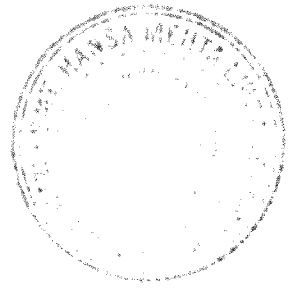
Chapter One

Introduction



Chapter-1
Introduction

1.0 INTRODUCTION

Various Commissions and Committees reviewing education have felt the need and importance of educational technology in the school curricula. NPE (1986) has emphasized on computer literacy. It states that 'As computer has become important and ubiquitous tool, a minimal exposure to computers and training in their use will form a part of professional education. Program of computer literacy will be organized on a wider scale from the school stage'. One of the strategies suggested by POA (1992) is 'computer application with adequate facilities of computers in schools would be encouraged on operational basis at secondary and higher secondary levels'. But inspite of recommendations given by the NPE and POA, the present classrooms are rigid in terms of the schedule, teacher, and duration of period. This makes the teaching-learning process quite uninteresting, unmotivating, non-participatory and boring. The present technology in the form of computers provides lots of flexibility. The learner decides which topic is to be learnt, when to learn and for how much duration. This means that number of students can learn the subject of their choice with their own pace. Students can manipulate different audiovisual elements and experience their impact. This facility can make various concepts intelligible to students. Individualization of instruction is possible through computer. Various curricular subjects can be taught with the help of computers by making use of computer assisted instruction. CAI packages can also be used for classroom instruction under the control of the teacher, either as the main focus of the lesson or to illustrate various points that may arise. Teachers develop the programmed learning material with the help of computer software. Teacher teaches and students learn through CAI. Even CAI can be used as a remedial material for all types of students as it can provide different tasks to different students, like, easy task to slow learners and difficult task to fast learners.

1.1 IMPORTANCE OF LANGUAGE

People have used language as a powerful medium of communication. Language has played such an important role in the

development of human civilization and culture that the story of language has rightly been called as the story of civilization.

Development of man depends upon the extent he uses language and literature. Language Education helps in the development of personality. It provides opportunities for creative expression, imparts information and aesthetic experience. The dynamism of personality has much to do with the effective use of language. From the above statements it is clear that language plays an important role in education. The aim of education is the adjustment in life and language is the most useful tool to achieve it.

It has been rightly said that language is an autobiography of man. In every walk of life, a man feels an utmost need of language. Nothing can be done without an adequate mastery over the language–oral as well as written. Language plays a vital role in studying any subject. The progress of a nation depends very much upon the general achievement in language as it provides an adequate and effective instrument of communication. In school curriculum also language plays a vital role.

Language is an instrument with which we form ideas and feelings; moods and aspirations, will and act. Thus, language plays a greater role for harmonious and happy life. Among all the languages ancient languages hold unique position in the development of any nation, since, they embody within themselves the gems of the tradition, culture, ceremonies, rituals helping a nation to preserve its cultures. India is a land with numerous dialects and languages. Among all of them Sanskrit is one of the most prominent and ancient languages of India.

1.2 IMPORTANCE OF SANSKRIT

The word Sanskrit means refined or purified. It is the antonym of prakrita, meaning natural. It is made up of the primordial sounds, and is developed systematically to include the natural progressions of sounds as created in

the human mouth. Jawaharlal Nehru has said that Sanskrit is a language amazingly rich, efflorescent, full of luxuriant growth of all kinds, and yet precise and strictly keeping within the framework of grammar which Panini laid down two thousand years ago. It spreads out, added to its richness, became fuller and more ornate, but always it stuck to its original roots. The ancient Indians attached a great deal of importance to sound, and hence their writing, poetry or prose, had a rhythmic and musical quality. Our modern languages of India are offsprings of Sanskrit, and to it owe most of their vocabulary and their forms of expressions.

SANSKRIT - The Language of Ancient India

Sanskrit meaning cultured or refined is a classical language. It is the oldest and the most systematic language in the world. The vastness and the versatility, and power of expression can be appreciated by the fact that this language has 65 words to describe various forms of earth, 67 words for water, and over 250 words to describe rainfall.

Sanskrit was a complete success and became the language of all cultured people in India and in countries under Indian influence. All scientific, philosophical, historical works were henceforth written in Sanskrit, and important texts existing in other languages were translated and adapted into Sanskrit. For this reason, very few ancient literary, religious, or philosophical documents exist in India in other languages. The sheer volume of Sanskrit literature is immense, and it remains largely unexplored.

Sir William Jones (1746-1794) came to India as a judge of the Supreme Court at Calcutta. He pioneered Sanskrit studies. His admiration for Indian thought and culture was almost limitless. He observed as long ago as1784: " The Sanskrit language, whatever be its antiquity, is of a wonderful structure; more perfect than the Greek, more copious than the Latin and more exquisitely refined than either: yet bearing to both of them

a stronger affinity, both in the roots of verbs, and in the forms of grammar, than could possibly have been produced by accident; so strong indeed, that no philologer could examine them all without believing them to have sprung from some common source which perhaps no longer exists...".**(Source: Discovery of India - By Jawaharlal Nehru p 165).**

Will Durant (1885-1981) American eminent historian, would like the West to learn from India, tolerance and gentleness and love for all living things. He has noted in his book, The Case for India that "India was the motherland of our race, and Sanskrit the mother of Europe's language. She was the mother of our philosophy; mother, through the Arabs, of much of our mathematics; mother, through the Buddha, of the ideals embodied in Christianity; mother, through the village community, of self-government and democracy.**(Source: The Case for India - By Will Durant).**

The renowned British Sanskrit scholar **Arthur Anthony MacDonnell (1854-1930)** summarized: "Since the Renaissance there has been no event of such worldwide significance in the history of culture as the discovery of Sanskrit literature in the latter part of the eighteenth century." **(Source: In Search of The Cradle of Civilization: : New Light on Ancient India - By George Feuerstein, Subhash Kak & David Frawley p. 257).**

According to **Forbes** magazine, (July, 1987),**"Sanskrit is the most convenient language for computer software programming." (Source: The Hindu Mind -Fundamentals of Hindu Religion and Philosophy for all Ages - By Bansi Pundit pg - 307).**

NASA and others have been looking at Sanskrit as a possible computer language since its syntax is perfect and leaves little room for error.

1.3 IMPORTANCE OF SANSKRIT AS COMPUTER LANGUAGE

The importance of Sanskrit is unquestionable. It is useful for all round development of the individual, which is the aim of education. The Vedantic and Upanishadic study develops our power of thinking and changes our attitude towards life. Books, like, Panchatantra, Hitopadesa create and cultivate many good qualities, like, modesty, generosity, boldness, discrimination, renunciation and love. Classical literature of Sanskrit is called the garden of wisdom. The Sanskrit language has a philosophical significance in as much as most of the Indian languages are derived from it. Article 35 of the constitution of India mentions that the vocabulary, when ever necessary is to be drawn from Sanskrit primarily. The development of modern language, like, Marathi, Hindi, Gujarati, owes a great deal to Sanskrit. 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 languages have been directly derived from Sanskrit language.

Thus, the study of Sanskrit is useful for building up the good and moral character, developing the self-confidence and qualities of heart and head, which ultimately leads to the sublimation of most natural human instincts. This language is the most primary need of today.

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 thrice as many multiple derivative words using suffixes and prefixes, could be the best language for computers.

The National Aeronautics and Space Administration (NASA) has acknowledged the scientific importance of Sanskrit as a possible computer language, since the syntax is perfect, with little room for error.Bala Sarveswara Gurukkal, founder of Sanskrit Vikas Kendra, Karaikal said the

language has lost its importance in recent decades in India. To revive it, we need to take the language close to the masses and encourage students from all sections of society.

1. SANSKRIT FOR COMPUTER

In July 1987, Forbes magazine published news, that, "Sanskrit is the most convenient language for computer software programming." It filled the hearts of all those who love and study Sanskrit with great joy and enthusiasm as it opened the doors to new fascinating world of Sanskrit studies. Sanskrit is extremely rich, powerful and expressive language. Its potentialities are gradually being appreciated all over the world, and its application is being extended in different fields. To mention a few, Indian Institute of Information Technology (IIIT), Hyderabad is working on a project called Natural Language Processing (NLP). The goal of NLP is to build computational methods of natural language for its analysis and generation. Similar work is going on at C-DAC, Bangalore. The project is called Natural Language Understanding (NLU).

2. COMPUTER FOR SANSKRIT

The association of Sanskrit with computer is constantly bridging the distance between the Science of ancient world and the world of Modern Science. Computer scientists and Sanskrit Pundits all over the world are trying to use the computer technology in the field of Sanskrit studies. Many such efforts have already been started in India. In this regard, Government of India has initiated two major projects:

1) Technology Development for Indian Languages (TDIL)

2) Sansk-net project. (Site name: http://www.sansknet.org)

3. TECHNOLOGY DEVELOPMENT FOR INDIAN LANGUAGES (TDIL)

The Indian Standard Code for Information Interchange (ISCII) was devised by C-DAC,for using any Indian Language in Word Processing, Data Processing and a host of other applications across platforms like DOS, WINDOWS, UNIX, Mac, etc. This standard provides instant transliteration of texts among Indian languages and Roman Script (with Diacritics).

4. SANSK– NET PROJECT

The Project Sansk-net was proposed by the Indian Heritage Group (IHG) and Real-Time Systems Group (RTSG), and Center for Development of Advanced Computing (C-DAC), Bangalore. The scope and objectives of the project are as follows:

Objectives of Sansk-net Project

The basic objectives of the "Sansk-net" Project are the following:

1. To present the database available in different institutions in a computer framework.

2. To assist the institutions to develop the hardware, software and the technical capability to place the information in the modern technical framework.

3. To develop computerized linkage among the different institutions, so that, each Institution can have access to the database available in the other institutions.

4. To make use of the principles and techniques available in Nyaaya, VyaakaraNa, Vedanta and Vedanta for developing new paradigms for the computer.

5. To develop packages for training for the faculties in the scientific work and Shaastric World for making best use of the infra-structural facility.

6. To facilitate preservation of the information on rare manuscript, Vedic literature and Shaastras.

5. MACHINE-AIDED TRANSLATION

Machine Aided Translation means the translation with the help of machine. It is an effective transfer of textual materials from one language to another language with the help of computer. This involves dictionary search, selection of equivalent terms, morphological information and error corrections, etc. Department of Computer Science and Engineering, IIT, Kanpur, from 1983 onwards, has undertaken a project attempting to utilize the Sanskrit grammar structure, particularly, Paanini's theory, for an interlingual-based machine translation system among pairs of Indian languages. This project has achieved considerable success by now, covering Hindi, Telugu, Kannada, Marathi, etc.

6. E-LEARNING PROGRAM FOR SANSKRIT

Sanskrit is taught from primary level to University level in different parts of the country in both traditional and general institutions. It is also learned in many foreign countries. However, the process of learning and the teaching is not up to the mark for various reasons. Besides, there is no facility for learning Sanskrit independently. Thus, there is a need to develop linguistic technique aided by audio-visual interactive media, which can take care of requirements of various learning groups. The work in this direction is an E-learning program for basic Sanskrit. Similar work is also going on at the University of Pune, Department of Sanskrit in collaboration with C-DAC multimedia group. This E-learning and Expression project aims at preparing programs for different levels in addition to SambhaasaNa portal, i.e., package for spoken Sanskrit.

7. COMPUTER-ASSISTED SHAASTRIC TEACHING

Sanskrit Shastras are usually taught at higher level. The study of such Shaastras includes the study of main text along with its commentaries and sub commentaries. When one studies a particular shaastra, it is necessary to understand the ideas expounded in that particular shastra in their proper perspective, for which one is required to go through a number of books, commentaries and dictionaries in order to collect all the scattered details. Without the help of modern technology it would be difficult to get all the relevant information, scattered over many texts or parts of single text. Computer can be used as an effective means of inputting, encoding and scanning the data. It can retrieve the desired information in a flash and can present it in a systematic way. We can thus develop a larger system of information, accessible through electronic network, to provide a better Textual exposition. Some such attempts have already been made. To mention a few, there is a package called 'Gita Super' developed by IIT, Kanpur, which presents text of Bhagavad-Gita along with its two commentaries. Another package called the Mahabharata is developed by Bandarakara Oriental Research Institute (BORI), Pune. Similar works are carried out abroad too. (LANGUAGE IN INDIA www.languageinindia.com Vol. 6: 5 May, 2006 Anirban Dash 5)

8. COMPUTATIONAL ANALYSIS OF SANSKRIT

Computational analysis signifies an analysis of given text with the help of computational techniques. The computational analysis of a Sanskrit text includes a number of procedures such as:

1) Keying the text in any editing software.

2) Analyzing the text from syntactic and morphological point of view.

3) Preparing a detailed help program for grammatical analysis.

4) Developing programs for sorting, searching, and indexing, preparing concordance,Creating hyperlinks for words, rules and verses.

5) Creating database for storing all the information.Though, a variety of Natural Language interface tools like an Editor, creation of multilingual documents with transliteration between the scripts of Indian languages and the Roman script, utilities for sorting, searching, indexing, concordance, various analyses like morphological, syntactic and semantic, lexical update, grammar help, hyperlinks to a variety of rule bases, etc. are developed for this purpose. Their effective application for producing better results is still a great challenge. Computational analysis of Sanskrit Shastras poses still greater challenge as it not only demands the knowledge of computer technology but also a thorough knowledge of the concerned text. A preliminary Natural Language Understanding (NLU) System for Sanskrit has been developed and is in use in universities and institutions. Essentially, it generates/analyses Sanskrit Words/Sentences with the help of Páninian grammar rules, for valid word forms. Paraphrasing an input sentence, changing the voice, euphonic combinations and accented input (Vedic) processing are the other salient features of this system. Rule base trace is also provided. The advanced computer technology has revolutionized almost all parts of human life and field of education is no exception. This attempt to use the modern technology for analyzing the ancient works will be helpful to the scholastic community as a whole in learning, understanding and interpreting ancient Indian knowledge in a better way. Such packages can also prove useful in teaching ancient Indian shastric texts effectively and with more efficiency. It can also be used as supporting systems for research. Thus, there is an immense potentiality in this field, which needs to be explored further for a better result. (LANGUAGE IN INDIA www.languageinindia.com Vol. 6: 5 May, 2006 Anirban Dash 6). In this way we can develop search packages based ancient texts. It is quite obvious that, For preparing such packages, the knowledge of Computer

and knowledge of Sanskrit should go hand in hand and complement each other for better results. What is required in future is the increased co–operation between a Computer professional and Sanskrit Pundits.

1.4 COMPUTER EDUCATION

The IX five-year plan document states "the important of educational technology has to be adequately provided for greater efficiency, effectiveness and wider reach of the educational programmes. Inspite of recommendation given by the NPE and POA the present classrooms are rigid in terms of time-schedule, teachers, and duration of periods. This makes the teaching –learning process quite uninteresting, unmotivating, non-participatory and boring. In the present age of technology in the form of computers, it is the learner who decides which topic is to be learnt, when to learn and for how much time. This means that number of students in a classroom can learn the subject of their choice according to their own pace. This can be possible through Computer Assisted Instruction (CAI). This CAI has both text and visuals. Students can manipulate different elements of audio visuals and experience their impact. This facility can make an abstract concept intelligible to different students. Individualization of instruction is possible through the use of computer software. Some educators believe that computer will substantially lower instruction costs and raise the quality of education at the same time, Properly programmed computer can eliminate boredom and provide individualized instruction. Computer can exhibit super human patience in working with students. The learner can repeat a sequence many times, without the machine becoming tired and irritated.

1.5 COMPUTER-ASSISTED INSTRUCTION

Computer Assisted Instruction (CAI) refers to instruction presented on a computer. Many educational computer programmes are available on-line

and from computer stores and textbook companies. They enhance teacher instruction in several ways.

Computer programmes are interactive and can illustrate a concept through attractive animation, sound and demonstration. They allow students to progress at their own pace and work individually or in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, the programme shows students how to correctly answer the question.

Computer-Assisted Instruction improves instruction for students with disabilities because students receive immediate feedback and do not continue to practice the wrong skills. Computers capture the students' attention because the programmes are interactive and engage the students' spirit of competitiveness to increase their scores. Also, computer assisted instruction moves at the student's pace and usually does not move ahead until they have mastered the skill. Programmes provide differentiated lessons to students who are at risk, average or gifted.

Individually paced instruction and frame-based, computer-aided instruction comprised early attempts to provide adaptive instruction and, although successful for some types of learning, fell short because their learning environments had low fidelity and their ability to adapt was limited to branching between static screens (Murray 1998).

In the sixties the first attempts to use computers in educations were based on rather behaviorist theories with emphasis on feedback and reinforcement actions (Gazzaniga & Scarafiotti 1997).

- The teaching path was fixed and linear.
- The communication style was mono-directional (from the computer to the student) and imperative.

- Individuality was restricted to the amount of time spent in the learning process.
- The CAI programs proved useful for training.
- Most severe criticism: the rigidness based on the action/reaction principle.

CAI refers to computer programs that provide drill and practice exercises while CMI refers to programs that evaluate and diagnose students' needs, guide them though the next step in their learning, and record their progress. Both CAI and CMI can be used with little teacher intervention.

Computer Assisted Instruction (CAI) is among the range of strategies being used to improve student achievement in school subjects, including reading. Programs for CAI have come a very long way since these were first developed over two decades ago. These programs tutor and drill students diagnose problems, keep records of student progress, and present material in print and other manifestations. It is believed that they reflect what good teachers do in the classroom (Kulik, Banger, & Williams, 1983).Students are expected to benefit from CAI. Among the benefits that have been expected are better and more comfortable learning for students, since they learn at their own pace and convenience; opportunities to work with vastly superior materials and more sophisticated problems; personalized tutoring; automatic Measurement of progress; and others. Teachers as well are expected to gain from CAI, as they experience less drudgery and repetition, greater ease in updating instructional materials, more accurate appraisal and documentation of student progress, And more time to work directly with students (Kulik, Banger, & Williams, 1983). With increasing advances in computer technology, computer-assisted instruction (CAI) is now seen by many as a method of providing relevant instruction for large numbers of students.A number of different approaches to the use of computers in education are reflected in

educational practices. A useful classification of these approaches is that of Goldberg and Sherwood (1983). Of these categories—learning from computers, Learning about computers, and Learning about thinking with computers—the most relevant to this study is Learning from computers. Learning from computers encompasses approaches to CAI in which the computer is used as a means for transmitting specific subject matter, such as reading. The flow of information is basically from the computer to the student, with the computer presenting learning material or activities for student responses. The computer retains records of the student's progress through the course of study. Based on the degree of interaction between student and computer, researchers have identified Different level of CAI.

Drill and Practice:

The computer provides the student with exercises that reinforce the learning of specific skills taught in the classroom, and supplies immediate feedback on the correctness of the response. Used in this manner, CAI functions as a supplement to regular classroom instruction, and may be especially useful when a teacher does not have the time to work individually with each student. Drill and practice on the computer may also motivate students' more than traditional workbook exercises.

This method leads the learner through a series of examples to increase dexterity and fluency in the skill. Drill and practice programmes provide a variety of questions with varied formats. The trainee is usually given several tries before the computer presents the correct answer. Several levels of difficulty can be available within the same drill and practice programme. Positive and negative feedback as well as reinforcement can be included. In this method, teacher arranges prior instruction. Teacher selects material based on intelligence level of his/her students. Teacher checks progress. Computer asks questions, evaluates student response, and provides immediate feedback to the students and

records student's progress. Students practice content that is already taught, responds to question and receives confirmation.

The simplest form of CALM uses the computer to present the learner with a series of exercises which he or she must complete by giving some response or answer. The computer processes that response (according to the rules embodied in its programme) to determine whether or not it is 'correct'. It may then provide the learner with some feedback about the answer in the form of a congratulatory message if it was right, or a corrective comment if it was wrong and a noncommittal message if the computer was unable to recognize the response. The exercises are specified in advance in their completer form or as templates which can be filled out according to a set or rules.

Computer assisted learning material offers a means of providing endless drill and practice without repetition, at a pace that can be controlled by the learners. The nature of the exercises depends on the learner's progress. Thus, as he or she learns and his or her accuracy and speed improves, the exercises can become more difficult or reverse. If a learner makes too many mistakes, they can be made easier. Mistakes can be systematically detected and computer can adapt the pattern of exercises to rectify this weakness.

Tutorial:

Tutorial CAI provides some information or clarifies certain concepts in addition to providing the Student with practice exercises. In this sense, the computer begins to take over actual instructional functions, tailored to the student's individual level of achievement.

In the tutorial role, the computer acts as the teacher. All interaction is between the computer and the learner. In this method information is presented in small units followed by a question. The computer analyzes

the student's response and appropriate feedback is given. Teacher selects proper material. Arrange instruction in logical sequence. Computer presents instruction, asks questions, monitors responses, provides remedial feedback, summarizes key points and keeps records. Students interact with computer, answers questions and accept the feedback.

The lay image of CALM is of serried ranks of students, each seated in front of a computer keyboard and screen, all learning in their own may and at their own pace. There is an assumption that each student is participating in some sort of tutorial where he or she is taken on a journey through the learning material via a dialogue, in which information is presented and feedback is elicited through a process of question, answer and challenge.

In its simplest form, this tutorial dialogue bears a close resemblance to the programmed learning sequences found in print and on teaching machines in the 1960's. It is reasonable to ask what the computer can add to the material apart from illuminating the text. If that were all, then there could be little benefit in using the computer, a book would be better. However, programmed texts present a number of problems, particularly in determining whether the student has really mastered the current steps and also for deciding about how to branch to the next step. Self-assessment may require a student to make difficult judgments and the routing may involve complex decisions based on his or her performance and progress through the material. This responsibility may make the student's work more difficult.

In order to construct the CALM tutorial, the teacher (as a part of the production team) must set out a dialogue which they themselves might have with learners under various conditions and decide upon the criteria which determine how they would adapt the pace and direction of their students' learning. These rules are them embodied in the computer

programme so that the computer can deliver an analogue of the real tutorial. However, in topics where it is reasonable to assume that most of the students will follow a few well-trodden routes through the material, this made can be an effective way of learning.

Dialogue:

With this type of computer use, the student takes an active role in interacting with the computer, giving instructions in the form of a computer language so as to structure the student's own curriculum. The computer provides information, exercises, and feedback. Dialogue CAI is believed to come closest to actually substituting for regular instruction (Gourgey, Azumi, Madhere, & Walker, 1984).The verdict for the use of computers in education seems to be in. As stated by the National Center for Education Statistics (NCES):Computers have become an essential tool in our society. Early exposure to computers may help students gain the computer literacy that will be crucial for future success in the workplace. Access to computers at school and at home allows students to retrieve information, manipulate data, and produce results efficiently and in innovative ways. Examining the extent to which students have access to computers at school and at home may be an indicator of how well-prepared students will be to enter an increasingly technological workplace. (NCES, 1999a, p.64)

Gaming Method:

A game is an activity in which participates follow prescribed rules that are different from those of reality as they strive to attain a challenging goal. The competition may be individual against individual, group against group. Games are above all, a form of play. As such, those who think learning and playing are incompatible may look them upon with suspicion, but as viewed by developmental psychologists play can be useful mechanism. Teacher sets limits, directs process and monitors

result. It acts as competitor, judge and scorekeeper. Students learn facts/skills, evaluate choice and compete with computers.

Simulation Method:

Simulations are representative of real life situations with some of the real elements removes for safety, expenses, lengthiness, time needed etc. Teacher introduces subject, presents background about topic on which simulation is going to be shown. Computer delivers results of decisions and presents the subjects. Students practice decision-making, makes choices, receives result of decisions and evaluates decisions.

Both the tutorial, and drill and practice modes of CALM operate by providing information in a structured way according to rules specified by the author/tutor. Another facet of learning involves the student studying real-life systems of phenomena. Sometimes this is quite feasible, but there are some learning experiences which are too time-consuming, too expensive, too difficult or too dangerous. The simulation may be supported by a laboratory system, which must be constructed before hand and may require expensive equipment.

Computer can be used to emulate a real-life system by following a set of rules/programmes which approximates the behaviour of the real system. The quality of the approximation is governed by the author of simulation who can specify the rules as being simple or complex. It may be educationally desirable to provide various levels of approximation within the same simulation package so that it can be used to show the effects of increasing experimental error or to give a feeling for the accuracy of the simulation.

The advantage of a CALM simulation over the use of the equipment and media is in the flexibility and control which the computer can bring. The computer is a general purpose information processing machine which

is transformed into a machine to carry out specific task by the programme within it. Thus, with different programmes the same computer can simulate different systems. As it runs the simulation, it can also meditate between the student and the analogue of the real-life system, guiding him or her towards experiences which are likely to be helpful and providing some tutorial assistance where necessary.

Modeling:

This mode of CALM is similar to the simulation mode. It helps the students to learn by working an analogue of a real-life system or phenomena expressed as a set of rules within the computer. Whereas in a simulation, the analogue as specified by the tutor is modeling. It is the student who must construct the analogue. In effect, the student must 'teach' the computer the rules, so that it can emulate the real-life system in given circumstances and correctly predict the behavior of the real-life system in new circumstances. The student through this process and demonstrates his or her mastery of the learning through the final model.

As with simulations, the technique of learning by modeling is not unique to CALM. It is possible to devise systems of rules or equations which describe the behaviour of the system to be studied and to test these models in new circumstances without using a computer. However, the computer provides a convenient way of checking the model, performing the calculations and following through the set of rules as an impartial referee.

Interactive Knowledge-Based Systems:

The preceding distinction between simulation and modeling for imperative analogues of real-world systems has a parallel in Interactive Knowledge-Based Systems (IKBS). These two modes may thus take an alternative approach. The imperative analogue comprises a set of (often mathematical) rules or equations which are used as instructions to the

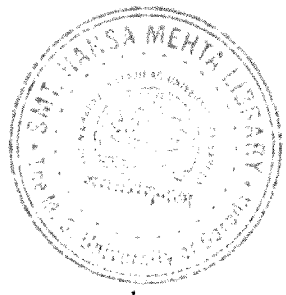
computer to govern the behavior of the knowledge relating to a particular topic, system or situation.

This can be explored by the learner, perhaps with an expert system providing tutorial guidance and explanation or by means of asking questions which will lead to an understanding and assimilation of the knowledge. Alternatively, the learner may use the IKBS to model his or her own knowledge of the topic, building and testing his or her own knowledge base. The bet way to learn a subject is to teach it and this use of an IKBS provides an opportunity for the student to 'teach' the computer about the topic.

Information Seeking:

The last of the six major modes of CALM uses the computer as a mentor and guide through a range of learning resources which might, but need not be, themselves based on the computer. The power of the computer to store, retrieve and process information is used to help the student as he or she browses through the material, responding to questions about related information and retrieving items which are needed, summarizing statistical data and suggesting possible lines of investigation that may be of interest.

This is also the least well-developed mode since it requires very substantial computing resources to cope up with the large quantity of information which people are accustomed to use in libraries, resources centers and finding out from other people. Further, if it is to act as an effective mentor, it must have some artificial 'intelligence' at a higher level than is currently feasible in classroom systems. If its unintelligent form, where all the routes through the materials are pre-specified and selected according to what is known about the student, the mode degenerates to the Computer-Managed Learning (CML) routing function.



Calculation:

In the early days of computers, before their full potential for general information processing was realized, they were regarded principally as calculating engines. It was natural to use tem as sophisticated calculators to relieve some of the numerical labour involved in learning in the numerical sciences and in statistics. It was noted earlier that, in practice, most CALM packages use components of several modes (for example simulation may be supported by some tutorial material) and calculation facilities are often to be found in packages which are predominantly frill and practice, tutorial or simulations. A number of the larger general purpose CALM systems provide the student with a 'calculation mode' which he or she can select in the middle of a tutorial sequence to help work out some numerical results.

The mode could sensibly be widened to include other ways in which the computer can process information so as to relieve the student's work load and help him or her to reach through to the underlying ideas. Thus, the computer might be used to retrieve data from a large database and to prepare, analyze and summary.

As with the use of simulations, care must be taken to ensure that the computer does not replace too much of the activity. Although the calculation and other information processing is often an unnecessary nuisance as it takes time and can obscure the underlying facts and ideas, it may be that the student must understand the processing and be able to carry it out without the computer. If the calculation is always carried out by the computer, then the student will lose out on valuable practice in circumstances where he or she is motivated by seeing it as a part of a larger process leading to a desired result. However, once he or she has

had adequate practice, further repetition is tedious and de-motivating and could sensible be undertaken by the computer.

Thus, computer can do a wide range of things for the learners in different ways. It can involve the learners in an active manner through interactive mode and learners can be engaged in the learning process. The learner becomes intellectually involved and has the opportunity to grow without a great deal of teacher simulation. In a definite sense, this interaction becomes a personal experience. Computer is versatile with regard to videotape players, electronic musical equipments, physical education monitoring equipment and so on. It becomes an invaluable teaching tool on both a personal and a collective scale. It has also the potential for abstract thinking because the learners can compare relationships with reference to computer games as well as concepts involving many academic areas such as Biology, Economics and Physics. By creating models and utilizing logic, the learner is out into thought process which might have remained unused if they are to read only (Decker, 1993). Computer may be used in analyzing and evaluating the class of teaching in the schools. It is also used in analyzing and interpreting the examination results from various educational viewpoints. Computer is also adaptable as a tool for teachers. It helps the teacher in teaching as well as analyzing students' tests. Such programmes could find ready application in most teaching situations. An incredibly versatile tool like computer can be used across different subjects. Thus, computers can greatly facilitate the search for and the retrieval of information and the learners are relieved for more productive learning tasks. This, in turn suggests the need for re-examination of all aspects of curriculum.

1.6 CAI AND USE OF COMPUTERS IN EDUCATION

The term CAI refers to the system of providing on-line direct interactive instruction, testing and prescription in the process of learning.

Students can be presented with assignments, problems, exercise, reading materials and references by computer for learning. After the students complete the assignment, they can be tested through the computers. If required, remedial exercise can be presented in the next set of assignments. To motivate the students, immediate feedback is an important ingredient of CAI. Computer Assisted Instruction is a set of programming instructions, which is used in instructional process to develop certain pre-decided skills for the student's mastery over the subject content. In this way, CAI is a use of computers to present Drill, Practice, Exercise and tutorial sequence to the students, and sometime to engage the students in a dialogue about the substance of the instruction. It means that computer is used as teaching aid and proxy for a teacher. So, CAI is a type of Instruction, which is used to achieve the objectives of the instructions. The computers are the means and have potentials to contribute to the instructional system. As the knowledge is exploding at a very fast rate, and individual teacher cannot handle the enormous amount of information in a limited time period. For this purpose computerized instructions can very well be used due to its following characteristics.

1.7 CAI AND DIFFERENT CURRICULAR AREAS

A few researchers undertook to compare the effectiveness of CAI in different curricular areas. Their findings, though not conclusive, indicate that CAI activities are most effective in the areas of science and foreign languages, followed, in descending order of effectiveness, by activities in mathematics, reading, language arts, and English as a Second Language, with CAI activities in ESL found to be largely ineffective.

(Capper and Copple 1985; Kulik, Kulik, and BangertDrowns 1985, Roblyer, et al. 1988; Rodriguez and Rodriguez 1986.)

1.8 BENEFICIAL EFFECTS OF CAI

CAI's effects on achievement, learning rate, retention, and attitudes has been extensively researched. Some researchers have, however, investigated CAI's influence on other variables and found it to confer benefits on:

- Locus of control: Capper and Copple (1985), Kinnaman (1990), and Louie (1985) found that CAI students have more of an internal locus of control/sense of self-efficacy than conventionally instructed students.

- Attendance: CAI students had better attendance in Capper and Copple's 1985 study, Rupe's 1986 review, and the 1990 ISTE study.

- Motivation/time-on-task: Bialo and Sivin (1990) and Capper and Copple (1985) found that CAI students had higher rates of time-on-task than traditionally instructed controls.

- Cooperation/collaboration: Cooperative, pro-social behavior was greater with CAI in the work of Dickinson (1986); Mevarech, Stern, and Levita (1987); and Rupe (1986).

1.9 CAI AND DIFFERENT STUDENT POPULATIONS

Is CAI more effective with some student populations than others? Many researchers have conducted comparative analyses to answer this question and have produced findings in several areas.

Younger versus older students: Most comparative studies have shown that CAI is more beneficial for younger students than for older ones. While research shows CAI to be beneficial to students in general, the degree of impact decreases from the elementary to secondary to post-secondary levels.

(Bangert-Drowns 1985; Bangert-Drowns, et al. 1985; Becker 1990; Bracey 1987; Ehman and Glen 1987; Hasselbring 1984; Kulik, Kulik, and Bangert-Drowns 1985; Okey 1985; Stennet 1985; Swan, Guerrero, and Mitrani 1989.)

Lower-achieving versus higher-achieving students: These comparisons show that CAI is more effective with lower-achieving students than with higher-achieving ones. Again, both lower- and higher-achieving students benefit from CAI. However, the comparatively greater benefits experienced by lower-achieving students, like those experienced by younger students, are largely due to the need these groups have for elements common to the majority of CAI programs--extensive drill and practice, privacy, and immediate feedback and reinforcement.

(Bangert-Drowns 1985; Bangert-Drowns, et al. 1985; Edwards, et al. 1975; Kinnaman 1990; Kulik, Kulik, and Bangert-Drowns 1985; Martin 1973; Okey 1985; Roblyer 1988.)

Economically disadvantaged versus higher-SES students: Researchers note that CAI confers greater benefits on economically disadvantaged students than those from more privileged backgrounds. Lower SES students, too, benefit greatly from opportunities to interact privately with CAI drill-and-practice and tutorial programs.

(Bangert-Drowns, et al. 1985; Becker 1990; Mevarech and Rich 1985; Ragosta, Holland, and Jamison 1982; Stennett 1985.)

Lower- versus higher-cognitive outcomes: Closely related to the above is the finding that CAI is more effective for teaching lower-cognitive material than higher-cognitive material. This research makes essentially the same point--that CAI is particularly effective for reinforcing the basic, fact-oriented learning most often engaged in by younger, lower achieving, and/or lower SES students.

(Ehman and Glen 1987; Hasselbring 1984; Schmidt, et al. 1985-86.)

Handicapped learners: Research conducted with learning disabled, mentally retarded, hearing impaired, emotionally disturbed, and language disordered students indicates that their achievement levels are greater with CAI than with conventional instruction alone. In some of this research, handicapped CAI students even outperformed conventionally taught, non- handicapped students.

(Bahr and Reith 1989; Bialo and Sivin 1990; Hall, McLaughlin, and Bialozor 1989; Horton, Lovitt, and Slocum 1988; Schmidt, et al. 1985-86; Woodward, Carnine, and Gersten 1988.)

Males versus females: This comparison was not addressed by enough researchers to draw firm conclusions. The 1988 meta-analysis of 82 studies of CBE conducted by Roblyer, et al. concluded that effect differences slightly favor boys over girls, with differences falling short of statistical significance.

1.10 WHY STUDENTS LIKE CAI ?

An earlier section of this report offers research evidence showing that CAI enhances student attitudes toward several aspects of schooling. Some researchers took these investigations a step further by asking students what it is about CAI that they like. The following is a list of reasons given by students for liking CAI activities and/or favoring them over traditional learning. These student preferences also contribute to our understanding of why CAI enhances achievement.

Students say they like working with computers because computers:

- Are infinitely patient
- Never get tired

- Never get frustrated or angry
- Allow students to work privately
- Never forget to correct or praise
- Are fun and entertaining
- Individualize learning
- Are self-paced
- Do not embarrass students who make mistakes
- Make it possible to experiment with different options
- Give immediate feedback
- Are more objective than teachers
- Free teachers for more meaningful contact with students
- Are impartial to race or ethnicity
- Are great motivators
- Give a sense of control over learning
- Are excellent for drill and practice
- Call for using sight, hearing, and touch
- Teach in small increments
- Help students improve their spelling
- Build proficiency in computer use, which will be valuable later in life

- Eliminate the drudgery of doing certain learning activities by hand (e.g., drawing graphs)

- Work rapidly--closer to the rate of human thought.

(Bialo and Sivin 1990; Braun 1990; Lawton and Gerschner 1982; Mokros and Tinker 1987; Robertson, et al. 1987; Rupe 1986; Schmidt, et al. 1985-86; Wepner 1990.)

Many of these items point to students' appreciation of the immediate, objective, and positive feedback provided by computer learning activities by comparison with teacher-directed activities. As Robertson, et al. (1987) point out: "This reduction in negative reinforcement allows the student to learn through trial and error at his or her own pace. Therefore, positive attitudes can be protected and enhanced".

1.11 SANSKRIT POETRY

Sanskrit is the oldest language of the world. Since Sanskrit literature has come down to us through oral tradition called the Shruti Parampara, the maximum numbers of works are in poetry only. Starting from the Rig-Veda, the earliest document in world literature, there is a continuous flow of Sanskrit works in poetry. The three Vedas – Rig, Sama and the Atharva are composed in verses. The Upanishads are all written in poetry form. Our great epics Ramayana in 24000 couplets and Mahabharata in 1,00,000 couplets are in verses only. All the eighteen Puranas, Vishnu, Bhagwatam, Narad, Garud, Padma, Varah, Brahma, Brahmanda, Brahma Vaivarta, Markandeya, Bhavishya and Vaman, Shiva, Linga, Skanda, Agni, Matsya and Kurma are composed in verses.

The puranas are followed by the great Mahakavyas. Buddacharitam and Saundera nanda are earliest in this line written by Ashvaghasha. Kalidasa's Raghuvansham and Kumarsambhavam are the great works of world fame. Bharavi's (6^{th} cent. A.D.) Kiratarjuniyam in eighteen cantos is famous for its depth of expression. Bhatti's Ravanavadham (6^{th} cent.

A.D.) In 22 cantos excels in the use of grammar rules. Kumardasa's Janaki Haranam in 20 cantos is based on Ramayana.

Magha's Shishupal-vadham has influenced all the later poets by his excellent usage of words. He flourished in 7th century A.D. Shriharsha's Naishadhiyacharitam is based on a story from Mahabharata. It is said that the glow of stars like Bhairavi and Magha faded down on the rise of the sun like Naishadha Kavya.There is a long series of other Kavyas like Ratnakar's Harivijaya, Kshemendra's Dashavataracharitam, Shrikanthacharitam by Mankha and many others.The historical works also are available in verses. The famous ones are Vikramankadevacharitam by Bilhan, Rajatarangini by Kalhan, Kumarpalacharitam by Hemchandra and many others. A huge amount of literature exists in the form of Khanda Kavyas, Giti Kavyas, Muktakas and stotra – kavyas. The famous ones are Ritusamhar and Meghadootam by world famous poet Kalidasa, Geeta Govinda by Jaideva, Bilhana's Chaur-panchashika, Bhartrihari's Shatakatrayam, Amaru-shatakam, and stotras by Adi Shankaracharya and Pushpadanta.Even in ancient times there was a long tradition of story telling. There are voluminous works in the form of collection of stories written in verses. In Panchatantra and Hitopadesha, the morals of the stories have been written in verses.

The most popular works are Brihat Katha Manjari by Kshemendra containing 7500 verses, Kathasaritasagara by Somadeva written in 24000 couplets, Vaitala-pancha-vimshtika available in both the forms i.e. poetry and prose.

A third form of literature came into existence known as champu kavyas written in mixed style of prose and poetry. Some of the works are Yashastilakchampu, Bharata champu etc. More than 500 champu kavyas are available till date. The greatest speciality of Sanskrit Literature is that topics like law, medicine, astronomy, grammar, poetics, politics,

mathematics, philosophy etc have also been written in verses only. Some of the renowned works are the various Smrities (law), Charaka-samhita, Sushruta Samhita (medicines), Aryabhatiyam (astronomy), Arthashastra (political economy), Sahitya-darpanam, Rasagangadhara, Dhvanyaloka (poetics) and Natyashastra (dramaturgy) etc.

The flow of Sanskrit poetry continues till date. Some of the famous poets of the 21st century are Srinivas Ratha, Ramakant Shukla, Satyavrata Shastri, Bhaskaracharya Tripathi, Shrikrishna Semwal, Om Prakash Thakur, Ganesh Dutt Sharma and many others. Annual Kavi Sammalens are organized by Rashtriya Sanskrit Sansthan and the various other Sanskrit Academies of India.

Poetry is a piece of creative writing in verse. In the word of Coleridge **"Poetry is the best words in their best order." Poetry is always read for aesthetic pleasure.**

1.12 OBJECTIVES OF TEACHING SANSKRIT POETRY

- To enable the students to comprehend Sanskrit literature.
- To enable the students to read Sanskrit poetry.
- To enable students to recite Sanskrit verses with proper stops and correct pronunciation.
- To enable students to speak Sanskrit with ease and grammatical exactness.
- To enable students to appreciate Sanskrit language and literature.
- To enable students to translate Sanskrit passages and verses in their mother tongue or English.
- To enable the students to increase their vocabulary.

- To enable the students to acquire primary knowledge of vowels, consonants in Sanskrit.
- To enable the students to identify a relation of Sanskrit grammar with that of the mother tongue.
- Exposure to and familiarization with poetic terminology and devices.
- Development of the skills necessary to engage with a poem's components and thus come to an initial and then refined understanding of the meaning of that poem.
- Drafting and revision of the original works of poetry, followed by appropriate written reflection on the creative process, and culminating in a student poetry reading.
- A formal analytical essay comparing and contrasting the use of figurative language as a medium to establish tone and meaning in at least two poems.
- Independent, careful reading and reflection on a broad selection of poems.
- Participation in informed discussions of a select group of poems representing a variety of periods, themes, and techniques.
- Creation of their writing to show each student's understanding of the reading, understanding, writing, and revision process behind poetry and its meaning.

Dr.Paliwal (1998) has enumerated the objectives of teaching poetry at the secondary level.

- To enable the students to understand and drive pleasure from the given poetry.
- To enable the students to appreciate the beauty of the language and the thought in the poem.
- To Enable the students to recite the poem with proper beats,strees,accent,intonation and rhythm.
- To enable them to kindle their imagination and develop their aesthetic sense.

1.13 RATIONALE OF THE STUDY

It has been observed that these days largely the poetry is taught through recitation & grammar translation method & explanation. At times the objectives of teaching poetry are not properly realized because the approach becomes too mechanistic. Teaching learning of poetry needs to be strengthened through innovative approaches. Computer as a medium because of its suitable attributes can help in realizing the objectives of poetry instruction, such as, vocabulary, recitation, pronunciation, modulation, intonation, explanation. Though Std. IX Students are at formal operational level but learning through poetry becomes too abstract in the absence of sound effects, visuals, animation and colors.

The climax of the plight of a poetry in the form of composition establishing relationship amongst very remote elements, though, highly creative, but at times goes beyond the levels of comprehension of readers/listeners in the absence of context and conditions. Technology can perhaps help bridge the gap between abstractions and their origin. The corresponding view compositions generated through technology may facilitate decoding the feelings embedded into the language of communication.

Sanskrit, being a highly condensed language, very often goes beyond the Psyche. That is why very limited persons highly resourceful, deeply rooted into the culture, have been Sanskrit language friendly. Can technology facilitate decode and disclose Sanskrit? With the advancement in the area of technology in the forms of latest software, such as, FLASH, DIRECTOR, Dream Weaver, Corel Draw, MAYA, Front Page the reality may be simulated. So, the methods of Sanskrit Teaching –Learning need to be enhanced.

The present study is an attempt to develop a CAI package using advanced software, namely, FLASH MMX, COREL DRAW, and DIRECTOR for Sanskrit Instruction to the Std. IX Students.

1.14 STATEMENT OF THE PROBLEM

Development and Effectiveness of CAI in Sanskrit for Std. IX Students

1.15 OBJECTIVES OF THE STUDY

1. To develop Computer Assisted Instruction (CAI) on Sanskrit Poetry for Standard IX Students.

2. To study the effectiveness of the CAI in terms of achievement of Std. IX Students on Sanskrit poetry.

3. To study the reactions of the Standard IX Students on the CAI developed by the investigator.

1.16 OPERATIONALIZATION OF TERMS

CAI IN SANSKRIT: CAI in Sanskrit in the present study refers to the Computer Assisted Instructional Package developed by researcher using various software to teach Sanskrit Poetry to Std. IX students.

ACHIEVEMENT: Here, achievement means the marks obtained by the students of standard IX on the pre- test and post-test of Sanskrit constructed by the investigator on the selected poems of Sanskrit from Std. IX.

EFFECTIVENESS OF CAI: Here, effectiveness of CAI has been studied in terms of the significance of difference of mean achievement gain scores of the students obtained on the pre-test and post-test, and their reactions on the developed CAI.

1.17 HYPOTHESES

1) There will be no significance difference in the mean gain scores of experimental and control group of the students on written pre-test and post-test.

2) There will be no significance difference in the mean scores of experimental group and control group of the students on oral post-test.

3) There will be no significant difference in the observed frequencies and frequencies expected against equal probability against various statements of the reaction scale

1.18 DELIMITATION OF THE STUDY

The present study is delimited to Sanskrit Poetry Section of Std. IX of GSHEB.