Learning Objective

- Define CBL, CAL, and CML.
- Explain the advantages and the disadvantages of CBL.
- Evaluate off-the-shelf courseware.
- Describe the factors that might affect the implementation of CBL.

It is important to know . . .

- Most forms of instruction can be ported for use on the computer.
  - Lecture may be shown as a video.
  - Skills may be taught via video or graphics.
  - All forms of testing, including oral tests, can be done by some testing programs.
  - The one form that would be difficult to offer on a computer is role playing, but a form of it as in a game may be substituted.
CBL -- Computer Based Learning

- Computer-based learning (CBL).
  - The broad term that covers any form of learning that is delivered or managed by a computer.
- Another term you may see that often means the same thing is e-learning.

Why learn about CBL?

- Increased availability to computers and improved software authoring systems make CTL accessible to more training and educational programs.
- More CBL educational programs are developed that offer unique learning opportunities for discovery learning and practical use of knowledge and skills.
- An excellent tool for trainers and educators to offer distance learning programs and to individualize learning.

Some CBL terms

- Hardware -- the actual equipment, such as the computer, the disk drive, and the monitor.
- Software -- the computer program that controls and instructs the hardware.
- Courseware -- the disk, booklets, and other materials that are the physical aspects of the training program itself.
- CBT, Computer-based training -- an alternative term for CBL.
CBL can be divided into two major categories

- Computer-Assisted Learning
  - CAT -- Computer-Assisted Training (or Teaching)
  - CAI -- Computer-Assisted Instruction

- Computer-Managed Learning
  - CMT -- Computer-Managed Training (or Teaching)
  - CMI -- Computer-Managed Instruction

CAL

- Computer-assisted learning (CAL) occurs when a trainee or student accepts learning inputs from a computer.
  - Data reduction -- computer is used to perform tedious and/or repetitive calculations, thus expediting other learning activities.
  - Drill (or practice) -- question, answer, check answer, diagnose difficulties (if any), and prescribe the next question in view of the diagnosis. Spelling, math, and typing programs are usually of this type.
  - Tutorial -- similar to a drill, except that provision is made to give learners additional information when they show they can answer certain questions.
  - Simulation -- always based on a model of some process, equipment, or procedure. They can clarify, simplify, speed up, or make safe learner experience with a close approximation of the real task. Pilot training simulators and business games are common simulations.
  - Problem solving -- Learners are required to develop strategies to solve a presented problem and receive scores based on the effectiveness of their strategy.
  - Inquiry -- receive learner requests and produce "intelligent" answers. Problem-solving skills plus the skill of diagnosing what information to seek when is learned.
The ability of the computer to manage each learner’s learning activities in a way that optimizes learning.

- **Testing** — A computer selects questions from a battery, administers a set of questions (a test), scores the questions, gives feedback to learners, and records each learner's results. This process is often integrated with the learning program and becomes part of the total learning experience.

- **Diagnosing** — Based on the results of a pretest, the computer can diagnose which units of the program particular learners can bypass because they already know the content of those units.

- **Reporting** — Through pre- and posttesting procedures, the computer can maintain a detailed record of each learner's learning activity. Records can include dates, time spent, pretest scores, units attempted, and posttest scores. Data on individual learners can be made available to the learners and/or the instructor, and summary data (class averages, etc.) can be produced.

**Linking CBL and CML**

- Most CBL programs use a combination of CAL strategies and may also include some CML facilities.

- Any course that limits itself entirely to one strategy is unlikely to produce the most efficient learning.
The Effectiveness of CBL
Advantages For Learning

- Learning is individualized (self-paced, at variable entry levels, and provides variable learning routes).
- CBL provides regular feedback on learning performance.
- Individualism and feedback tend to produce satisfaction with learning, which probably produces motivation for further learning.
- The interactive nature usually ensures active learning.
- All learners can continue to learn until all (with few exceptions) achieve competence.
- CBL allows a variety of teaching/learning strategies, some of which may be to manage in a group learning situation.

The Effectiveness of CBL
Advantages To the Learner

- Usually, reduced time is spent learning the material and spent traveling to a learning center.
- Reduced dislocations occur to home life.
- Learning is self-paced, so the trainee has some control over the degree of boredom or stress experienced.
- Entry levels and course content are diagnosed to suit individual learners.
- Learners may derive increased satisfaction and motivation from learning.

The Effectiveness of CBL
Advantages To the Instructor

- CBL provides more detailed and more accurate records of learning.
- CBL ensures increased control over what each learns and how they learn it.
- Instructors are less involved in presentations, so they have more time for course development work and for individual attention to learners. The instructor’s role changes from instructor to guide and helper — a facilitator.
The Effectiveness of CBL

Advantages To the Organization

- Average training time and travel time and costs decrease.
- On-the-job performance improves.
- Learning content is standardized, and there is decreased variability in learner scores.
- Learning can occur when needed. One person does not have to wait for other learners to justify running a course.
- Facilitates “just-in-time” learning.
- Learning is available to geographically scattered learners. It does not have to occur in a centralized center.

Disadvantages of CBL

For Learning

- CBL cannot utilize all teaching/learning strategies. CBL is unsuitable for some instructional applications.
- The cost of developing CBL courseware reduces the regular modification and improvement of material.
- If the actual operation of the hardware or the courseware is complex, learners may be so occupied making the system work that they have little spare capacity to devote to learning.

Disadvantages of CBL

To the Learner

- Some hardware/courseware is not user friendly.
- Learners must possess basic computer skills to operate the system.
- Some do not like computers, even to the extent of developing a computer phobia.
- An estimated 30% actively reject the lack of interpersonal contact fostered by CBL.
- Learners with low motivation find it difficult to start and/or continue with a self-paced learning system.
- Where a computer has multiple users or uses, instruction may be continually interrupted or postponed due to low priority.
Disadvantages of CBL
To the Instructor

- It is often difficult to integrate individualized CBL learning with group learning activities.
- Hardware incompatibilities dictate frustrating courseware incompatibilities.
- Courseware design requires complex and demanding skills. Instructors may feel stress when acquiring these skills or make the stress-inducing decision to avoid them and be left behind professionally.
- CBL is seen as a direct threat to the employment security of some instructors.

Disadvantages of CBL
To the Organization

- Hardware is costly to acquire and to update.
- Courseware is expensive to purchase or to develop.
- Some hardware (particularly peripheral equipment) is less than reliable in the hands of novice users.
- Competing uses for scarce hardware capacity often result in CBL receiving a low priority and restricted time allocations.
- In large, decentralized organizations, hardware incompatibility problems may be immense.

Selecting CBL Equipment

- Instructors often have little input into decisions concerning hardware because:
  - The hardware is already there.
  - A "recognized expert" in the organization has final control over all computer purchases.
  - The hardware is primarily purchased for uses other than CBL.
  - Organizational policy on computer compatibility dictates certain purchases.
  - The purchase of hardware is based largely on economic (including "special deal") considerations.
When you do have some control on selecting CBL . . .

- Your order of investigation should be courseware, then hardware.
- Your prime concern should be to acquire equipment that will run the best available (and predictable) courseware.
- Resist the temptation to go for the biggest or the fastest computer simply because it is the biggest or fastest.
- Evaluate courseware first, establish the requirements of the courseware, and then start looking at the hardware that meets the identified requirements.

Selecting Courseware

- Does the course achieve its objectives effectively?
- Do the objectives of the CBL course dovetail well with the learning objectives in your particular course or organization?
- Does the course use its chosen medium/media to best effect?
- Does the course use the most effective teaching/learning strategies for your context?

Authoring Systems

- The popularity of CBL is based largely on the availability of cheap, reasonable capacity computers and on the advent of effective authoring systems.
Prior to the existence of authoring systems

- Three major sets of skills were required to create CBL courseware.
  - First, an expert in the subject matter (who may not have been a trainer) decided on the content of the course.
  - Then an instructional design expert (usually a trainer) decided on the teaching/learning strategies to be adopted, the content that should be in each frame, and the sequence of (connections between) the frames.
  - Finally, a programming expert coded the course into one of the standard computer languages.

With the advent of authoring systems

- The authoring system takes over the role of the programmer
  - It allows an author to create CBL courseware with virtually zero knowledge of programming.
  - The creator of the courseware provides plain English instructions, which the authoring system converts into a program that allows the computer to function.
  - Some authoring systems even provide assistance with aspects of the instructional design.

The desirable characteristics of an authoring system

- Must run on the hardware you have available (assuming you already have hardware).
- The cost should be reasonable.
- It should be flexible, allowing the design of courseware varying from drill through tutorial and simulation to inquiry.
- It should allow the use of other media, such as, calling up video.
- It should support color, graphics, and sound effects.
- It should support diagnostic and evaluative testing.
When choosing an **authoring system** . . .

- Assess your needs for the predictable future, and then rank order the criteria listed in order of their importance in meeting your needs.
- Each available system can then be evaluated in terms of how well it fulfills your particular criteria.
- Finally, be prepared to spend at least half a day playing with each system, especially the larger ones.
  - You can't expect to do a thorough review of a system in less time than that.

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**Implementing CBL**

- Many factors affect whether a CBL implementation will be successful. Some of the more important factors are briefly covered in the next few slides.

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**Equipment Reliability**

- Users will quickly tire of attempting to use a CBL facility if it frequently doesn't work or behaves unpredictably.
- For many users, learning the courseware is difficult enough. Problems with the hardware are likely to be the last straw.
Training

- All staff who will use a CBL system should be trained in its use, rather than left to muddle through.
- Frequently, learners are afraid they cannot master the equipment's requirements, and for some, a computer is considered a direct threat to their job.
- A carefully supervised introduction to a successful first experiences with the system is a high priority requirement.

Documentation

- Poor documentation (e.g., user manuals, operating instructions, assembly instructions) is a never ending problem for computer users, even users with years of experience.
- It is unrealistic to expect new CBL users to be willing or able to put up with confusing or inaccurate documentation.

User Involvement

- Involving learners in needs analysis, objectives setting, and even course design is a time-proven method of increasing learner motivation to learn.
- User involvement in the design and the implementation of CBL has been shown to have the same effects.
- In addition, involvement of those instructors that the CBL course will "replace" frequently converts them from potential negative influences into strong supporters of CBL systems.
Management and Supervisor Commitment

- Senior members of the organization must be supportive of CBL.
- This will ensure that the CBL system receives the high level of resources that it requires.
- Any under-resourced project is much more likely to fail. CBL is particularly prone to this problem.

Evaluation and Control

- Because CBL is likely to be an expensive project, it is important that public evaluation of results be carried out and that appropriate control actions are seen to be taken.
- Under these circumstances, CBL will be seen as having to perform in the same way all other projects are expected to perform.

Using CBL in your Instruction

- Think of it as an lesson or series of lessons.
  - It must have one or more objectives.
  - It must have explanations.
  - It must have activities or practice
  - It must summarize
  - It must evaluate.
  - It must conclude.
Using CBL in your Instruction

- If it leaves something out, you need to add it. If not part of the DBL lesson, then as your personal instruction.
- Most often the following may be missing:
  - Good objective
  - Evaluation test

Lesson Plan

- In most cases it is still needed.
- The lesson plan may cover a series of objectives if the CBL does that.

CBL in Lesson Plans

- Since different parts of the instructional process can be driven by a computer, a lesson plan using CBI can differ in lots of ways. Including it as part of a whole lesson, you can have it in the following places of a lesson:
  - Introduction
  - Pre-test
  - Activity
  - Practice
  - Posttest

So, the lesson plan can vary depending on how you utilize the computer in a lesson.
Let's look at a lesson plan which includes CBI.

Next Week

- April 2nd
  - The Algorithm
  - Programmed Instruction
  - Behavior Modeling
  - Read Ch 18

- Work on your Optional Assignments

Have a nice week...