

COMPUTER ASSISTED INSTRUCTION FOR TEACHING AND LEARNING

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INTRODUCTON

A decade ago, access to technology was limited and providing technology was highest education priorities of any nation. But now the situation has changed. According to secretary, Fourth Annual Report on Teacher Quality, Virtually every school with access to computers has internet access (99%), compared to only 35 percent of schools in 1994, according to National Centre for education Statistics (NCES)(Prasad and Jones, 2005). Many different types of technologies can be used to support and enhance learning. Everything from video content and digital movie making to lap top computing and handheld technologies (Marshall, 2002) have been used in classroom and new uses of technology such as podcasting are constantly emerging.

Technologies available in classroom today range from simple tool-based applications (such as word processors) to online repositories of data and primary historical documents, to handheld computers, closed-circuit television channels and two way distance learning classrooms. Even the cell phones that many students now carry with them can be used to learn (Prensky, 2005) .

Use of technology in teaching in 2000 by teachers (according to Technology counts 2001, Education Weekly) at beginning stage-28%, Intermediate stage- 46%, Advanced stage-8% and innovator category is 1%.

Schater (1999) found that students who had an access to any of a number of technologies (such as Computer Assisted Instruction, Integrated Learning Systems, Simulations and software that teaches higher order thinking, collaborative networked technologies, or design and programming technologies) performed better on researches conducted tests, standardized tests and national tests. Every technology has a different role to play in learning. The matter of concern for the researcher is –“what kind of technologies are being used in the classroom and for what purposes?

The verdict for the use of computers in education seems to be in. Earlier exposure to computers may help gain computer literacy that will be crucial for future success in the workplace. Access to computers at school allows students to retrieve information manipulate data and produce results in innovative ways. As stated in National Centre for Education Statistics (NCES), computers have become an essential tool in our society. Computer Assisted Instruction is among the range of strategies being used for teaching and learning. Research indicates that computer technology can help support learning and is especially useful in developing the higher order skills of critical thinking, analysis and scientific inquiry by engaging students in authentic, complex tasks within collaborative learning contexts. (Roschelle, Pea, Hoadlay, Gordin & Means 2000 ; Means, et.al.1993) Students can learn “with” computers- where technology is used as a tool that can be used as a tool that can be applied to a variety of goals in the learning process and can serve as a resource to develop higher order thinking, creativity and research skills(Reeves 1998; Ringstaff and Kelley,2002).When we say to learn “with” computers means that these are being used for developing students abilities for reasoning and problem solving.

The invariably used terms with Computer Assisted Instruction (CAI) are:-

- Computer Aided Learning (CAL)
- Computer Aided Training (CAT)
- Computer Aided Instruction (CAI)
- Computer Assisted Learning (CAL)
- Computer Assisted Training (CAT)
- Computer Based Training (CBT)
- Computer Managed Instruction(CMI)
- Computer Managed Learning (CML)

Computer Assisted Instruction (CAI) means use of computer to provide instruction. It also uses electronic data processing, data communication, audio-visual and media principles, communication theory, systems theory and learning theory.CAI is directly involved in tutorial work. It can provide many instructional uses in the classroom.

Computer Aided Learning (CAL) means computer program or file developed specifically for educational purposes. It is a technique used throughout the world in a variety of contexts, from pre and primary school aged children to train adults in medicine, law and accounting.

(Whalley, 1996). Computer Managed Instruction (CMI) means the use of the computer is basically for record keeping and it does not provide any direct instruction to the learner.

History of computer based instruction

- The use of computers in Education started in 1950s and 1960s in US.
- In the late 1970s and early 1980s, the appearance of the microcomputers revitalized the CAI movement because the computers were now smaller and cheaper because they were beginning to find their way into the everyday lives of average individuals. They became more palatable to schools and districts (Venezky and Osin in 1991; saettler;1990)
- Bitzer was first to realize the importance of graphics and sound in the teaching process.
- TICCI (Time Shared Interactive Computer controlled Information television (Meril,1983,1988) at the Brigham Young University was based on a specific instructional framework that dictated the actual hardware.
- Logo was the first CAL system based on a Specific Learning approach (the experimental, discovery learning approach).

PURPOSES FOR WHICH CAI IS USED

Programs for CAI have come a long way since they were first developed over two decades ago. These programs are

- Tutor and drill students
- Diagnose problems
- Keep records of students progress
- Present material in print and
- Other manifestations.

It is believed that they reflect what good teachers do in the class room.

Many classifications of CAI available in market, six specific types by Spiro and Jehng (1990, pp. 163-205) seem to be most often utilized for educational purposes.

*Drill and Practice instructional programs simply assist the student in remembering and utilizing information that the teacher has already presented, reinforcing previous learning through repetition. It is most important to improving knowledge level.

*Tutorials are designed to introduce unfamiliar subject matter. The format of a computer tutorial often emulates a dialogue between the computer and the student, i.e. information is

presented, questions are asked of the student and on the basis of the response given, a decision is made to move on to new material or review what has already been presented. These first two CAI types are most successful at improving the knowledge and comprehension levels of Bloom's taxonomy.

*Instructional Games present course content in a competitive and entertaining manner, in an effort to maintain a high level of student interest. Though most frequently used to reinforce factual knowledge at the lower levels of the taxonomy, it is quite possible to create instructional games that demand application skills from all levels.

*Simulations require the student to apply acquired knowledge to a novel situation. As a result, the student must analyze a presented scenario, make decisions based on the information given and determine a course of action. The simulated environment must change based on the course of action taken, presenting a significant challenge to the programmer. Successful performance relies on skills up to Bloom's level of analysis.

*Problem-solving software requires the student to use high level cognitive abilities in the process of considering the problem at hand, analyzing the problem situation and its various solutions, predicting respective outcomes, determining which specific plan to attempt, and enacting the appropriate action(s) (Shute, 1993, p125).

Well designed software that fits this classification may require abilities from all levels of the taxonomy. However, perhaps the best way to have a student use abilities of synthesis is to have him/her create a novel hypertext system (Jones, 1990, p. 270). In this case, the student would be forced to identify relationships and evaluate all aspects of the chosen set of course materials. Evaluative ability can be tested (and improved) throughout programs representing any of these five types of CAI by prompting the student at significant times during the session and providing appropriate feedback or explanation.

Discovery-environment; in addition to the delineated types of CAI, it is also possible to provide a discovery environment (Kendall, 1987, p. 192) within which the student is given a high level of freedom in determining the specific information presented during each session, as well as the order of presentation" (Spiro & Jehng, 1990)

CAI as an effective teaching method

If an instructor, who uses structured CAI within a course, continues to hold traditional meeting sessions with students, the class room time can mature into an enriched experience

which benefits students more by allowing more interaction between faculty and peers than in the traditional classrooms (Brooks, 1997).

In traditional classrooms settings, students and faculty often do not interact, rather they sit (as if separated by miles), and write downwards describing a linear presentation of materials. In the computer-assisted teaching model, students could access CAI materials during their course preparatory time, and class time could be reserved for conceptual discussions, peer interactions and mentoring. Rather than spending time making linear presentations of lecture material, instructors could implement creative teaching strategies in the classrooms (Porter, 1997).

Cuoco and Goldenberg (1996) found in a mathematics curriculum that CAI offered the learner the ability to tinker with concepts in order to visualize results. Learners who could manipulate formulae, variables, and models independently using a CAI-based tool gained a better working knowledge of these concepts compared to learners listening to the same concepts presented by lecture.

Bergman and Cheney (1996) found CAI increases learner knowledge when it involves the Mintz (2000) and Campbell (2000), as quoted by Mahmood (2004), compared computerized and traditional instruction in the area of elementary Mathematics and elementary reading. It was found that there was significant difference in critical thinking skills between students who received CAI and students that did not.

A comparative study conducted in 1996 on frog dissection in a traditional lab and by a CAI simulation found users reported higher satisfaction levels using the simulation. While some of the satisfaction was due to the ability to perform a dissection without requiring an actual animal, users also reported satisfaction with the branching ability of the instruction, the ability to make their own choice on navigating the dissection, and the ability to back up and correct mistakes (Kinzie, Larsen, Burch, & Boker, 1996).

Kim and Lee(2000)found that an experimental (CAI) system was effective in improving students, understanding of academic material.

Ebenezer S. O. Collier (2004) described that instruction supplemented by properly designed CAI is more effective than instruction without CAI. Computers can be used for text and test reading, games, tutorial, drill and practice, and simulation of laboratory experiments. Computer-assisted instruction can play an important role in classrooms and laboratory work not as substitute for other activities but as an additional tool.

Benefits of Computer Assisted Instruction

Computer assisted instruction offers teachers and students another avenue to learn required instructional material. Educational computer programmes are available online, at computer stores or through Text book companies. Students as well as teachers can benefit from CAI.

The benefits of CAI for students are:--

- Students are able to work at own pace.
- They receive instant feedback to self assess before moving to next skill.
- CAI helps students in correction.
- Programs of CAI are interactive.
- Group or individual learning is possible through CAI.
- CAI helps to gain computer skills which are useful to students throughout their life.
- Automatic measurement of progress is possible.
- It provides opportunities to work with vastly superior materials and more sophisticated problems.
- Personalized tutoring is possible through CAI.
- It provides differentiated lessons for various levels of learning(including gifted and disabled) .
- CAI provides learning through various senses.

The benefits of Computer Assisted Instruction for teachers are :-

- CAI provides better and comfortable learning for students as they experience less drudgery and repetition.
- CAI provides greater ease in updating instructional materials.
- It helps in more accurate appraisal and documentation of students' progress.
- It provides more time to work directly work with students.
- Teachers are able to track their students' strengths and weaknesses.
- It enhances the lessons and allow teachers to pick different levels of a program or different programs altogether for students who may be behind or students who are advanced.
- Students being involved in learning actively, teacher will have less behavioral problems.
- A teacher can work with small groups of children on a particular skill while other students are working.

- Students work independently minimizing distraction to the teacher.

Precautions to be taken care of while implementing any programme of Computer Assisted instruction:-

1. Ensure That CAI Activities Are Integrated into Your Curriculum.-CAI activities in a course should not be isolated exercises, but should be embedded in lesson plans and integral to the instructor's goals . The instructor should be very explicit about what students are expected to achieve with computer activities
2. Do Not Overuse CAI :-If a strategy currently in use is effective, do not replace it automatically with CAI . Analyze advantages and drawbacks of CAI, and let the results of the analysis dictate the decision.
3. Plan for Uses of CAI Adjusted to Infrastructure and Resources Available:- Inadequate infrastructure and deficient on-site technical or teaching assistance can limit the effectiveness of CAI applications, so plans should be adjusted to existing conditions. The following items should be included in a checklist: (a) facilities (physical space, number of machines, etc.); (b) characteristics of the computers (CPU performance, display size, and resolution, etc.); (c) technical support (essential for setup and troubleshooting); (d) onsite teaching assistants; (f) ethical and copyright issues; (g) connectivity and network. All instructors should be familiar with the CAI resources.
4. Maximize Interactivity .When utilizing the CAI as a tutor, involving the student in the learning process interactively is of utmost importance. Computers are not constrained to the linearity evidenced in textbooks or earlier instructional software. The use of hypertext and hyper linking allows the student to determine his/her own presentation sequence, within limits established by the instructor and/or programmer (Scott D. Lipscomb, 2004).
5. Allow for Different Rates of Progression in Class, but Ensure That All Students Reach the Objectives:- Student-centered learning in class can be implemented with CAI . Once the instructional objectives are explicit and available to students , you should allow variations in individual or team progression in the same class without considering it a disadvantage for students or a threat to your control. In fact, it is quite the opposite: different paces stimulate peer collaboration and classes become easier to manage. Another advantage is the stimulus to the development of the ability to communicate concepts.
6. Define Milestones and Coach Students through Them :-Providing the appropriate guidance becomes critical when CAI is used with complex problems . Students should not be too lost,

nor should they be guided to the extent that they become mentally inactive. Milestones or checkpoints for the achievement of certain goals can both facilitate class progress and allow it to be monitored

7. Ensure Students Understand the Scope and Objectives of Assignments make sure that your students read and understand the CAI tasks, the deadlines, and their role in instruction.

8. Be Sure Students Understand the three – dimensional concepts Presented on the Screen

9. Assess and Evaluate Student Performance When You Use CAI:- Always be aware that assessment drives learning. Students tend to ignore instructional activities that make no contributions to marks . It is therefore of the utmost importance that you assess at least some of the CAI outcomes.

10 Make use of internet

Though there had been a great impact of CAI on education in advanced countries, it has not been of a great use of in India. The reason may be lack of awareness, infrastructure, and training of teachers or others. Infected computers may be hardly used by teachers as far as their classroom instructional work is concerned. Our country is still in the stage of infancy, providing computer literacy in schools and that to not to 100% success. If we want to implement CAI successfully in our schools, a more comprehensive plan is needed to be developed.

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