Innovative Methods
(Computer Assisted Instruction (CAI))

*Dr.S.Rajasekar,
Professor of Education,
Annamalai University
Email: sr@sekars.net
Website: www.sekars.net

Introduction:
Teaching is an art and the success of teaching lies in presentation or in methodology. If you use appropriate methodology, while teaching, then your teaching will become effective and useful to the students. Therefore, methodology plays a vital role in the teaching process.

One cannot say which method is superior to the other as each and every method is very much important and the application of it may vary from situation to situation.

Innovative methods
Innovative methods are nothing but the methods which are situational and creative in nature. The use of this method involves divergent thinking or lateral thinking. It facilitates quick learning, more learning and longer retention. In some occasions, one can make even a traditional method, innovative with the help of additional electronic gadgets, viz., computer, LCD projectors etc. The following are some of the important innovative methods.

- Programmed Instruction (PI)
- Computer assisted Instruction (CAI)
- Personalized System of Instruction (PSI)
- Web based instruction (WBI)
- *Power Point based instruction* and so on.
**Computer Assisted Instruction (CAI)**

“Computer-assisted instruction” (CAI) refers to instruction or remediation presented on a computer. They enhance teacher instruction in several ways. Computer programs 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 problem solve in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, the program shows students how to correctly answer the question.

Computers offer a different type of activity and a change of pace from teacher-led or group instruction. 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 programs are interactive and engage the students’ spirit of competitiveness to increase their scores. Also, computer-assisted instruction moves at the students’ pace and usually does not move ahead until they have mastered the skill. Programs provide differentiated lessons to challenge students who are at risk, average, or gifted.

Computer Assisted Instruction in other words is “giving Instruction with the help of computers”. It can be used to impart formal and non-formal education at all levels and also in all areas. This CAI has been developed from the principles of programmed Instruction. It is one of the types of individualized instruction. In general CAI refers to a system of educational instruction performed almost entirely by computer. It typically incorporates functions such as:
• Assessing student capabilities with a pre-test
• Presenting educational materials in a navigable form
• Providing repetitive drills to improve the student's command of knowledge
• Providing game-based drills to increase learning enjoyment
• Assessing student progress with a post-test
• Routing students through a series of courseware instructional programs.
• Recording student scores and progress for later inspection by a courseware instructor.

Origin of CAI

Computer assisted instruction has started in the 1950s and 1960s, mainly in the USA, after the development of a small commercial computer in the Census Bureau in USA. Pioneers such as Patrick Suppes (Stanford University), Kemeny and Kurtz (BASIC, 1960s (Kemeny and Kurtz, 1968, 1985)) and Bitzer (University of Illinois) were among the first to use a computer as part of the learning process.

The very first attempt in CAI has taken place after a decade around 1961, after the development of PLATO (Programmed Logic for Automatic Teaching Operations) by the University of Illinois at Urbana-Champaign. The PLATO system evolved with the involvement of Control Data who created the first authoring software used to create learning content. The authoring software was called PLATO. The Science Research Council then wrote the first CAI system of Maths for K-6. Wicat Systems then created WISE as their authoring tool using Pascal and developed English and Maths curriculum for K-6. The very
first complete CAI classroom for K-6 students was set up at the Waterford Elementary School in Utah using the Wicat system.

The first public CAI classroom with its own layout and design was implemented with the Wicat System by Baal Systems (later known as Virtual Systems) in Singapore as a joint operation between Wicat and Baal. It is from this design that all the computer learning centres globally evolved.

The second stage of development in CAI has taken place after the development of computerized tutorials in arithmetic and reading for elementary school children by Patrick Suppes of Stanford University in 1966 and in fact he was considered to be the father of CAI.

The early CAI programmes were rudimentary by today's standards, with mainly text-based interfaces. Bitzer was one of the first to realize the importance of graphics and sound in the teaching process. Initially, CAI programs simply tried to teach a particular topic without a basis on any particular educational philosophy. The TICCIT (Time-Shared Interactive Computer Controlled Information Television - (Merrill, 1983; 1988)) at the Brigham Young University was based on a specific instructional framework that dictated the actual hardware. The Logo project (Papert, 1980; 1993) was probably the first CAI system that was based on a specific learning approach (the experimental, discovery learning approach).

**Basic assumptions of CAI**

`The basic assumptions of CAI are as follows:

1. CAI is suitable for all type of teaching and learning activities.

2. As the learners’ performance is going to be recorded automatically in the computer memory, immediate feedback can be provided to the learners by the teachers`
and also the teachers can use the data in making the best teaching strategy for the learner in future.

3. CAI can be provided simultaneously even for 4000 students and thereby it facilitates individualized instruction.

CAI Programmes

Several kinds of CAI programmes are available and the important kinds are as follows.

(i) Simulation
(ii) Instructional games
(iii) Tutorial,
(iv) Drill and Practice,
(v) Problem solving/ Information Retrieval,
(vi) Demonstration and
(vii) Controlled learning

(i) Simulation

The thing which is not possible to bring into a class-room (real or Imaginary) can be represented by Simulations. It is considered to be one of the most powerful applications of Instructional computing. These programmes are designed to depict real-world happenings without the danger, expense or time needed to experience the actual event. They provide continuous feedback to the user regarding the status of the event and the options available. When we consider that learning to read is a process, it only makes good sense to teach reading in meaningful contexts.

Simulations are highly motivating since there is continual input required of the user. Instantaneous feedback guides students as they proceed through the material permitting them to try different approaches besides discovering those that are successful. Simulations
permit learning experiences that are simply beyond the capability of textbooks besides involving the learner in the instructional process and thereby permitting learning to be internalized through continuous practice in life-like situations. Much of the on-screen and written documentation is beyond the reading capability of the poor students. Some simulation programmes depict events in simplistic and unnatural ways. Unless the simulation represents the real-world event, students may develop inappropriate understanding of the event.

(ii) Instructional games

Instructional games are activities that are played with a prescribed set of rules and usually result in a winner at the completion of the activity. Games make the learners practise physiological, mental and social skills that improve their fitness besides fostering cooperation among them. Games should be integrated into the day-to-day curriculum of the school. If they are not tied to curricular goals, they may be played outside the school. Since students love to use their imagination, games can provide an excellent vehicle to impart knowledge in an enjoyable manner.

(iii) Tutorial:

Tutorials give information as a lecturer might give. Also they are interactive in nature. Tutorial programme is designed to present small increments of information followed by questions assessing the learner’s comprehension of the instructional content. It teaches concepts in much the same way a teacher would in a one-on-one situation. Here, the learner interacts with the computer rather than with a text besides proceeding at his own pace. Students who can grasp the content move ahead while those who feel difficulty are directed to learn other things that reinforce the objectives of the instruction. Correlation with the existing curriculum materials, moving
ahead fast enough so as to maintain students’ interest and innumerable branches enabling those who experience difficulty initially to have adequate review lessons would make a tutorial program very effective.

**(iv) Drill and Practice:**

Drill and Practice provide drill and practice in a specific subject. Conversions of one unit to the other, solving mathematical problems and so on are the examples for Drill and Practice. They will not give elaborate explanation, but reinforce learning by giving appropriate opportunities for students to practice desired skills and receive feedback on their performance. It provides practice on skills previously taught. The program is so designed that the student gets drilled until a skill is not only learnt but is brought to a state where the response becomes automatic. When decoding skills are over learnt until they become automatic, the learner can devote a greater portion of his attention to comprehending the written material. Providing repeated drilling of the same material by the teacher may be uninteresting to both the teacher and the taught. However CAI, in drill practice mode, permits students to work at different levels. The same instructional unit can be presented a number of times occurring in a different order. It also provides opportunities for the students to review skills that may have been missed earlier. The systematic design of the material permits the user to proceed, step by step, through a logical instructional sequence.

**(v) Problem solving/ Information Retrieval:**

This programme utilizes the computer as a resource to provide learning. This programme is used to quantify some effects and changes produced under different sets of conditions in science. By using the computer as a data base, Problem solving can also be used
to provide relevant information. In other words, the computer serves as an electronic library, giving the user access to references, scientific data, software information etc.

(vi) Demonstration:

Demonstration is considered to be the very important part in science teaching. There are so many demonstration softwares available through which one can do demonstrations very easily. This software has the facility to change the colour operation, movement sound and so on. In general, computer demonstrations can change each time they are shown, depending on the variables specified by the user.

(vii) Controlled learning:

It has of both drill and practice within it. The teacher may specify the topics in advance and also introduces the fundamental concepts. Then, the students practice fundamental skills of their own. Also the computer provides immediate feedback to the learners individually and simultaneously as they work through the exercises.

Advantages of CAI

Computer assisted Instruction has several advantages and the major advantages are given below.

- Self-Pacing,
- Reteaching and Reinforcing,
- Personalized Feedback of Instruction,
- Multisensory Presentations,
- Simulations,
- Acquiring knowledge through games,
- Motivation and Reward and so on.
Limitations of CAI

Eventhough, CAI has a lot of advantages; it has some limitations, too. They are

- A poor substitute for actual experience,
- Software limitations,
- Restricted Text displays,
- lack of Human qualities,
- Limited sensitivity to needs,
- Hardware limitations and so on.

Role of the teacher in CAI

In CAI, the teacher has to play so many roles like computer engineer, Lesson Writer and a system operator, as CAI, needs the services of the aforesaid experts. No computer can replace a teacher, as teachers’ role is very important in the process of teaching-learning. In CAI the role of the teacher has changed from the traditional method of delivering lectures to a supervisor or a guide. In fact the CAI has definitely increased the scope and quality of contribution of teachers in the society.

Web Based Instruction (WBI)

It is nothing but giving or providing instruction with the help of web or websites. The teacher has to prepare the required e-content which he wants to teach and that has to be hosted on the web with necessary enhancements for better understanding of the content, for which the teacher should possess computer skills and the web designing skills. WBI involves the following important steps.

- Preparation of story board
- Preparation of web layout
- E-content creation
A story board is a layout or a plan contains the entire framework of WBI. It includes the following.

- Arrangement of segmented content
- Necessary animations / transitions
- Additional clues / links / help
- Required audio / video
- E-resources
- Duration of each frame

A web layout will tell us the exact navigation pattern of a web page or website. It has the following patterns.

- Horizontal
- Vertical
- Single page

The next step in WBI is to create e-content. It includes the following.

- Development of content by using the story board
- converting into web pages
- Registering for domain
- Web hosting

**Power point based Instruction**

Power point based instruction is otherwise giving instruction by using appropriate power point slides with necessary enhancements. There are certain shortcuts and significant methodologies available in power point software and are given below.

- use of hyperlinks
- Getting the required slide
- Use of blank slides
- Use of mobile in navigation
- Power point auto run software
One should know that too much of animations in power point slides will distract the attention of the learners and hence the teachers should use them cautiously.

**Conclusion**

There are also other methods available, but to say whether they are innovative or not, it is only in the hands of the teachers and hence do not try to use always innovative methods, but use proper methodology in an innovative manner.

*Lecture delivered in the in-service programme for the members of staff of Faculty of Agriculture organized by Faculty of Agriculture, Annamalai University on 05th October, 2009.*