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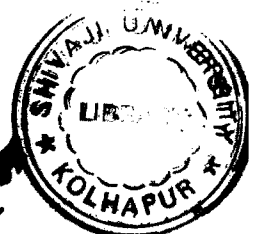
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CHAPTER - I

SECTION - A

INTRODUCTION

We are going towards the twenty first century. The people of the advanced countries like America, Japan and Russia are using computer in every aspect of life. These advanced countries find significance of computer in every field of life e.g. Education, Banking, Medical, Technology etc. The development of nation is measured in terms of development of advanced technology in that ration and development of advanced technology is highly related to development of Computer Science of that nation.

India is a developing country. In various fields, use of computer is started and in short time there is lot of increase in usability of computer in various fields.

The N.C.E.R.T. (National Council of Educational Research and Training) emphasises use of computer in various fields of life. N.C.E.R.T. included 'Computer Science' at various levels. Not only in Colleges of Education or Engineering but also in school syllabus also computer is included.

Computers are increasingly used in Education due to the fact that it can provide a large data bank information. The Computer can be used to help in the actual teaching learning process of all the subjects. It is useful not only for the subjects of higher level but also it can be useful for teaching school subjects. It is also useful in teachers' Education.

Computer can make learning fun and also unlike teachers, they have infinite patience and always give immediate replies.

A large number of researches are being attempted at various school levels to see the effect of use of computers to teach school subjects.

In schools various methods are adopted for teaching Algebra. Inductive, deductive, inductive-deductive, narration, explanation, programmed learning, auto instruction, Ausubel's, Burner's strategies etc.

Here, in this study an attempt is made to teach Algebra through computer. **There are three methods used for computer based Education.**

1) Computer assisted instruction (CAI)

2) Computer assisted learing (CAL)

3) Computer managed learning (CML)

The computer is one of the most powerful tools ever designed by man to solve problems that involved computing and processing of data. Computer can manipulate and transfer all kinds of data at a tremendously fast speed without a flaw.

SECTION - B

USE OF COMPUTERS IN VARIOUS FIELDS

Though computer was originally conceived as high speed calculator, more than eighty per cent of the works done by computers today

is non mathematical in nature. The essentiality of computers has led to its application in almost every field now. Computer has become a very common in day-to-day life of almost every body.

For example, a hand held unit of a television set with remote control is nothing but micropocessor. In case of electronic typewriters which are fast replacing traditional typewriters the microprocessor does an important work of moving the text from one place to another as well as carrying out corrections wherever necessary.

Now-a-days, computers are used for reservation of plane seats and also for reservation of railway seats in big cities. They are installed in banks for improving the services to the customers. also they are used in several industries and business houses for pay roll, accounting, inventory auditing, costing materials management and production planning materials management and production planning.

Computers are also being used increasingly in field of engineering, medical science, education, space research programmes, weather forecasting and education research. The computer is used in various fields of life.

The number of applications to which computers, are being put are so innumerable and so rapidly increasing that it is even difficult to classify them. The wide applicability of computers in various fields is due to the following characteristics, they are extremely fast, accurate, store large amount of information to which they have rapid access and are capable of doing extremely complex sequences of operation automatically. Computers are accepted as a useful tool in research and business. The various fields of application of computers are :

I) ENGINEERING APPLICATIONS :

Civil Engineering :

Structural analysis and design, bridge and road design, plant lay out and architecture by interactive graphics.

Chemical Engineering :

Plant simulation studies, chemical processing calculations.

Mechanical Engineering :

Computer aided design of mechanical elements tensile and fatigue testing.

Electronic Engineering :

Modeling, analysis design, lay out, production and testing of integrated circuits, microwave, calculations, electrical and transformer design.

Communications Engineering :

Computer controlled switching system to switch, record and analyse messages on the basis of priority and security classifications, temporary data aquisition, automatic timing control of audio and video broadcasting for synchronisation.

Industrial Engineering :

Linear programming, critical path analysis for scheduing of projects with interdependent activities, mathematical modeling, statisical analysis
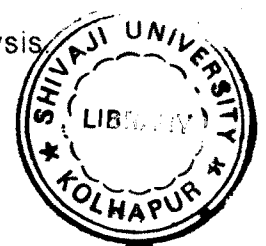
II) INDUSTRIAL APPLICATIONS :

Integrated manufacturing, Process control and materials handling are major application areas.

Computer aided manufacturing :

Manufacturing operations are real time operations and hence require a delicated computer. Some examples are numerical control of machine tools and computerised pattern making and cloth cutting.

Process Control :

Continuous manufacturing process like chemical production require the maintainance of number of parameters (Pressure, temperature and rate of flow) these parameters in truth depend on dozen of other factors. The decisions that must be made to maintain them can be stated explicitly. Computers are used for continuous and comparison of the process parameters and to make necessary changes in control.

III) COMMERCIAL APPLICATIONS :

The characteristic of this type of application is large volume of data. Banking payroll and inventory are typical examples.

Banking :

Computers read, analyse and tabulate monetary transactions and computation must be performed many times daily to have timely record of status of each account.

Payroll :

It consists of processing files, records of which contain the details of an employee. A payslip must be prepared for each employee and his record updated.

Inventory :

In inventory accounting, a record is usually kept for each item in store, showing the number of units on hand and the price associated. When there is a receipt or issue an updating of the item record is necessary. Data on current stock, cost of storage, customers order and seasonal variation in the cost of material can be processed quickly by the computer to provide information on the purchase of raw material.

IV) CONSUMER APPLICATIONS :

Super market check-out systems, air line and railway reservation systems, new printing and typesetting, medical diagnosis systems, entertainment applications are a few examples.

V) MILITARY APPLICATIONS :

The computer runs a real time network. The network may consist of early warning, radar and defensiser missile control. It is also used for training officers by simulation of war.

Thus we see that the computers are relieving the human being from physical labour. Instead of sitting at a lathe for 6 hours together to run out a shaft, the man can now be called upon to programme a numerical control machine which can complete the job in an hour. Their results in increased productivity and the dull repetitive labour decreases i.e. we are called upon to do more creative work, less routine physical labour.

SECTION - C

USE OF COMPUTERS IN EDUCATION

Necessity of Computers in School Education :

Computers are necessary to any educational system since :

(1) . They can help to improve the learning process.

(2)   Future citizens of the country namely todays children should be aware of the nature and uses of computers so that they can cope with the present and future technological society.

(3)   They can help with certain administrative charges such as maintaince of students records and scheduling of classes.

Computers contribute to educational programmes :

(1)   as aids to learning and instruction in the class rooms

(2)   As versatile tools in research on human cognition.

Computers are superior to other teaching aids with respect to following points.

(1)   With the use of simulation technique it is possible to visualise difficult concept in a better way.

(2)   With microcomputers, it is also possible to teach some concepts in curriculum by constantly drawing the attention of the learners to interesting visual experiences.

(3)   Even slow learners are allowed sufficient time to design their strategy.

(4) A microcomputer data base programme will lead to a variety of activities in class room.

(5) A data base programme is superior in developing the skills in collection and structuring of information in comparison to conventional class room practices.

The role of teacher in handling microcomputers :

(1) If we divide the levels of computer knowledge into awareness, literacy, application and innovation, in the order of importance then the teacher should strive for application level in order to use computer successfully.

(2) The computers' pervasiveness is not guaranted by its mere presence.

(3) A teacher must have some skill in the fourth 'R' namely computeR in addition to the basic skills in the three 'R's (Reading, WRiting and ARithmetic)

(4) Computers can be used in the learning process under the following modes.

    (a) Tutorial mode.

    (b) Simulation mode.

    (c) Computational mode.

    (d) Word Processor.

    (e) Graphics Processor.

A computer is a teaching aid in the hands of a practicing teacher and the learning in a class room takes place with the help of a computer. There are scientific evidences to show that the use fo computers in

classroom enhances the learning process in the children. Educators should use the computers to provide alternative ways of representing knowledge. In particular, when used to present certain kinds of material graphically rather than textually, the computer can help a majority of learners comprehend some aspect of that material faster and more accurately. Computer enhances the educational productivity of teaching students to be creative to think critically, to make valid decisions and to explain and present their ideas.

Teacher is a right person to decide as to how and when computers are to be used for instructional purposes. Computers have been successfully used as aids in teaching high school students and pre-service teacher trainees. It has been found that learning outcomes of these students is measurable and significant. Practising teachers can use these extra ordinary machines as teaching aids during instructional work for the benefit of students.

Generic packages are well suited for use in class room teaching and learning in the curriculum. Many computer specialists advocate the use of content free packages in computer awareness and literacy programmes. This is because such packages can be used with very little effort and the user can solve their problems instantly without the need for an intermediary.

COMPUTER AND HOME EDUCATION

In many ways the computer helps as an instrument of education.

(1)   It allows access to incredible amount of information, news papers data bases, the major libraries of the world, museums and other professional information.

(2) Vide recording can be used for broadcasting educational programmes through local cable network. Such recording can be stored in homes, schools or libraries.

The computer contutes an important educational tool due to following features :

(a) The computers are interactive unlike books.

(b) Computers have infinite patience. A computer does not care how slowly the user responds or how often a user makes mistakes.

(c) Computers can provide privacy.

(d) Computers can be used in variety of social situations.

(e) A computer can explain concepts in a more interesting and understandable manner by means of animated material.

(f) A computer programme can be full of surprises, uncertainty and mystery.

(g) The ability to stimulate complex situation such as chemical reactions, ecosystems, demographic or economic changes is a particularly powerful reason for using computers in Education.

COMPUTER BASED TRAINERS ASPIRATIONS AND EXPECTATIONS :

Computer based training and micro electronics are not synonyms although they are often confused by many people. There are already a number of computer and micro-electronics appreciation courses which deal with the way in which computers work, how they process information, how they are programmed and their impact on society. These are primarily concerned with teaching about, rather than teaching with the aid of computer, and are not designed to help teachers and trainers to make informed decisions about whether when and how, to use CBL in the

classroom. There is, ofcourse a need for courses at both levels. At the first level there is a general need which could be described as a computer literacy. At the second level there is a need for a course which can build on this basic level of computing to provide teachers and trainers with an appreciation of CBL and CBT and to introduce them to the basic skills needed to use the medium effectively.

The guide for trainers and managers on Computer Based training produced for man power services commission by Mills and Allen identifies five commonly occuring terms.

CAI : Computer Assisted Instruction.

CAL : Computer Assisted Learning.

CAT : Computer Assisted Training.

CBT : Computer Based Training.

CML : Computer Managed Learning.

Computer Assisted Instruction (CAI) :

CAI is the use of computers on a time-shared basis to perform any instructional function presenting material or problem situations guiding a student's thinking by answering his questions, assessing his performance, managing his path through a course by selecting the material to be prescribed or by assigning tasks to be performed away from the computer or any combination of these "CAI" is the use of time sharing computers in instruction".

In the machine directed applications the various alternatives and paths through an instructional unit are programmed in to the machine, for this it requires a pre-determined model of the educational needs of the student. Similarly it requires methods of testing the knowledge

and maintaining the past performances. These machine directed activities include drill and practice, programmed learning, machine student dialogues, adaptive testing, counselling, guidance and various instructional management functions.

The effectiveness of the above activities is strongly dependent upon a knowledge of the learning process.

In the addition to the above, there are applications which the machine is user-responsive. Here the sequence of instructional materials is altered on the basis of student requests. It includes learning by experimentation and discovery simulation and gaming.

Computer Assisted Learning

A computer assisted learning approach, which provides for student self - evaluation under tutorial conditions. The tutorial provides immediate feed back. It posts a student's total score following each tutorial exercise. Students are allowed a second try after an incorrect response.

One objective of this tutorial is to establish a mechanism through which students will be able to supplement class and text material interactively and reinforce cognitive skills.

Thus the CAL has been designed to help students to extend their interaction with the course concepts and develop superior learning habits.

CAL provides a medium to which the instructor can direct a student for exercise on course concepts.

CAL can reinforce and expand learning and help students to

Modes of CAL

There are a number of modes of CAL which in practice overlap somewhat and are often used in combination.

Old Mode Calculation

In the early days computers, before their full potential for general information processing was realized, they were regarded principally as calculating engines. It was therefore, natural to use them as sophisticated calculators to relieve some of the numerical labour involved in learning, in the numerical science and in statistics.

If the calciuation is always carried out by the computer then the students will lose out on valuable practice in circumstances where he or she is motivated by seeing it as a part of a larger process learning to bring about the desired result. However, once he or she has had adequate practice, further repetition is tedious and demotivating and could sensibly be undertaken by the computer.

New Modes

(1)   Drill and practice

The simplest form of CAL uses the computer to present the learner with a series of exercises which he or she must complete by giving some response as answer. The computer processes that response to determine whether or not it is 'correct.'

Computer - assisted learning offers a means of providing endless drill and practice without repetition, at a pace that can be controlled

by the learner. It is possible to arrange that the nature of exercise 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 conversely, if the learner makes too many mistakes, they can be made easier. Systematically mistakes can be detected and the computer can adapt the pattern of exercises to rectify this weakness. This ability to tailor a drill and pracitce session to the progress of each learner, combined with helpful feed back can lead to more effective learning.

(2) Tutorial

The lay image of CAL is of serial ranks of students, each seated in front of a computer key board and screen, all learning in their own way 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 feed back is elicited through a process of question answer.

In its simplest form, this tutorial dialogue bears a close resemblance to the programmed learning sequences found in print and on teaching machines in 1960.

As in the drill and practice mode discussed earlier, the computer can be used not only to present the learning information but also to determine the student's needs and preferences, and to decide how to branch through the structural materials. Thus, the material can be made more compulex without adding to the student's burden.

In order to construct the CAL tutorial, the teachers must set out the dialogue that they themselves might have with learners under various conditions and decide upon the criteria which determine how they would adapt the pace and directions of their students learning. This mode can be an effective way of learning.

We present the following points which will not favour such types of computer programmes in Education.

(1)   The learner gets tired of looking at the moniter screen when long passages are presented.

(2)   It is quite possible that, instead of trying to answer the question posed by the micro, the student might try to get the right answer from stored data.

(3)   In the tutorial mode, the computer is in 'didactic' mode of teaching and learning this imposes an unnecessary restriction on the learners freedom to choose the learning style.

(4)   Though the material in a tutorial software is presented in pupil in a systematic way attention is paid to the efficiency of the instruction rather that the quality of learning.

(5)   In a tutorial software, the dialogue is restricted to its ability to match the learners alternative responses against those which had been anticipated by the programme designer.

(6)   The computer can recognise only pupil responses regarding to a small part of the subject currently under discussion.

(7) A human tutor will do the same job with a 'personal touch' as compared to the micro, which ignores the personal aspects.

(8) Computers can do much more than what it is doing in a page turning tutorial programme.

(9) The tutorial programme is fundamentally limited in its use. It does not aim to make more than a marginal contribution to Education.

The intelligent tutorial programmes provide control over both strategy and manipulation of content and are an improvement over the conventional tutorials because they can suppport students defined goals and requests for help with much greater flexibility.

The first use of micro computers in Education followed the programmed instruction of skinner (1958). The computer is programmed to be a patient tutorial such that tutor lessons and drill practice are given to the students. The teaching material is usually arranged on a set of elements which require a response from the learner. If the response is matched with the stored one then the computer selects the next material to be presented to the student. On the other hand, if the response is not matched the question is repeated.

For example - on the moniter screen is presented a chemical symbol of an element and the learner is asked to identify the same. If his input is wrong then the computer responds by flashing a message. On the second attempt, if the response happens to be incorrect, then the computer explains as to what went wrong with the pupils identification, the computer then presents the symbol

of another element randomly selected from the stored list and waits for the pupils response. This activity will be repeated for a few more elements.

(3)   Simulation

Both the tutorial and drill and practice modes of CAL operate by providing information in a structured way according to rules specified by author tutor. Another fact of learning involves the student studying real life systems or phenomena. Sometimes this is quite feasible, but there are some learning experiences which are too time consuming, too expensive, or too dangerous. Among them many examples could be includes, viz. the study of genetic through Mendel's breeding experiments etc. Many simulations are already used in Education and training. The simulation may be supported by a laboratory system, which must be constructed before hand and may require expensive equipment, or it may be based on printed materials, rather like a board game with a rule book and a referee. In the case, the effective management of simulation, the interpretation of the rules and necessary calculations, may be difficult in the time available.

The advantage of a CAI simulation over the use of other eqipment and media is in the flexibilty and control which the computer can bring.

The main difficulty with all simulations, whether they use a computer or not is in their credibility and in the transfer of learning to real life.

Thus, although, the simulation can be useful as a simplified learning

experience, it should not be regarded as a total surrogate for experience of the real life system or phenomena. Part of the credibility problem with computer - based simulations lies with the interface between the student and the computer. The student must control the simulation by entering data on a key board or through other devices such as touch screens light pens, joy sticks, or roller balls, except in a few cases, these are very different from the means that he would use to control the real life system, and can form an artificial barrier to learning.

(4)   Modelling

This mode of CAI is similar to the simulation mode in which both help the student to learn by working with an analogue of a real life system of phenomena, expressed as a set of rules within the computer. However whereas in a simulation, the analogue is specified by the tutor, in modelling it 's 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 behaviour of the real life system in new circumstances.

As with simulations, the techniques of learning by modelling is not unique to CAL ; it is possible to devise systems of rules or equations which describe the behaviour of the systems 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.

(5) Browsing

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

Methods Of Computer Assisted Learning

Distinction can also be made between different methods of using CAL materials in teaching and learning, all of which are familliar in order contents with other media.

(1)   Computer assisted teaching

The CAL Package can be used as a class demonstration, under the control of the teacher, either as the main focus of the lesson or to illustrate various prints that may arise. This is similar to the laboratory demonstration or the use of a video tape with the whole class. This method works best with simulation and modelling; the more individualized modes of drill and practice, tutorial and browsing.

Logistically, the method requires only one computer equipped with several large displays so that the whole class can see the screens clearly. The computer may be operated by the teacher or by a chosen student.

(2) Individual Learning

What may be last when a student participates in a CAL programme is the social aspect of learning, the opportunity for students to learn by face-to-face discussions with each other and with their tutor. It has often been criticized as an impersonal and dehumanized method of learning.

(3) Small group learning

The use of CAL with small groups offers many of the advantages of the classroom teaching and individualized methods while avoiding their disadvantages. A group of two or three students work with a CAL package discussing the course of their joint learning, their inputs to the package, and the resulting output.

SECTION - D

Computer in Mathematics

In the new syllabus of IX & X standard following objectives regarding computer education are kept.

(1) To help the students, to appreciate the role of mathematics in scientific and technological development.

(2) To equip those students, who may opt mathematics as a subject for their further studies, with new mathematical tools and techniques which shall help them in understanding and appreciating the advanced techniques.

Regarding above objectives following topics are included in IX

and X standard's mathematics.

Standard IX Paper II unit II computing.

(1)   Popular introduction of the computers, what they are, what they can perform and what they cannot perform, role and use of computers in modern society.

(2)   Meaning of problem. Algorithm, a detailed and precise step by step method of solution of a problem (like buying an artical etc.) simple flow charting easy experiences.

Standard X Paper II Unit 3 Computing.

Flow charts involving decision boxes and loops, algorithms for mathematical problems, already studied from topics such as profit and loss, ratio and proportion, simple and compound interest, discount etc. Easy Exercises.

SECTION E

About the Research

Statement of the Problem

THE USE TEXT-BASED SOFTWARE IN TEACHING LEARNING OF ALGEBRA FOR EIGHT STANDARD ADOLESCENTS - A STUDY

This study intends to investigate the results of the introduction of computer and its use with a text based software in the teaching and learning of Algebra to eighth standard adolescents of Kolhapur city.

DEFINITIONS OF TERMS

SOFTWARE :

A set of programme that can run in a computer is called software. The programme is a set of logically sequencial instructions to the computer.

TEXT BASED SOFTWARE :

Software prepared on instructional material based on the eighth and ninth chapters of text book of Algebra of VIII standard.

TEACH :

Teach means to organise experiences together, which help students in getting experience.

Eighth Standard

Adolescents of Age group 12+

SIGNIFICANCE OF THE PROBLEM

(1) As far as the knowledge of the investigator goes no study of this kind especially on teaching of VIII standard Algebra by using computer has being done earlier.

(2) As VIII standard Algebra forms the basis for ninth and Tenth standard Algebra, it is necessary to teach it effectively at their own speed through the computer. Hence the necessity for this study to see the effectiveness of CAI.

(3) A computer programme will be prepared by investigator for the subject Algebra of Eighth standard.

OBJECTIVES OF THE STUDY

(1)   To analyse the course content of Algebra of VIII standard.

(2)   To prepare text based software for Algebra of VIII standard.

(3)   To study the effectiveness of text based software.

(4)   To determine the sex differences on the ability to learn through computer.

HYPOTHESES

1.   There is no significant difference in the performance in Algebra in the experimental group and control group.

2.   There is no significant sex difference in the ability to learn through computer.

LIMITATIONS

1.   The sample was comprised of only English medium eighth standard students.

2.   Only 60 students were taken at random. In these 30 were taken up for experimentation.

3.   The study was limited to eighth and ninth chapter of eighth standard Mathematics book of Maharashtra Secondary School Board, Pune which pertains to Algebra.

SECTION - F

CHAPTER SCHEME

The present study is presented in five chapters

The chapter I deals with the introduction. Use of computer in various fields of Education teaching mathematics definiting the problem, definition of terms, objectives of study, Hypothesis, Limitations of the study, significance of the study.

Chapter II deals with 'Review of Related Literature.' The review is taken as studies comparing the use of traditional method with the computer method. Studies presenting views and opinions about the computer use, other studies, conclusion and the importance of the present study.

Chapter III deals with plan and procedure of the study. It contains method of procedure, preparation of the text material in programmed learning sequence, preparation of questionaries for the pre and post tests and preparation of the computer programme and execution of the programms.

The chapter IV presents Analysis of data in pursuance of the objectives stated earlier and testing of hypotheses.

The chapter V presents the summary and conclusions. Educational implications and recommendations for further research.