	χ^2 & level of significance
f_o	26 (86.67%)	2 (6.67%)	1 (3.33%)	1 (3.33%)	0 (0%)	83.64 0.01
f_e	6	6	6	6	6	



At 0.01 significance level, the table value of χ^2 against 4 degree of freedom is 13.28 here calculated value of χ^2 is 83.64 Thus calculated value of χ^2 is greater than the table value of χ^2 so the null hypothesis is rejected.

Therefore there is significant difference between expected and observed frequencies.

A large majority of respondents i.e. 86.67% strongly agreed with the statement content was presented logically so it was easy to understand whereas 6.67% student-teachers agreed with this statement and 3.33% student-teachers remained undecided.

4.4 Conclusion

Thus this chapter presented calculation of t-value, reaction scale and calculation of chi square, tabulation and charts of the data. It also deals with the data analysis and interpretation

The next chapter is about findings of the study, implications and recommendation. It also presents some suggestions for future studies that can be undertaken in the field.

CHAPTER - 5

Findings, Implications, Suggestions and Conclusion

5.1 Introduction

The researcher conducted study on development and Implementation of Computer Assisted Instruction for Teaching Sanskrit Grammar at B.Ed level. The statistical as well as descriptive analyses have confirmed in previous chapter the positive outcome of the experiment. This positive outcome encourages the researcher to make generalization regarding CAI Programme used in the present work. This chapter includes the major findings of the research and their educational implications and suggestions.

5.2 Discussion

On the basis of the calculation of the 't' test of both experimental and control group the Researcher arrived at the decision that Control group and Experimental group both were almost equal. Control group was taught through conventional method whereas experimental group was taught through CAI. Mean achievement of experimental group was more than the mean achievement score of control group in post-test .It means experimental group progressed more and achievement of Student-teachers was more than that of control group.

Though the control group also progressed in achievement and mean achievement score of post test was more than the mean achievement score of pre-test but in experimental group the difference between achievement score of pre-test and post-test was more.

Thus again indicates that experimental group Student-teachers learnt better.

5.3 Findings

5.3.1 Findings on the Bases of Achievement Test

- Experimental group academically achieved more than the control group. They were able to perform better than the control group Student-teachers.
- Value of 't' calculated on the basis of the mean and S.D. of both achievement tests indicated that the teaching through CAI Programme was successful in enhancing Sanskrit grammar. Analysis of reaction scale also proved that Student-teachers liked the programme.

5.3.2 Findings on the Basis of Reaction Scale

- The CAI Programme presented through the computer provided knowledge. Most of the Student-teachers considered that the content presentation was interesting. They believed that simulation took them to the depth of the topic and provided real like experience.
- The Student-teachers believed that the pictures, charts, language used in the CAI Programme, text presented for each topic were appropriate. The question at the end of topics did not break the continuity of the topic.
- Majority of the Student-teachers suggested that they would like to learn other topics of the Sanskrit also with this kind of CAI. This type of learning program should be used in other subjects also. Presentation through such technique reduces the burden of content.
- The students believed that content was presented at proper pace, explanation given for every topic is proper. They believed that the learning through Computer is really a captivating experience.
- Majority of the students found that learning through CAI Programme motivated them to know more about the subject. This type of Programme helped them to develop their interest in learning Sanskrit Grammar.

5.4 Educational Implications

From the findings of the present study following educational implications could be drawn.

1. To bring novelty and to provide visual experiences, CAI Programme can be effective and useful in class-room teaching.
2. CAI Programme is found useful to increase the students' concentration and interest. To satisfy the need of different types of learners especially slow learners, the teacher should use this method.
3. The government can arrange training programmes for the teachers to develop such programmes.
4. The teacher should be inspired to develop and to use Computer Assisted Instruction Programmes.
5. The CAI Programme is very useful for self-learning, drilling, revision and diagnostic and remedial teaching in class-room.

5.5 Suggestions

Student-teachers of B.Ed are future teachers, and this is very important as they have to develop grammar concepts. So there are some suggestions for different agencies or institution which are as follows:

5.5.1 Suggestions for the State Government

State government is taking many projects for developing industries, health for children and female, education, developing infrastructure, developing skills of teachers, etc. But it is very necessary to develop Sanskrit grammar concepts. After

studying those results, government can take different projects to develop Sanskrit concepts of students and get result in form of expected achievement.

5.5.2 Suggestions for the Institution or School

Now a days, facilities are available in most of the institution. But its difficult to utilize it in good manner. Although institutions are serious about success of students, but don't know how? This research can inspire this. Institutions should think about different methods of teaching and use of technologies. Institution should encourage Sanskrit teachers to use Technology in teaching Sanskrit. So that students can find the subject interesting. This study would help those institutions.

5.5.3 Suggestions for the Classroom Teacher

The teacher of Sanskrit should be innovative and create she/he should be always ready to use new technologies .So that students find the subject interesting and joyful. Teacher of any subject should try technology in classroom teaching to increase ratio of success.

5.5.4 Suggestions for the Students' Parents

Parents are always giving facilities to their child for education. Games, music, songs, movies etc, are possible and available in computer. So most of parents avoid this facility as they think that it has harmful effect o students. But parents should think about its positive side. And at some level they should give facility of computer. Many CAI can be available in commercial market and they should try it.

5.6 Suggestions for Future Research

The following suggestions may be useful for the future researchers in their research.

1. There is a chance to develop the CAI in different topics in Sanskrit.

2. There should be a chance to develop CAI programme for teaching other subjects.
3. One can develop programme to see effectiveness of it on mental health and adjustment.
4. One can do a comparative study of CAI programme and CAL programme.
5. One can develop programme to see effectiveness of it on interest of students.
6. There should be a chance to develop CAI by different multimedia programme.

These and many other area of CAI could be studied in order to make education progressive and make students excellent, qualitative and productive. Thus there can be further studies on the following topics.

1. CAI programme to teach Sanskrit poetry.
2. CAI programme to teach Sanskrit prose.
3. CAI programme to teach Sanskrit Writing.
4. CAI programme to teach Sanskrit Reading.
5. CAI programme to teach Sanskrit Drama.
6. CAI programme to teach other components of Grammar.

5.7 Conclusion

This research can contribute a wider and novel field in the methodology of school subject. Investigator's aim was to construct CAI and study an effectiveness of it in Sanskrit subject. The researcher hopes that this study will be very useful to develop CAI material in different subjects and which direct effect on their study, achievement and educational objectives.

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www.google.cai.com

[www.wikieducator.org/Computer Assisted Instruction \(CAI\)](http://www.wikieducator.org/Computer_Assisted_Instruction_(CAI))

Search engines:

www.Google.com

www.youtube.com

Appendices

List of Experts

Dr.Bharti Rathore	Assistant Professor, Waymade College of Education, V.V.Nagar.
Dr. Rucha Desai	Assistant Professor, Waymade College of Education, V.V.Nagar.
Dr. Yagnesh Purohit	Assistant Professor,Shri I. J. Patel B.Ed college, Mogari.
Mrs.Jalda Pandya	Assistant Professor,Shri I. J. Patel B.Ed college, Mogari.
Mr. Mahesh Chavada	I/c Principal Shri P. K. I College of Education, Bakrol.

પૂર્વ કસોટી

વિષય : સંસ્કૃત

કોલેજનું નામ : _____

પ્રશિક્ષણાર્થીનું નામ : _____

જાતીયતા(sex): છોકરો / છોકરી _____ વિસ્તાર : શહેરી / ગ્રામ્ય _____

તારીખ : _____ સમય : ૧:૦૦ કલાક

મેળવેલ ગુણ : કુલ ગુણ : ૨૫

સુચના :

-કસોટીના પ્રશ્નોના જવાબ આ પ્રશ્નપત્રમાં લખવાના રહેશે.

-આ પ્રશ્ન પત્ર માં કુલ છ પ્રશ્નો છે.

-આ તમારી પરીક્ષા નથી, તેથી પરીક્ષા નો ડર રાખ્યા વિના જવાબ લખો.

-તમારા અન્ય મિત્રોના લખાણમાંથી જવાબ લખવાની વૃત્તિ રાખશો નહિ.

પ્રશ્ન-૧ સાચો વિકલ્પ શોધી ને સાચા વિકલ્પ નીચે લીટી કરો. (૫)

૧. પઠિષ્યામિ - માં કયું પદ રહેલું છે?

(અ)પરસ્મેપદ (બ)આજ્ઞાર્થ પદ (ક)આત્મને પદ (ડ)વિસર્ગ પદ

૨. લેખિણ્યથ - કાળ ઓળખાવો.

(અ)સામાન્ય ભવિષ્ય કાળ (બ)વર્તમાન કાળ (ક)હ્યસ્તન ભૂતકાળ (ડ)આજ્ઞાર્થ

૩. પુષ્ય - કયો ધાતુ રહેલો છે?

(અ)પુષ્ય (બ)પુષ્ (ક)પુષ્ (ડ)પુશ્

૪. લભેથામ- દ્વિવચન નું એકવચન રૂપ લખો.

(અ)લભાવહે

(બ)લભૈ

(ક)લભે

(ડ)લભામહે

૫. કથય માં કયો ગણ અને વિકરણ પ્રત્યય જણાવો.

(અ)૧૦,અ

(બ)૧૦,અય

(ક)૬, અ

(ડ)૬, અય

પ્રશ્ન ૨ (અ)કૃદંત નો પ્રત્યય લખો.

(૨)

૧. હેત્વર્થ કૃદંત : _____

૨. સંબંધક ભૂતકૃદંત : _____

પ્રશ્ન ૨ (બ)કૃદંત ઓળખાવો.

(૨)

૧. લિખિતુમ્ _____

૨. પિત્વા _____

પ્રશ્ન ૩ નીચે આપેલા વાક્યોમાંથી અવ્યય ઓળખાવો.

(૩)

૧. યદિ ધનં યાસ્યસિ તર્હિ સઃ ગમિષ્યતિ | _____

૨. અહં સર્વદા સત્યં વદામિ | _____

૩. યથા રાજા તથા પ્રજા | _____

પ્રશ્ન ૪ સમાસ નો પ્રકાર લખો.

(૪)

૧. રામ લક્ષ્મણૌ _____

૨. દંપતિ _____

૩. ચક્રપાણી _____

૪. અહિનકુલમ _____

પ્રશ્ન ૫ સંસ્કૃત અંકમાં રૂપાંતર કરો.

(૬)

૧. પચ્ચસપ્તતિ: _____

૨. અષ્ટાદશ _____

૩. વિંશતિ: _____

૪. એકાદશ _____

૫. શતમ્ _____

૬. નવતિ: _____

પ્રશ્ન ૬ નીચે આપેલા વાક્યોમાંથી ઉપસર્ગ શોધી ને જુદા તારવો.

(૩)

૧. સીતા રામમ અનુગચ્છતિ | _____

૨. વૃક્ષાત્ ખાગા: ઉત્પતન્તિ | _____

૩. રામ: વનં આગચ્છતિ | _____

ઉત્તર કસોટી

વિષય : સંસ્કૃત

કોલેજનું નામ : _____

પ્રશિક્ષણાર્થીનું નામ : _____

જાતીયતા(sex): છોકરો / છોકરી _____ વિસ્તાર : શહેરી / ગ્રામ્ય _____

તારીખ : _____

સમય : ૧:૦૦ કલાક

મેળવેલ ગુણ :

કુલ ગુણ : ૨૫

સુચના :

-કસોટીના પ્રશ્નોના જવાબ આ પ્રશ્નપત્રમાં લખવાના રહેશે.

-આ પ્રશ્ન પત્ર માં કુલ છ પ્રશ્નો છે.

-આ તમારી પરીક્ષા નથી, તેથી પરીક્ષા નો ડર રાખ્યા વિના જવાબ લખો.

-તમારા અન્ય મિત્રોના લખાણમાંથી જવાબ લખવાની વૃત્તિ રાખશો નહિ.

પ્રશ્ન : ૧ નિર્દેશાનુસાર ધાતુરૂપાનાં પરિચય લિખત |

(૬)

ધાતુરૂપમ્	ધાતુ:	કાલ:	પદમ્	પુરુષ:	વચનમ્
પઠિષ્યામિ					
લેખિષ્યથ					
કથયિષ્યન્તે					
પુજયિષ્યત:					
લભેથામ્					
પુષ્ય					

પ્રશ્ન : ૨ કૃદંત પ્રકાર લિખત |

(૪)

૧ વિકીર્ય- _____

૩. આદાય - _____

૨ ભવિતુમ્-_____

૪.છેતુમ્-_____

પ્રશ્ન-૩ અધોલિખિતાનામ અવ્યયાનામ ઉપયોગેન વાક્યાનિ રચયત |

(૨)

૧. અત્ર-તત્ર _____
૨. યદા-તદા _____
૩. યથા-તથા _____
૪. યત:-તત: _____

પ્રશ્ન-૪ ક- વિભાગં ખ-વિભાગેન સહ સંયોજયત |

(૪)

ક

ખ

૧.નવરાત્રમ

૧.બહુવ્રીહિ સમાસ

૨.રામલક્ષ્મણૌ

૨.સમાહાર દ્વન્દ્વસમાસ

૩.અહિનકુલમ્

૩.અકશેષ સમાસ

૪.પિતરૌ

૪. દ્વિગુસમાસ

૫.ઇતરેતર દ્વન્દ્વસમાસ

(૧-_____)

(૨-_____)

(૩-_____)

(૪-_____)

પ્રશ્ન-૫ કોષ્ટક પૂરયતુ |

(૩)

		અંકોમાં	શબ્દોમાં(સંસ્કૃત)
1	૨૫×૩ =		
2	૩૭+૪૬=		
3	૧૬÷૮=		

પ્રશ્ન-૬ વિકલ્પેભ્યઃ સમુચિતમ ઉત્તરમ ચિત્વા લિખત |

(૫)

(૧) સંબંધક ભૂતકૃદંતમાં જો મૂળધાતુની પહેલા કોઈપણ ઉપસર્ગ હોય તો ધાતુ ને નીચેનામાંથી કયો પ્રત્યય લગાડવામાં આવે છે?

(અ) તુમ

(બ) ઇત્વા

(ક) ત્વા

(ડ) ય

(૨) જો શબ્દને પોતાનો સ્વતંત્ર અર્થ હોય અને ધાતુ કે સંજ્ઞાની આગળ મુક્તા તેના અર્થમાં પરિવર્તન લાવે તેને શું કહે છે?

(અ) અવ્યય (બ) પરસ્મૈપદ (ક) આત્મનેપદ (ડ) પૂર્વગ

(૩) નીચેનામાંથી દ્વંદ્વ સમાસનું દ્રષ્ટાંત કયું છે?

(અ) દમ્પતી (બ) પિતામ્બરમ્ (ક) નવરાત્રમ્ (ડ) યથાશક્તિ

(૪) 'ગન્તુમ્' કયો કૃદંત પ્રકાર છે?

(અ) સંબંધક ભૂતકૃદંત (બ) વર્તમાન કૃદંત (ક) હેત્વર્થ કૃદંત (ડ) કર્મણી કૃદંત

(૫) 'અહં શીઘ્રમ્ આગછામિ'|-વાક્યમાંથી ઉપસર્ગ શોધીને લખો.

(અ) ગછામિ (બ) અહં (ક) આ (ડ) શીઘ્રમ્