**Incorporating Instructional Design into Teaching and Training**

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February 18, 2012
Texas Association for Behavior Analysis conference, Austin, TX
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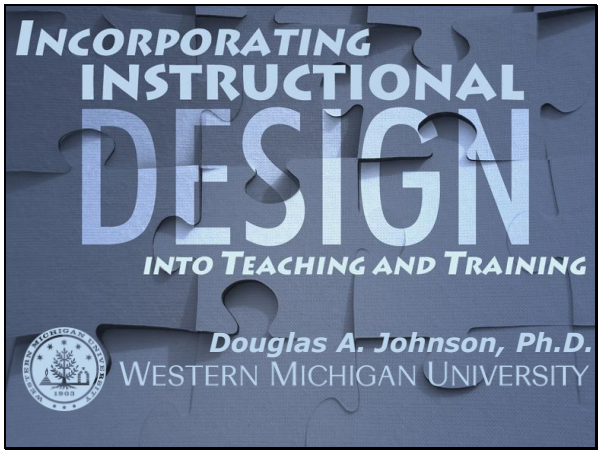


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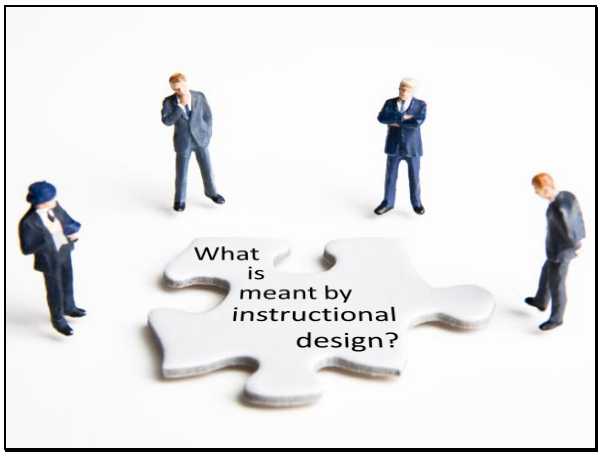


- Explicit focus on behavior change and relevant environmental conditions
- Logical and systematic approach to analyzing subject matter
- Ongoing data-driven revision
- Scientific method being applied to instruction

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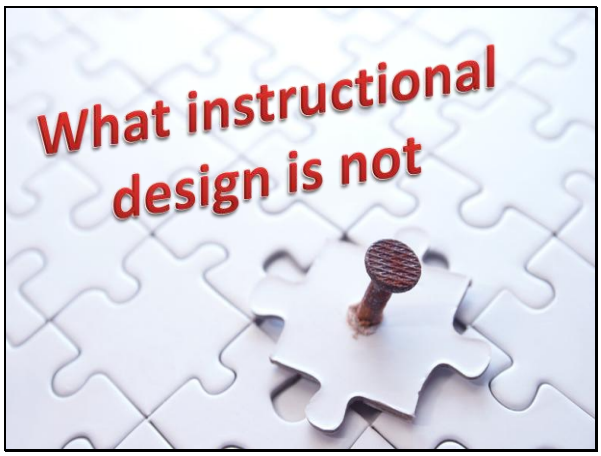


- Non-examples of instructional design:
  - Simply taught a class
  - Wrote some study objectives
  - Programmed a computer tutorial
- Nailed into place whether fits or not
- No active self-correction or systematic approach
- Does not explicitly incorporate the role of data-driven revision
- Pseudoscience approach to instruction

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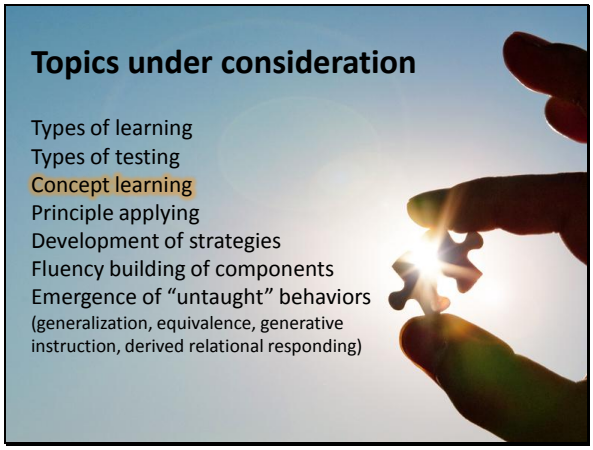


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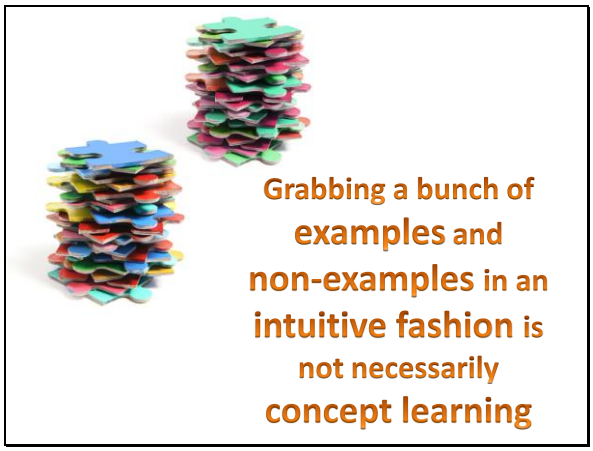


- Reviewed 10 years of TAVB
- Concept teaching procedures
- MEI

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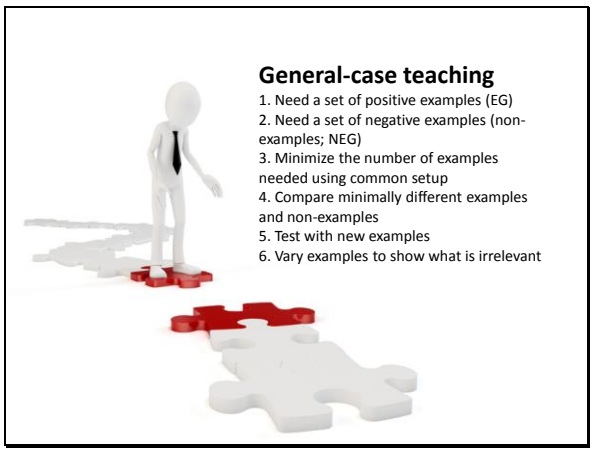


- Becker design principles
- Good criteria and helps explain Direct Instruction's success, but still could be more specific in regards to process
- Minimum-difference principle: how do you determine if your negative example is least different?
- How do you determine the minimum number of examples or non-examples?
- This is still instructional design, but we can still be more systematic

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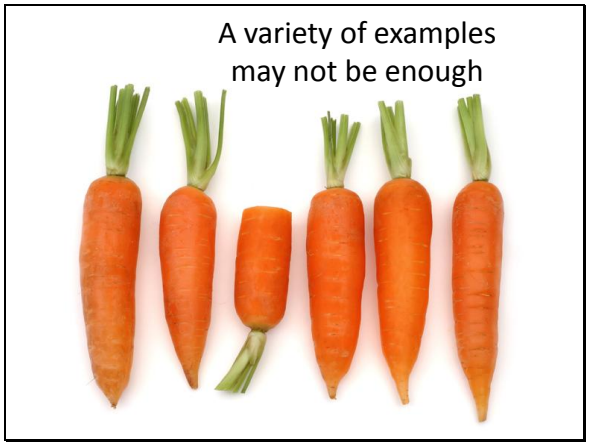


- Multiple examples, but not much variation
- Possible undergeneralizations
  - Leaf must be cut, cannot be cut length-wise, must be 3-4 inches, etc.

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- More might be better, but too much makes instruction inefficient

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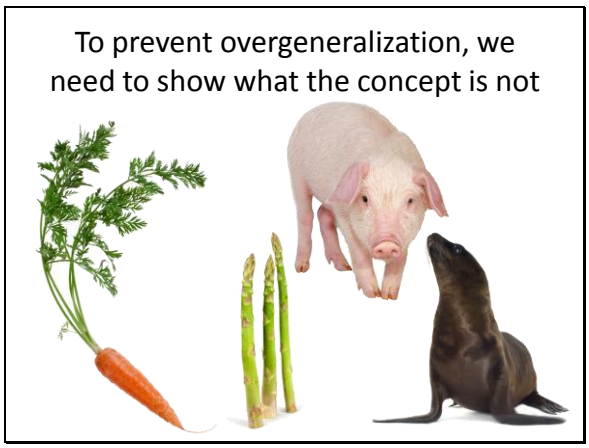


- Misunderstanding arise and strengthen over time if not corrected
- Cannot correct if not tested for
- Just cause a non-example is better, that doesn't mean it is best (carrot concept: pig vs. asparagus vs. parsnip)

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- Could intuitively pick ones that seem better (inefficient and tedious), or use a systematic
- Proposing is a better way of selecting examples and non-examples to ensure conceptual mastery

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- Conceptual stimulus control
- One way to define to terms is to figure out what common features evoke a response (for most people vs. for experts)
- Inherent is this is figuring out what you can subtract to make something a non-concept

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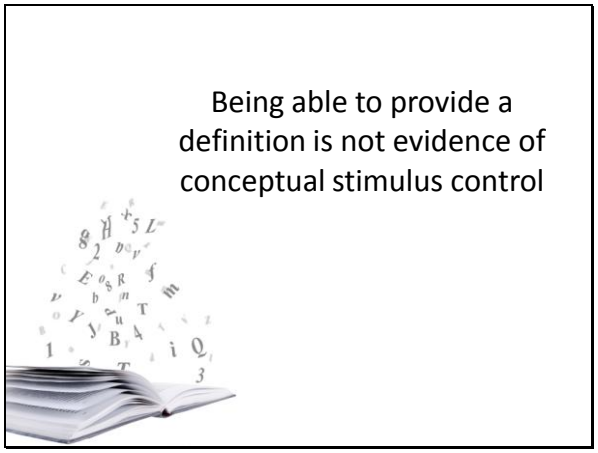


- Can be helpful in proving classification guidelines for learner, but it not demonstration of conceptual learning by itself
- Much of life, we are not consciously classifying using explicit rules

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- Alter features until controlling variables of "bicycle" response are discovered

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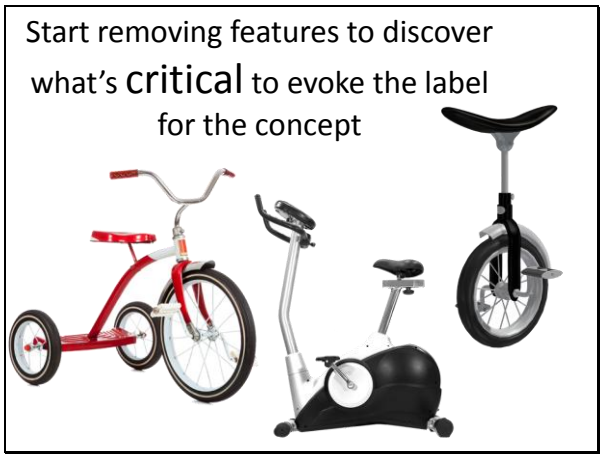


- Imprecision of verbal community
- Arguments over what is or is not critical

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Finding all the
critical attributes
is difficult but important

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There are many attributes that can vary within the stimulus class while still evoking the response

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- Must always field test your instruction with learners from your intended audience

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***Critical attributes***
A. Two wheels
B. Completely person-powered
C. Foot pedals

***Variable attributes***
A. Color (red, blue, yellow, green)
B. Size (small, large)
C. Type of seat (saddle, recline, banana)
D. Type of handlebar (straight, curved, side)

- Initial bicycle analysis
- We may need to refine later based on learner errors

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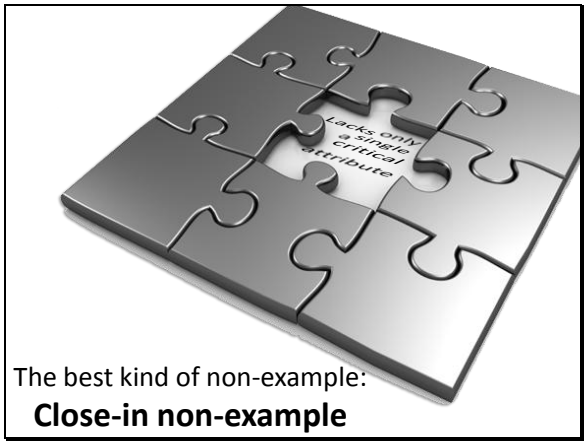


The best kind of non-example:
**Close-in non-example**

- A close-in non-example is a non-example that lacks one and only one critical attribute
- Close-in non-examples are the best stimuli to choose when trying to teach discriminations

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Only missing person power

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Minimum set of non-examples

Two wheels and foot pedals (no person power)

Person power and foot pedals (not 2 wheeled)

Two wheels and person power (no pedals)

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***Variable attributes***
A. Color (red[1], blue[2], yellow[3], green[4])
B. Size (small[1], large[2])
C. Type of seat (saddle[1], recline[2], banana[3])
D. Type of handlebar (straight[1], curved[2], side[3])

- The variable attribute with the most dimensions determines the number of examples necessary

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Minimum set of examples

(**red[1], small[1], saddle[1], straight[1]**)

(**green[4], large[2],** saddle**, curved[2]**)

(**blue[2],** small**, banana[3],** straight)

(**yellow[3],** large**, recline[2], side[3]**)

- All variations are represented:
  - All four colors
  - All two sizes
  - All three seats
  - All three handlebars

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When testing, we must use novel stimuli to ensure conceptual stimulus control, not rote memorization

- With the minimums, have much better starting point for lean and efficient training
- Most test with novel examples and non-examples
- Testing might suggest the need to fatten up training items
- Better than alternative of random, intuitive grab leading to larger set and still possible misunderstandings

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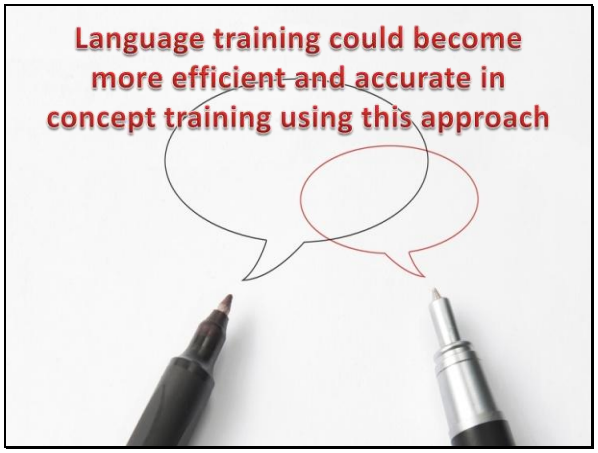


- Language training: conceptual stimulus control and its relation to tact and intraverbal training

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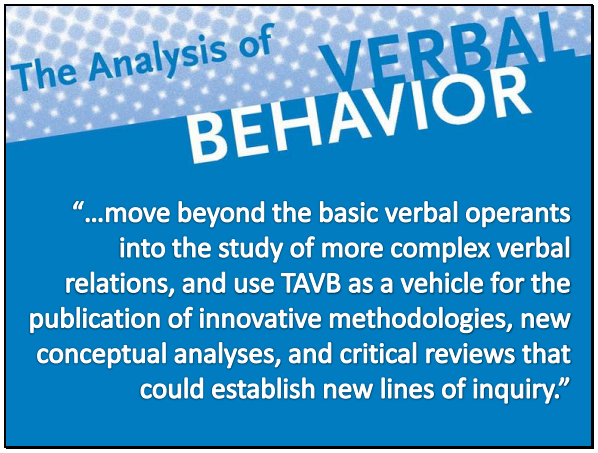


- Miguel editorial
- Instructional design is one avenue to move beyond basic operants

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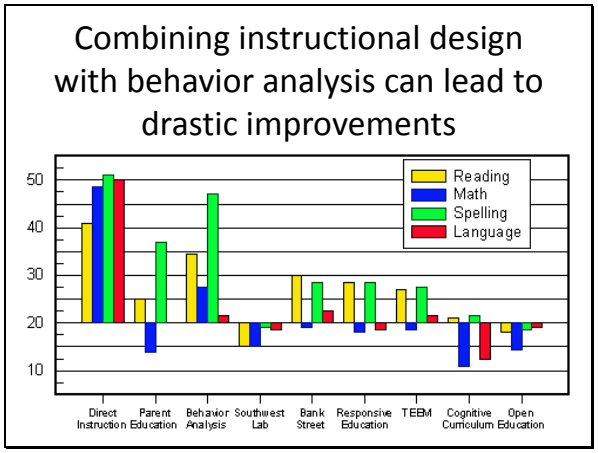


- Direct Instruction (which is still behavior analysis) versus standard behavior analysis
- Applying the science of behavior to instructional design and then combining them results in huge improvements

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- Discovery learning, progressive education, and constructivism
- K-12 Teacher training and instructional design
- No instructional design training
- Typically trained to be hostile to anything too structured

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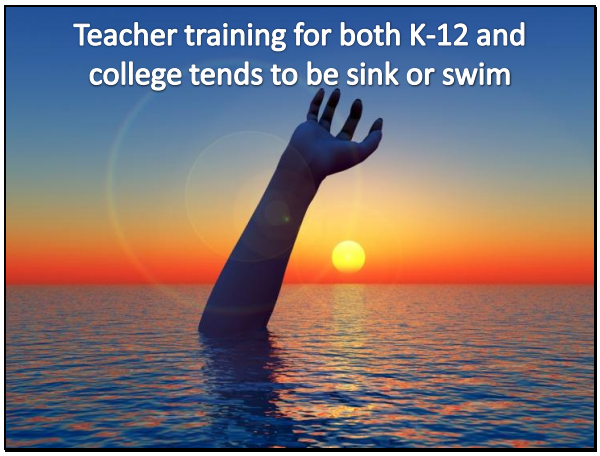


- College teacher training
- Sink or swim

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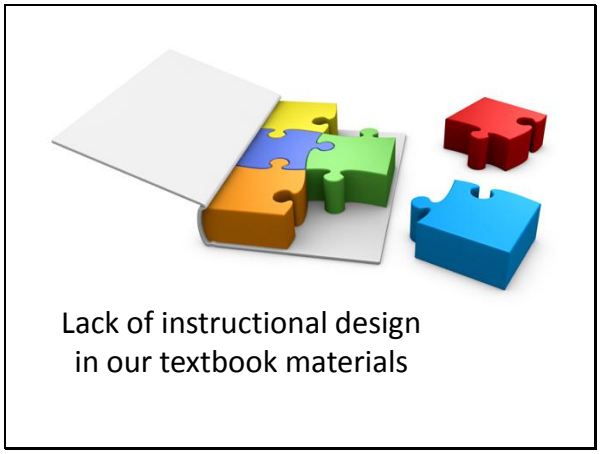


- Typically simple and test very limited concepts of the chapter
- Of the concepts sampled, only a very few aspects are tested
- Inaccuracies and/or ambiguous questions are common

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## Concept of REINFORCER

***Critical attributes:***
**a) Is a stimulus**
**b) Follows behavior of interest immediately**
**c) Future frequency of that behavior increases**

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***Variable attributes:***
**a) General cultural value** (good, bad)
**b) Modality** (gustatory, visual, tactile)
**c) History** (learned, unlearned)

- Other possible variable attributes:
  - Intentions of conditioner (intended to increase behavior, did not intended to increase behavior)
  - Consistency of effects across people (similar, different)
  - Consistency of effects across time (similar, different)

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Which of the following events in italics are reinforcers? (more than one may be correct)

A) A young boy named Alex eats his first apple and immediately experiences a *delicious taste*. In the future, Alex eats apples more often.
B) A rat pulls a chain, and then a few seconds afterwards that rat *pushes a lever*. In the future, chain pulling increases in future frequency.
C) A line cook develops a new risotto recipe. A year later, his supervisor gives him a *certificate of recognition* for being so innovative. In the future, the line cook develops new recipes more often.
D) Bert uses a pickup line to a cute girl and is immediately *slapped* hard. In the future, he uses similar pickup lines more often.
E) A teenager is working math problems independently in class. Her teacher sees this and immediately *praises* her work in front of the class. In the future, the teenager works on math problems less frequently in the future.

- Not uncommon to find advanced undergrads and new graduates students who cannot pass these, even those that aced previous behavioral courses
- Past classes that failed to test conceptually; rote memorization is not that same as conceptual stimulus control
- These type of setups could be used to enhance end-of-chapters quizzes and classroom examinations
- This multiple-choice is harder than short answer or essay asking to provide definition; this is not just simple recognition

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- Rote memorization is not “drill and kill”
- Useful; foundation of much knowledge
- Definitions with clear critical attributes listed can help with concept acquisition
- But it is not a stopping point!

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Textbooks are consistently error-prone and lacking instructional design


- 64% of textbook fail to make it clear that intentions are irrelevant (variable)
- 44% of textbooks fail to clarify that reinforcers are idiosyncratic and status varies across time
- 92% of textbooks fail to remind readers that change in future behavior is critical

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**Confusing or wrong attributes from current texts**

- Reinforcer - stimulus that strengthens responding in either the classical or operant procedures
- Reinforcement - process by which a reinforcer increases the environmental guidance of behavior
- Punisher - stimulus that evokes escape and withdrawal responses that interfere with the behavior that produced it
- Reinforcer - an internal or external event that increases the frequency of a behavior

- Misleading and contradicting examples (later in text and supplemental resources) are common, even when text's initial definition is accurate

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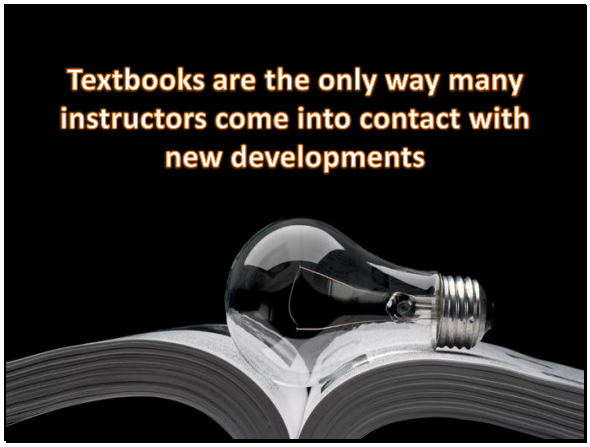


- Transmitting erroneous folklore
- Lack of instructional design is part of the reason for confusion

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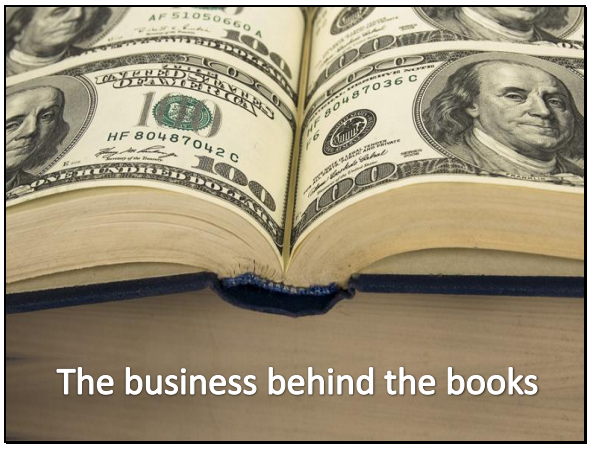


- Lack of data-driven revisions
- Necessity of recovering publishing costs in a single semester (used book market obliterates sales by 2nd semester)
- Sales considerations overrule instructional design considerations
- Authors can fight, but may lose publishers
- Publishers are NOT the problem, the market is

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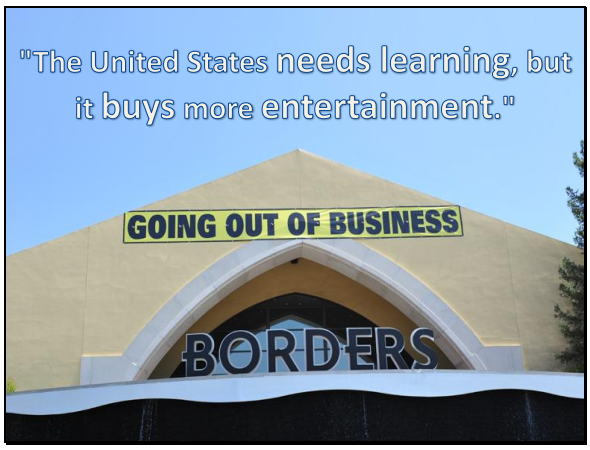


- Lindsley quote
- If you think learning should be more than pain-free entertainment, you need to demand (through your adoption practices) and implement higher standards
- Textbook selection is too driven by graphics/photos and simplistic entertainment
- Physical characteristics of a book have been shown to be a more important determinant than pedagogy of book
- Books lack true peer review, substitute a market-driven approximation

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- Shortcomings of the typical training processes

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- Conceptual stimulus control: good customer service examples and close-in non-examples
- Train components to fluency; allow generative instruction to save time and money

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