The Need for Instructional Design with Educational Innovations

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- Technological advances allow us to take the very old principles of behavior and apply them in very new and exciting ways
- Using technology to advance education is not a new concept

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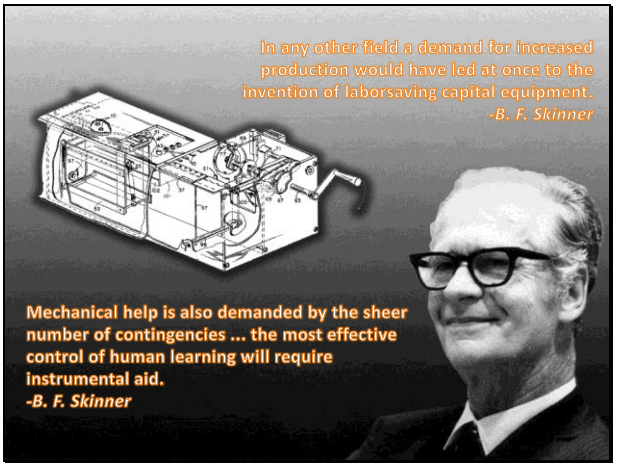

- Skinner's teaching machines as a technological innovation to efficiently and effectively educate the large numbers of people demanded for the modern skilled workforce

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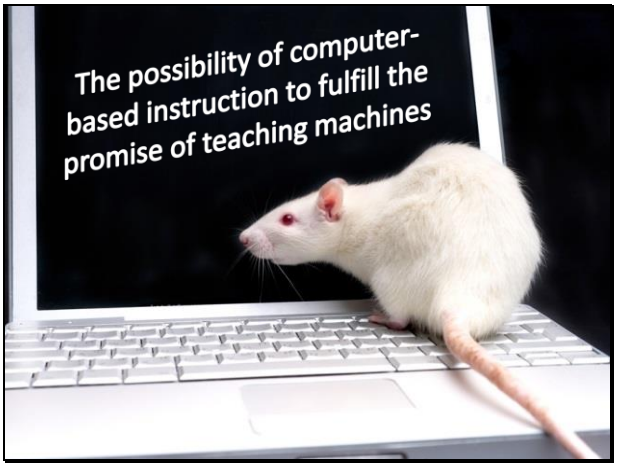

- Teaching machines are long gone, but the modern counterpart, computer-based instruction, remains
- Computer-based instruction is capable of meeting the ideals put forth by Skinner

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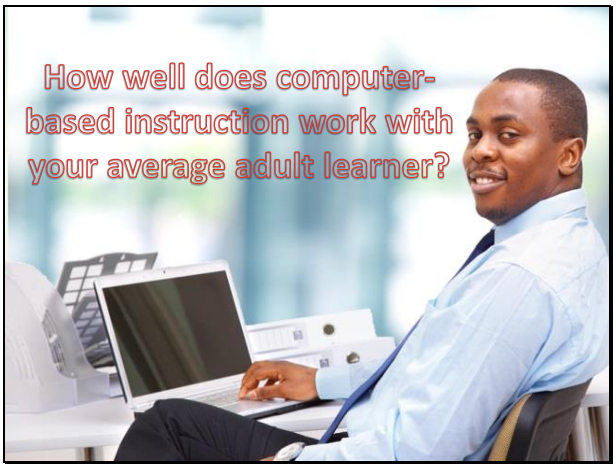

- An investigation of how well computer-based instruction fares with normal adult learners

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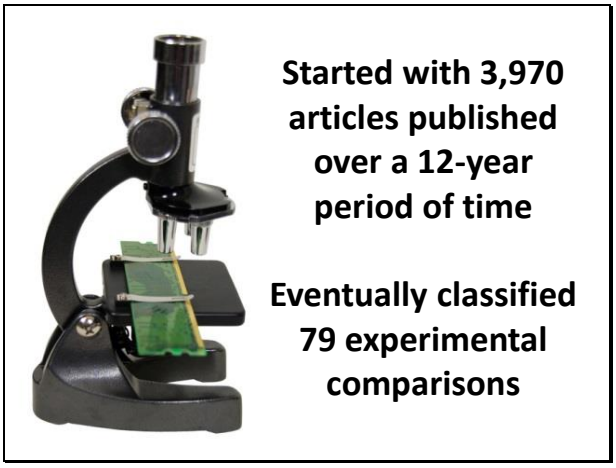

- In regards to computer-based instruction, it turns out that if you investigate more than simple descriptive articles or opinion pieces, you can eliminate most of the literature
- Main restriction that reduced our 4000 articles down to less than 80 articles

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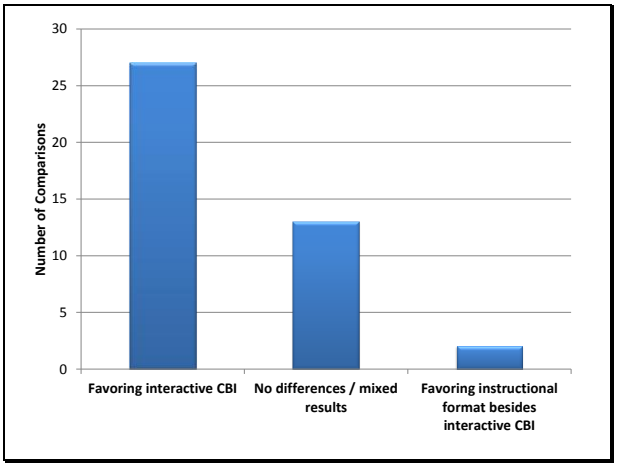

- Still found interesting results with the remaining articles
- CBI was found to be at least as good as, if not better, than instructional alternatives 95% of the time (Johnson & Rubin, 2011)

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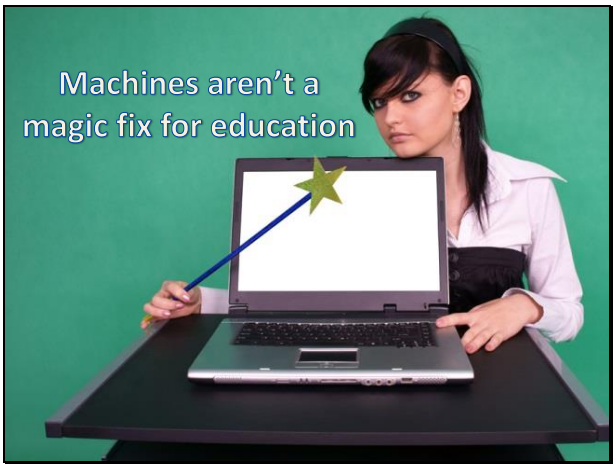

- It is not the equipment; machines aren't magic
- Must conduct an analysis of the instructional content
- Must conduct an analysis of the learner's behavior
- Must align these two analyses

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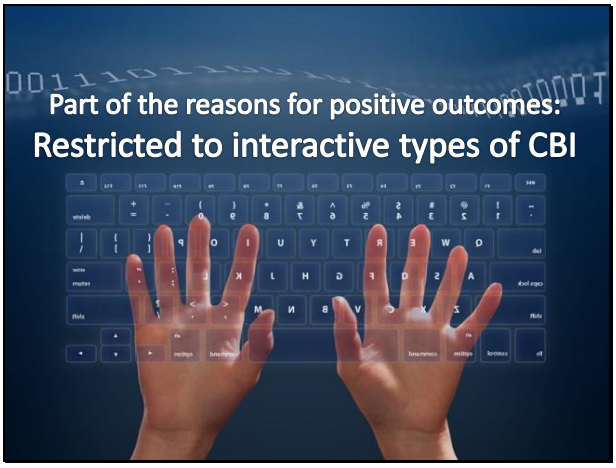

- Part of the reason for the positive outcomes relates to the parameters we established for the review
- In the spirit of Skinner's teaching machines, we restricted ourselves to just interactive forms of computer-based instruction

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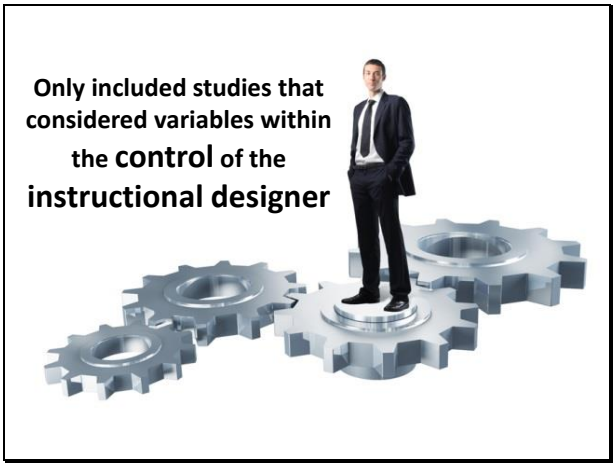

- Also, in the spirit of Skinner, we focused on factors that could be manipulated (rather than traits or cognitions).
- When you put the burden of learning inside the head of the learner, you stop making advances in instruction

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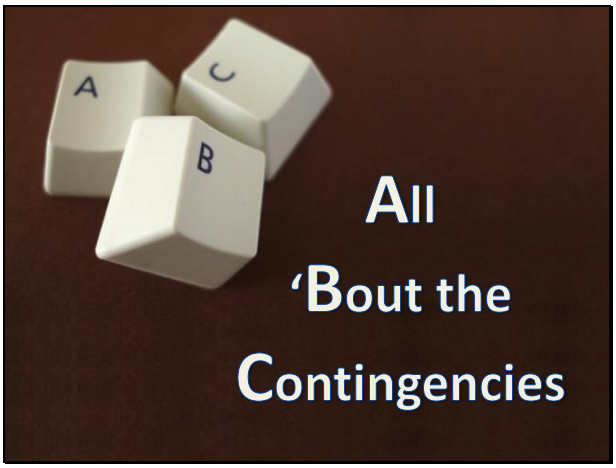

- The burden must be placed on the environmental contingencies
- Must relate the antecedent and consequent variables to desired learner behavior

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- Some variables require caution; need to not get caught up in bells and whistles
- Our innovations should be attractive, slick, and exciting, but never at the expense of the underlying instructional design

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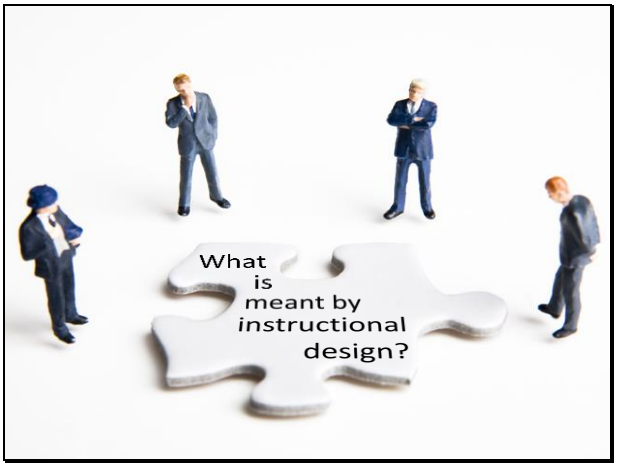

- Instructional design is a term often used loosely
- When done properly, it is an analysis of stimulus control to evoke desired behavior
- If conceptual behavior is the goal, then conceptual stimulus control needs to be established

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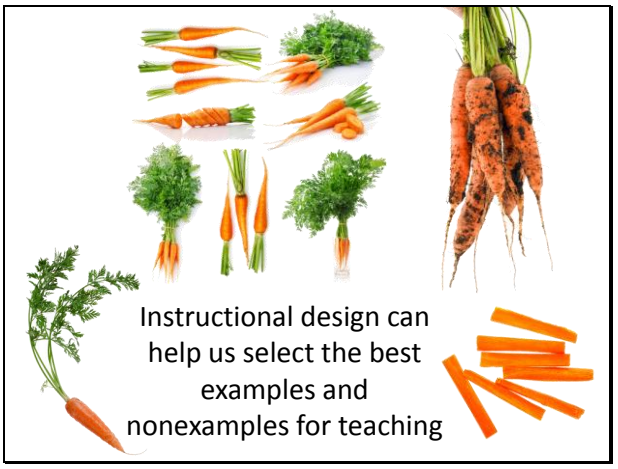

- Example: If you want to teach the concept of carrot
- Instructional design can tell us if we have enough variation to establish the conceptual behavior or too much variation (thus needlessly slowing down the instruction)

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- Could be done as an intuitive process
- Obvious that asparagus is a better nonexample for teaching carrot than pig or seal
- Just cause something is better doesn't mean it is best

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- Good instructional design should be systematic
- When done properly, we can identify even better examples and nonexamples (parsnip vs. asparagus)

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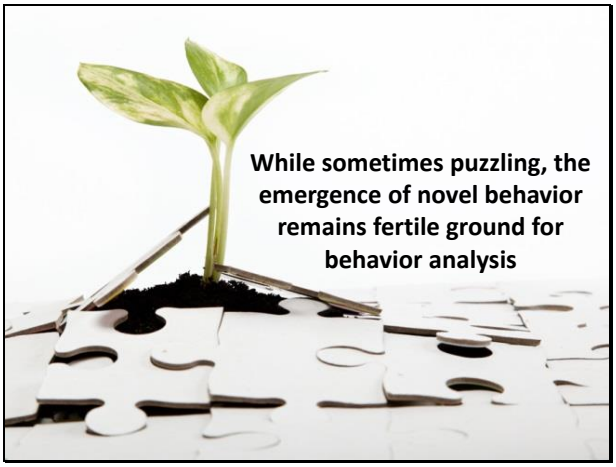

- Once we better understand the controlling stimuli with good instruction design, we can begin engineering novelty, engineering problem-solving, engineering creativity, engineering many desirable behaviors that have long fascinated the general public

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- By better understanding the controlling variables, we can stop wasting time with unnecessary examples or non-examples that don't quite capture the distinction
- We can avoid unnecessary re-teaching by establishing the appropriate stimulus control the first time

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- Good instructional design allows us to make a forceful, empirical counterargument to traditional criticisms of our field
- Data to disprove the outdated notion that we neglect or are incapable of discussing insight, creativity, problem-solving, etc.
- By showing how these complex forms of behavior arise from the same principles that account for simpler forms of behavior, we undercut many of the traditional criticisms

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