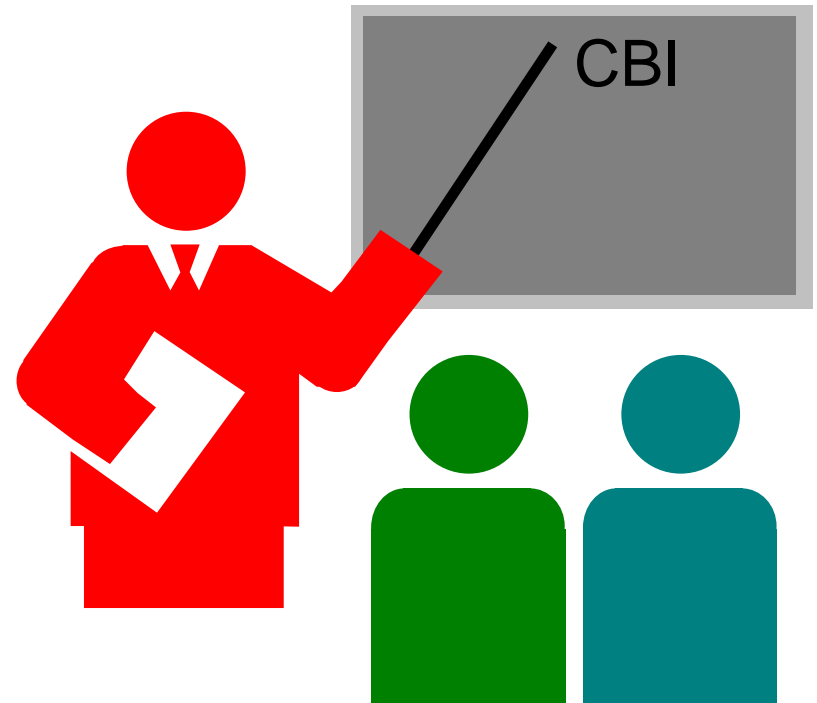


Computer Based Instruction: Categories, Characteristics, and Applications in Education

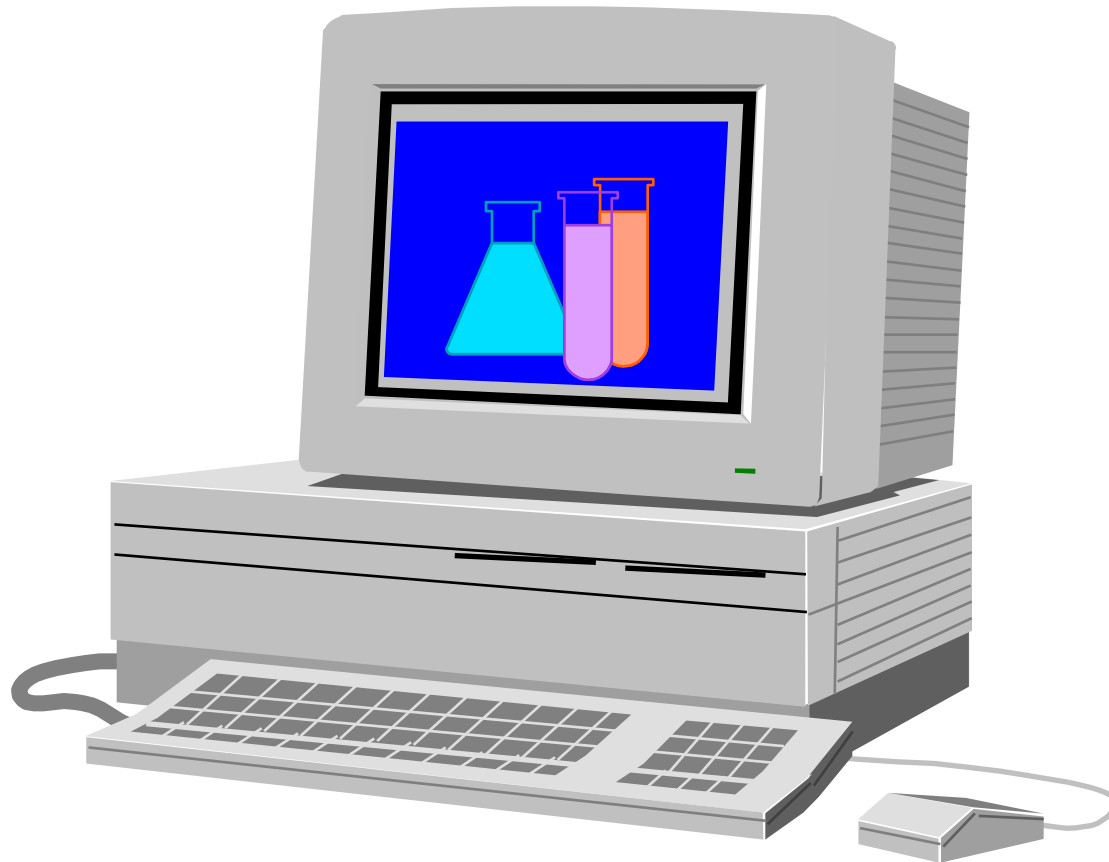
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Computer Based Instruction

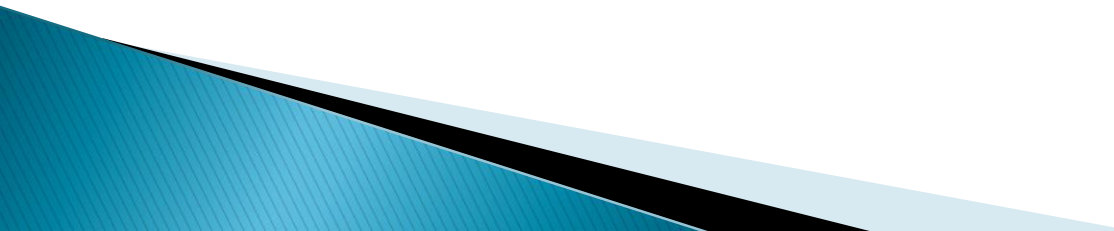
- ▶ What is it?
- ▶ Forms of computer assisted instruction
- ▶ Advantages and limitations
- ▶ Research
- ▶ Integration
- ▶ Evaluation



Computer Based Instruction



Computer Based Instruction

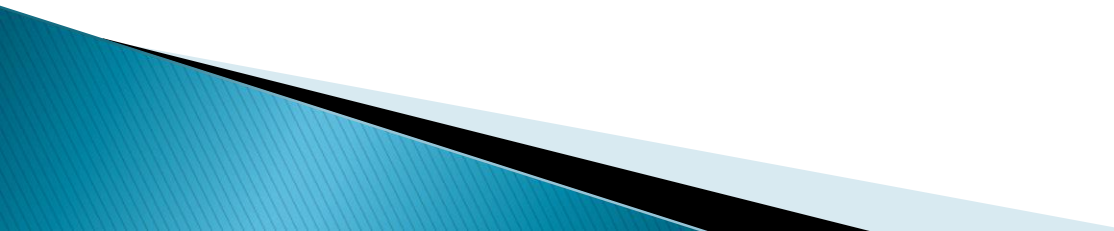
- ▶ Computer based instruction (CBI) is defined as the use of the computer in the delivery of instruction.
 - ▶ Other similar terms include: computer based training (CBT), computer assisted instruction (CAI), and computer assisted learning (CAL).
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Computer Based Instruction

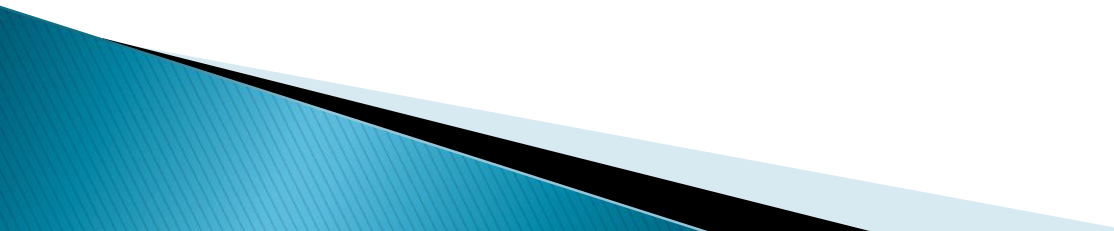
- ▶ CBI is the oldest form of computer use in education; when most people think of computer applications in education, they think of CBI first.



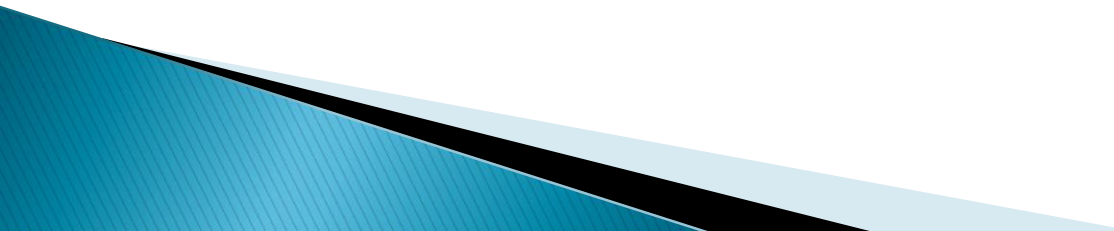
Common Categories of CBI

- ▶ Drill and Practice
 - ▶ Tutorial
 - ▶ Simulation
 - ▶ Instructional Game
 - ▶ Problem–Solving
 - ▶ Other
- 

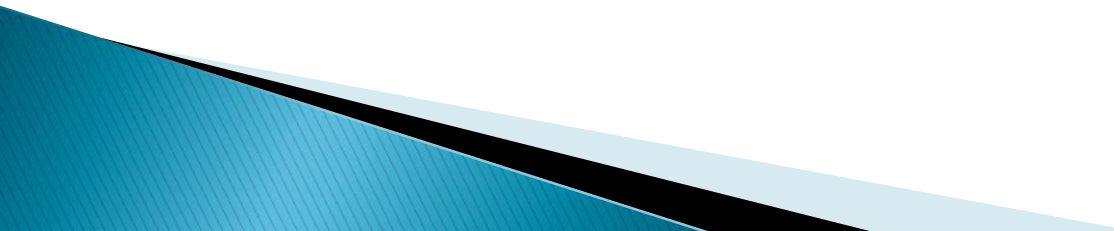
Drill and Practice

- ▶ Exercises designed to increase fluency in a new skill or body of knowledge or to refresh an existing skill or body of knowledge.
 - ▶ This approach assumes that the learners have previously been introduced to the content.
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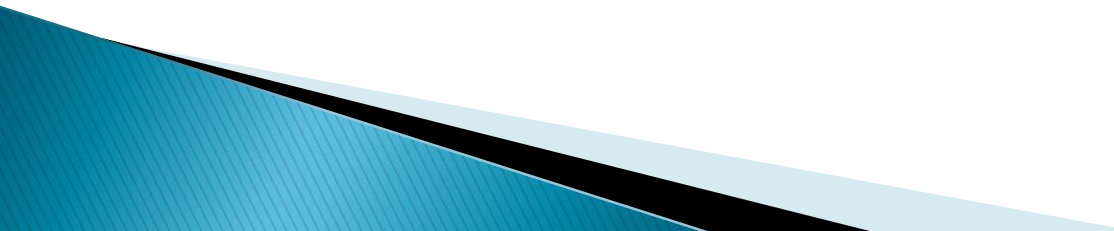
Drill and Practice

- ▶ Traditionally associated with basic skills in topics such as:
 - Mathematics
 - Language arts
 - Terminology
 - ▶ Good programs provide user control, give feedback and reinforcement, and help learners master skills.
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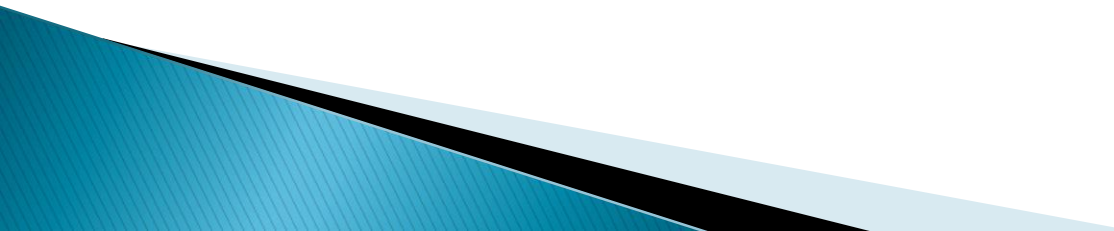
Drill and Practice

- ▶ Good for basic skills/knowledge where rapid student response is desired.
 - ▶ Usually best to use in a series of brief sessions.
 - ▶ Mainly intended for use by individuals.
 - ▶ Should be geared to a level appropriate for the students.
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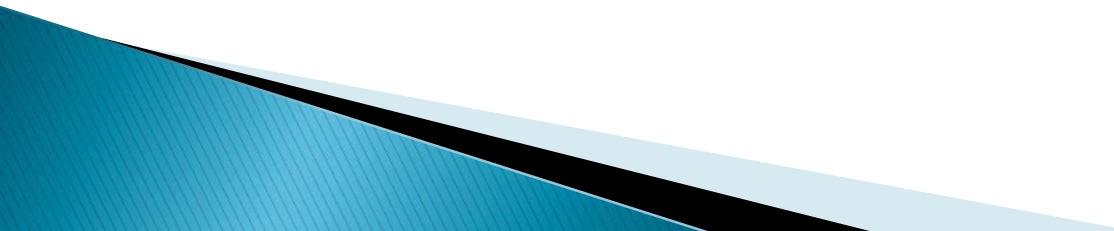
Tutorial

- ▶ A form of CBI in which the computer assumes the role of a tutor -- introducing content, providing practice, and assessing learning.
 - ▶ Tutorials are used to introduce new content to learners in much the same manner that a human teacher might.
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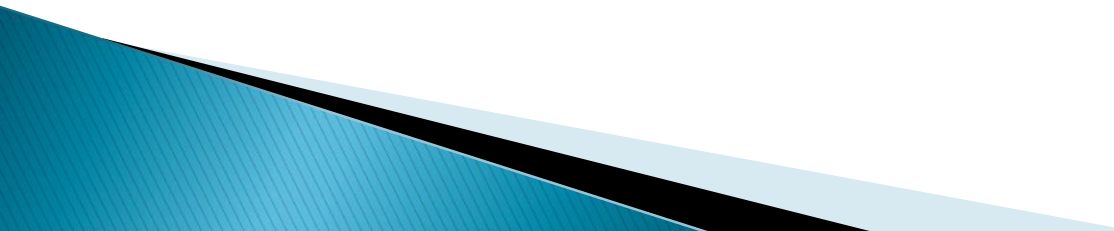
Tutorial

- ▶ Because tutorials present content to students, they can be used in any area of the curriculum for:
 - remediation when learners lack necessary background knowledge.
 - enrichment when learners wish to go beyond the basics.
 - introduction of content to all learners (freeing the instructor to do other things).
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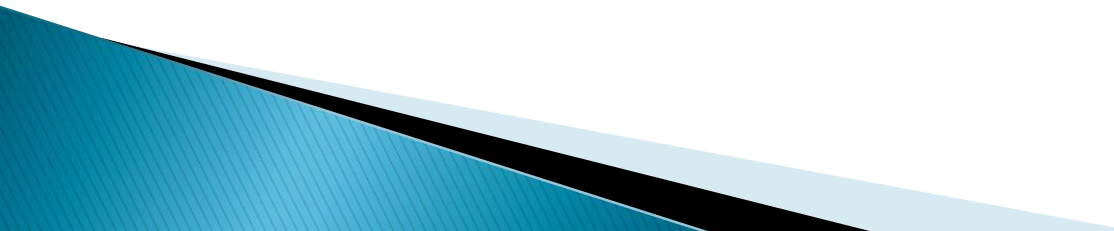
Tutorial

- ▶ Good for verbal and conceptual learning.
 - ▶ May require significant investment of students' time.
 - ▶ Can be effectively used by individuals or groups of 2–3 students.
 - ▶ Should be followed by opportunities for student application of knowledge.
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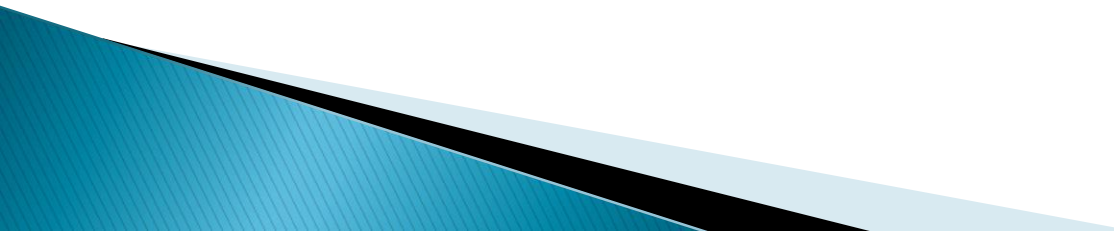
Simulation

- ▶ A form of CBI that provides a simplified representation of a real situation, phenomenon, or process.
 - ▶ Provides the opportunity for students to apply knowledge in a realistic format but without the time, expense, or risk associated with the real thing.
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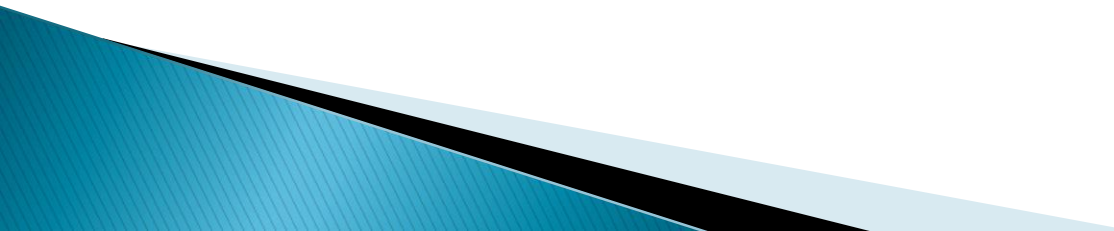
Simulation

- ▶ One of the best ways to use CBI in the sciences and other subject areas; simulation makes good use of what the computer does well.
 - ▶ Simulations can mimic physical objects or phenomena, processes, procedures, and situations.
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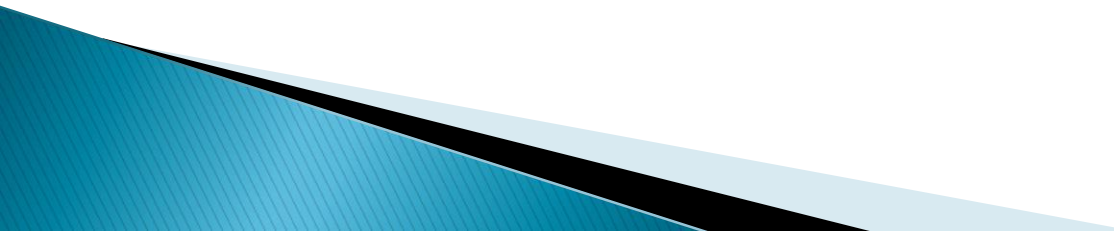
Simulation

- ▶ Best used for application of knowledge, problem solving, and thinking skills.
 - ▶ Time involvement may be brief or extended depending on the simulation.
 - ▶ Good for small groups of students, although can be used by individuals.
 - ▶ Often requires guidance and follow-up for effective use.
- 

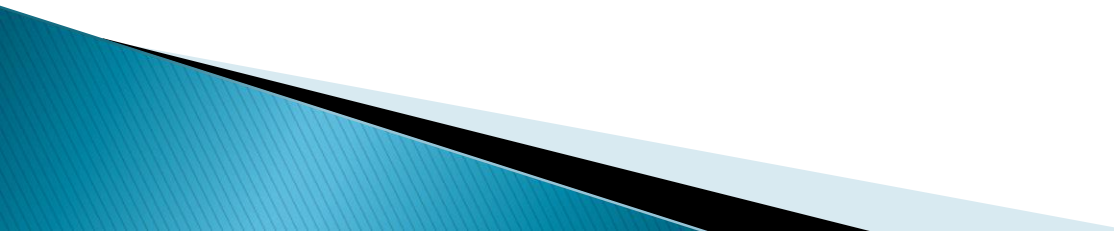
Instructional Game

- ▶ Usually another type of CBI (e.g., drill and practice or simulation) modified to include gaming elements.
 - ▶ Generally features
 - an end goal and rules of play.
 - sensory appeal.
 - motivational elements (e.g., competition, cooperation, challenge, fantasy).
- 

Instructional Game

- ▶ Examples of this type of CBI are found throughout education. Usually, they are aimed at younger learners such as those in the elementary grades.
 - ▶ Games can substitute for worksheets and exercises, as a reward, or, in some cases, to foster cooperation.
- 

Problem Solving

- ▶ CBI program that is designed to foster thinking or problem solving skills, but does not fit into one of the other categories.
 - ▶ Usually focuses on a specific type of problem solving and provides practice on a number or variety of problems.
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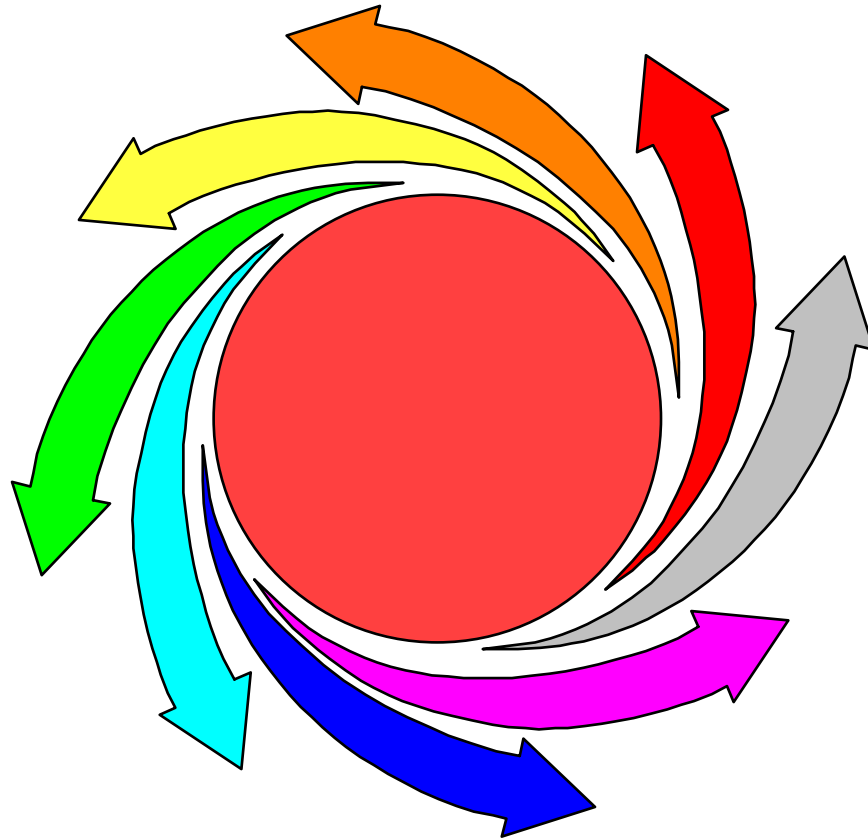
Problem Solving

- ▶ Problem solving applications sometimes focus on specific topics areas (e.g., mathematics, science) and sometimes they are designed to promote general problem-solving abilities (e.g., pattern recognition, prediction).

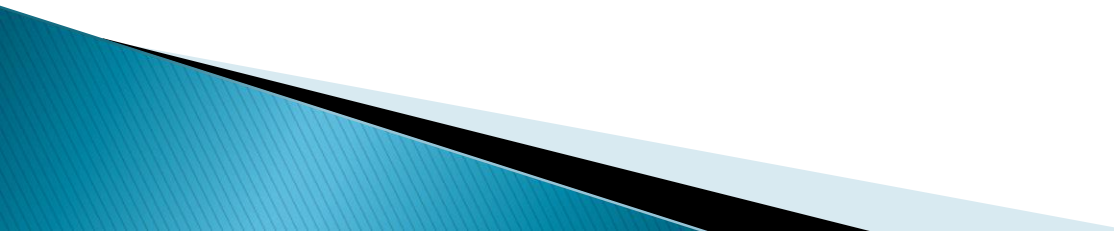
Other

- ▶ Many applications, particularly those that have been developed in recent years, are not easily classified into one of the preceding categories.

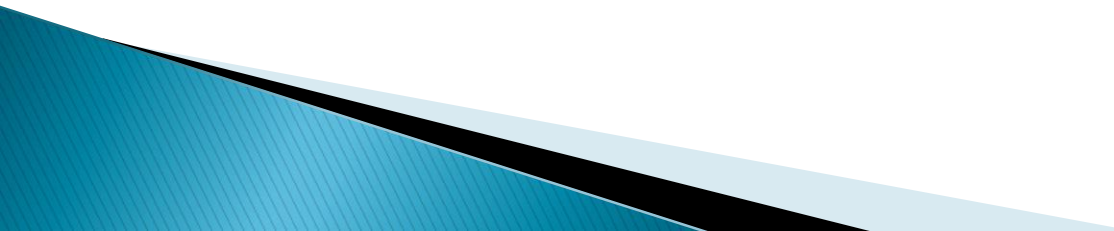
Advantages and Limitations of CBI



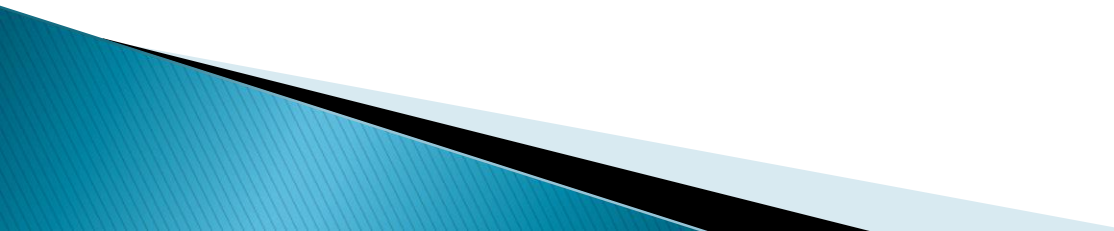
Advantages of CBI

- ▶ Interactive.
 - ▶ Provides immediate feedback.
 - ▶ Infinitely patient.
 - ▶ Motivates learners.
 - ▶ Provides consistency in presentation.
 - ▶ Can adjust difficulty to level of learner.
- 

Advantages of CBI

- ▶ Able to branch to provide appropriate content presentation to the learner.
 - ▶ Can present concepts or processes dynamically and using multiple forms of representation.
 - ▶ Can maintain records of student performance.
 - ▶ Frees the instructor to do other things.
- 

Limitations of CBI

- ▶ Equipment and software can be costly.
 - ▶ Development takes time and money.
 - ▶ Not all learning outcomes are well addressed by CBI.
 - ▶ Unsophisticated applications may not make good use of the computer.
 - ▶ Simple CBI has limited modalities (but multimedia is changing that).
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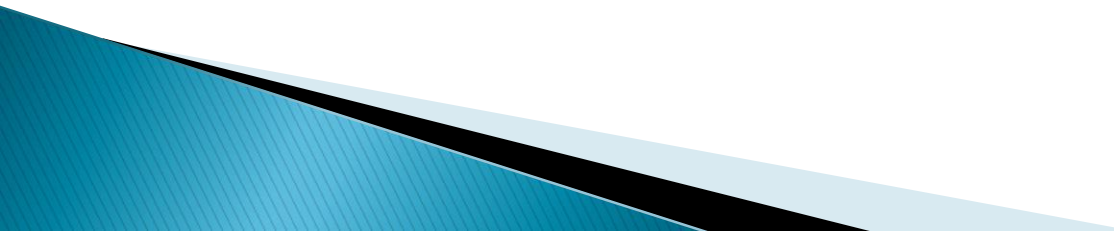
What the Research Says About CBI



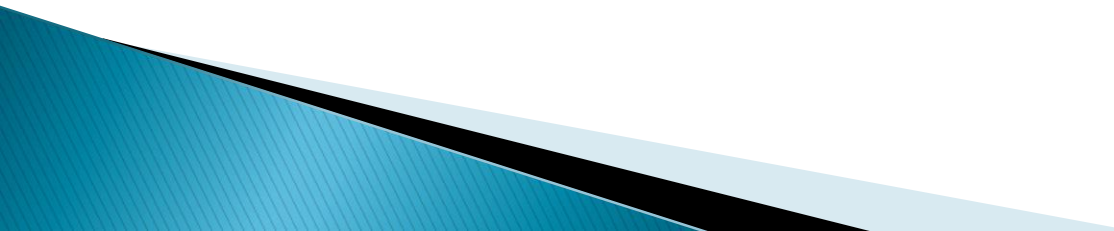
What the Research Says About CBI

- ▶ James Kulik and associates at the University of Michigan completed several meta-analyses examining the impact of computer based instruction in comparison to “traditional” instructional approaches. The results have been generally positive.

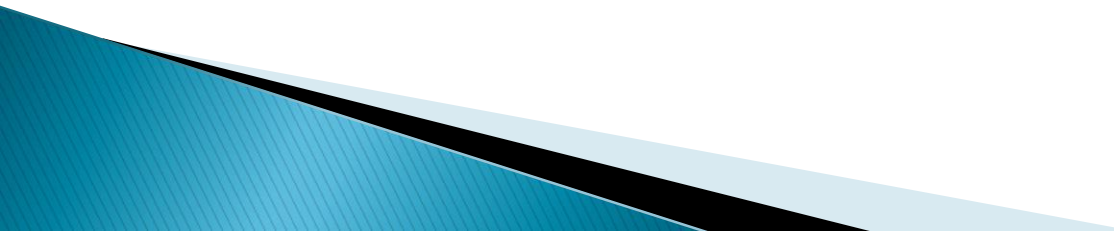
What the Research Says About CBI

- ▶ $ES = 0.30$ associated with performance for computer based instruction when compared to traditional methods (i.e. learners using computers tend to do moderately better).
 - ▶ The effects tend to be larger at lower grade levels.
- 

What the Research Says About CBI

- ▶ On average, computer based instruction takes 30% less time than traditional methods.
 - ▶ Using computers tends to give students more positive attitudes toward computers and, in some cases, more positive attitudes toward the subject.
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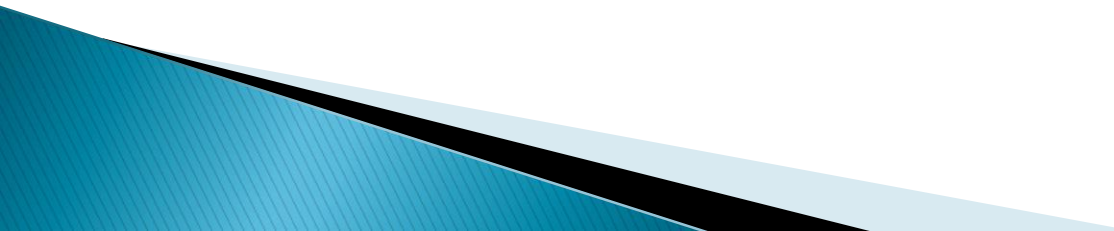
What the Research Says About CBI

- ▶ While encouraging, it is important to point out that Kulik's studies have been criticized for various reasons.
 - ▶ It is not computers per se that affect performance. Instead, it is software design and implementation methods that are the key.
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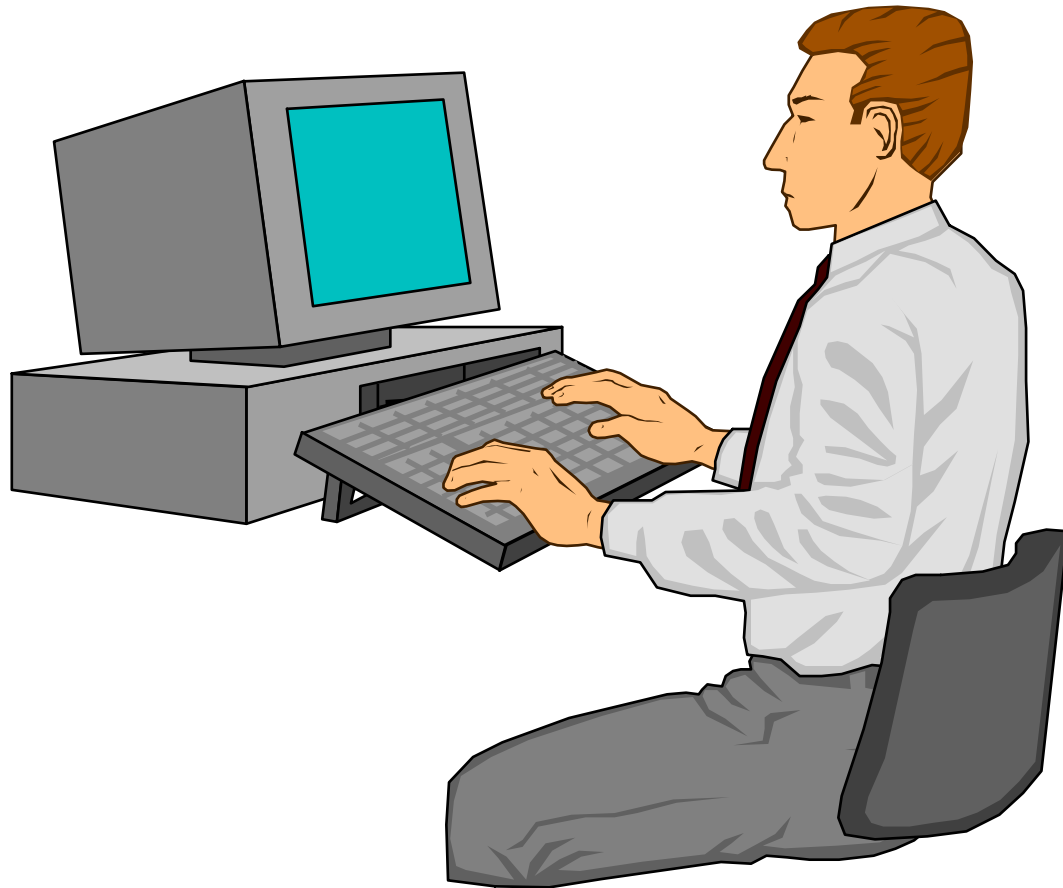
Newer Research

- ▶ A March 2007 report of research on reading and math software, from the Institute for Education Sciences, reported no significant difference in standardized test scores between classrooms using reading and math software and control classrooms.
- ▶ See <http://ies.ed.gov/ncee/pubs/20074005/>

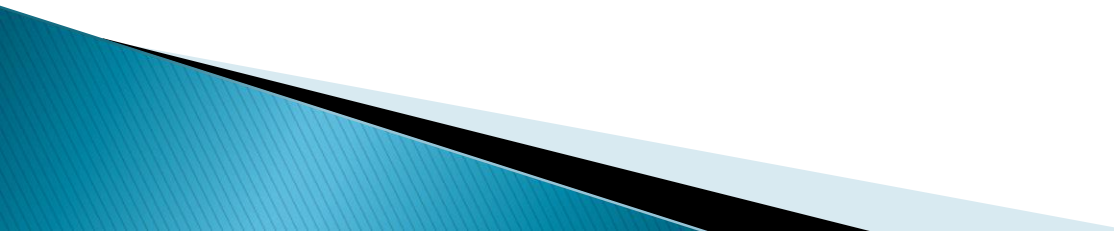
New Research

- ▶ Critics suggest the study had flaws (only 10–15% of instructional time was given to the software, teachers were not fully fluent in using it, and the software was not aligned with the assessments used).
 - ▶ However, the study does raise concern about typical patterns of use of CBI in schools.
- 

Integrating CBI



Level of Integration

- ▶ Course
 - CBI support throughout an entire course is usually accomplished with an integrated Learning system (ILS)
 - ▶ Unit
 - ▶ Individual Lesson
- 

Degree of Integration

▶ Primary Instruction

- Use of CBI for primary instruction is not common, but some users of ILS's rely on the system for major portions of instruction.

▶ Adjunct

- Most teachers use CBI in a supplementary role for remediation, enrichment, or just a change of pace in the classroom.

Issues in Integration

- ▶ Make sure the software fits with the curricular goals for the subject.
- ▶ Use the software that fits with your personal teaching philosophy and your teaching style.

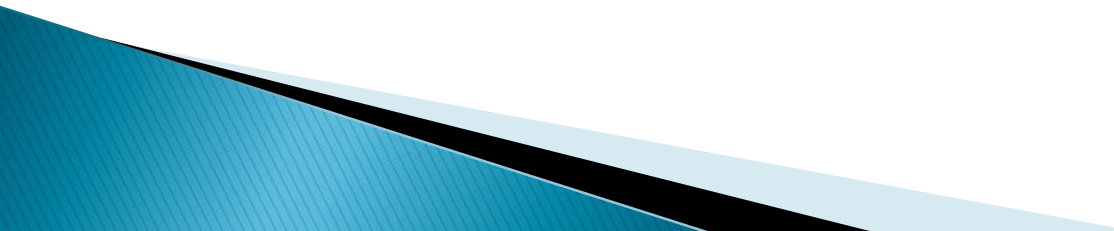
Large Group Approaches

- ▶ Lecture adjunct
- ▶ Demonstration
- ▶ Problem-solving, simulation, or game for a group (e.g., Tom Snyder software)

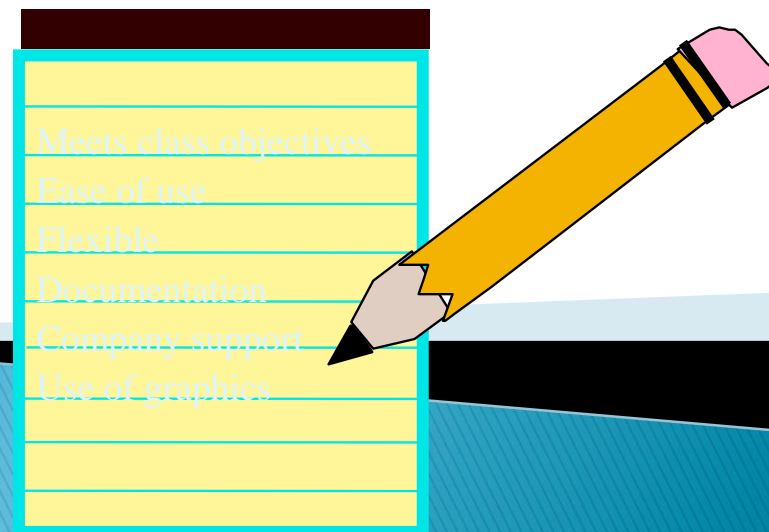
Small Group Approaches

- ▶ Tutorial
 - ▶ Simulation or Game
 - ▶ Problem-Solving
-
- ▶ Groups of 2–4 students working together on a particular piece of software works best.

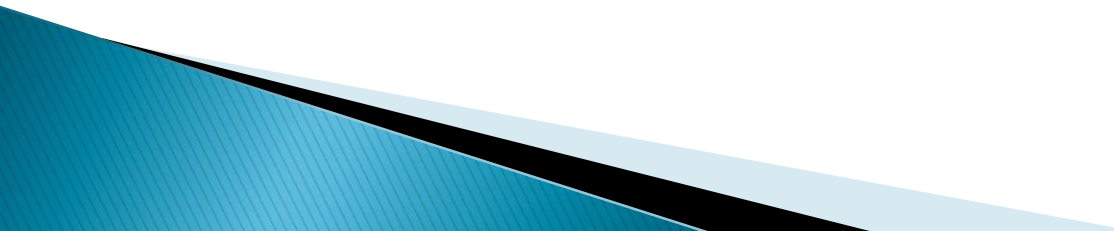
Individualized Instruction

- ▶ Drill and practice
 - ▶ Tutorial
 - ▶ Simulation or game
 - ▶ Problem-solving
- 

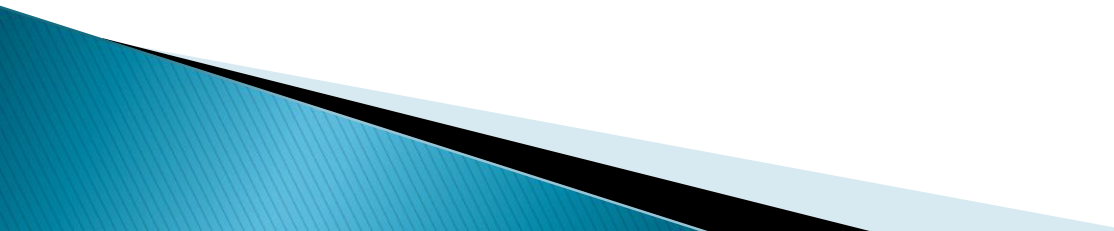
Software Evaluation



Software Evaluation

- ▶ Determine needs.
 - ▶ Specify desired software characteristics.
 - ▶ Obtain or construct an evaluation form.
 - ▶ Survey available sources of software.
 - ▶ Obtain software for preview.
- 

Software Evaluation

- ▶ Read the documentation.
 - ▶ Run through the software several times.
 - ▶ Complete the evaluation form.
 - ▶ Repeat the process for any competing products
 - ▶ Make your selection.
- 

The End