

COMP 915

Learning Styles and Course Planning

Don Porter

(Portions courtesy Samarjit Chakraborty)

Disclaimers

- * I am not an education or psychology expert
- * And some of the scholarly consensus has changed since I took a similar course
- * Lessons: Stay humble, stay curious

Bold Assertion:
People are different

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- * Hence: Many, many personality tests/types
Most fun and no real scientific grounding
- * Big 5/OCEAN (actually scientifically validated):
 - Openness: curious vs cautious
 - Conscientiousness: organized vs. careless
 - Extraversion: outgoing vs. reserved
 - Agreeableness: compassionate vs. critical
 - Neuroticism: sensitive vs. confident
- * Myers-Briggs (e.g., INTJ)

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Silly quizzes are obv. Copyright buzzfeed



Lesson 1:

- * What worked for you to learn, will NOT work for all of your students
- * And, it is not the students' shortcoming



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All models are wrong, Some are useful

- * My favorite: the Whole Brain Dominance Instrument

	Left	Right
High	Analytical	Visionary
Low	Detail-Oriented	Empathetic

- * People have varying degrees of comfort in each area

Example: Bill Clinton

- * 42nd President of the United States (1992—2000); spouse of Hillary Clinton
- * Only US President from my home state of Arkansas
- * Widely considered an exceptional speaker
 - * Why?



The formula for a Clinton Speech

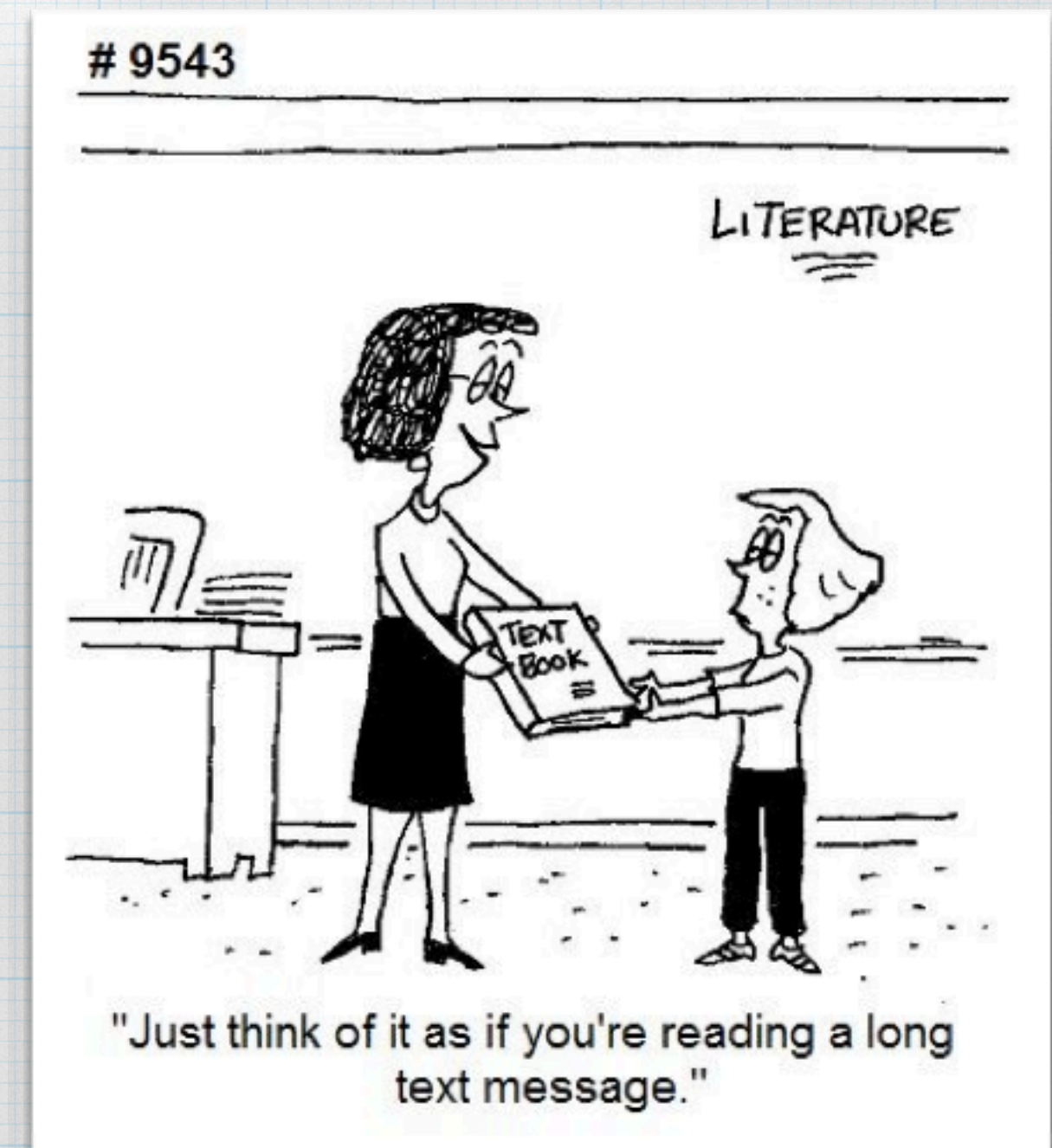
1. I feel your pain
2. Here is why you are experiencing your pain
3. I have a vision for a world without your pain
4. And a 12-point plan to accomplish it!



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High	Analytical	Visionary
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Learning Styles: A Teaching-Specific Model

<i>Preferred Learning Style</i>		<i>Corresponding Teaching Style</i>	
sensory	} perception	concrete	} content
intuitive			
visual	} input	visual	} presentation
auditory			
inductive	} organization	inductive	} organization
deductive			
active	} processing	active	} student participation
reflective			
sequential	} understanding	sequential	} perspective
global			



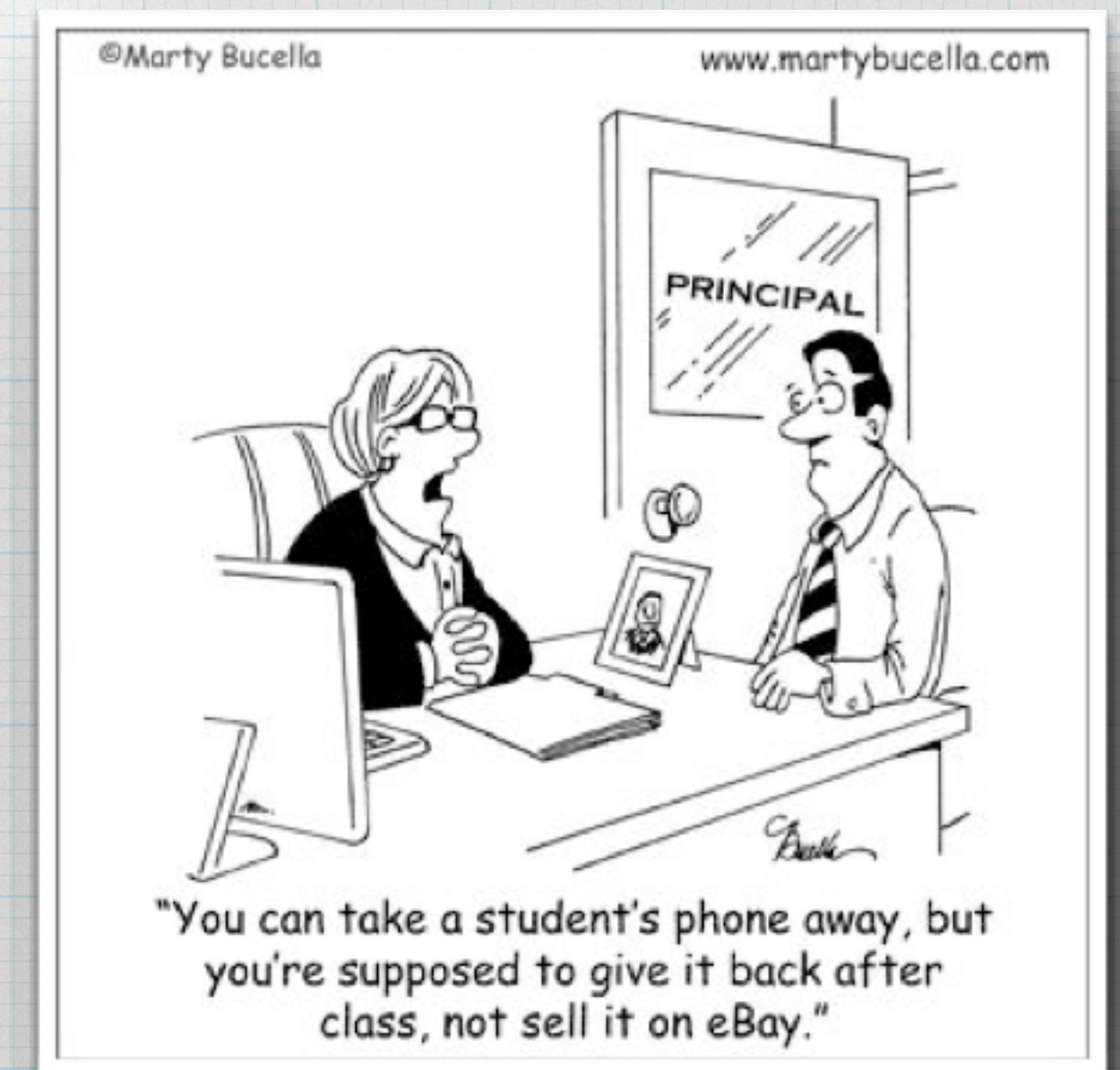
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- * There are multiple dimensions in learning and teaching styles
- * To account for all students, what should you do?
Accommodate all the 32 styles?

Sensing and Intuitive Learners

Gap between engineering education and what would be effective

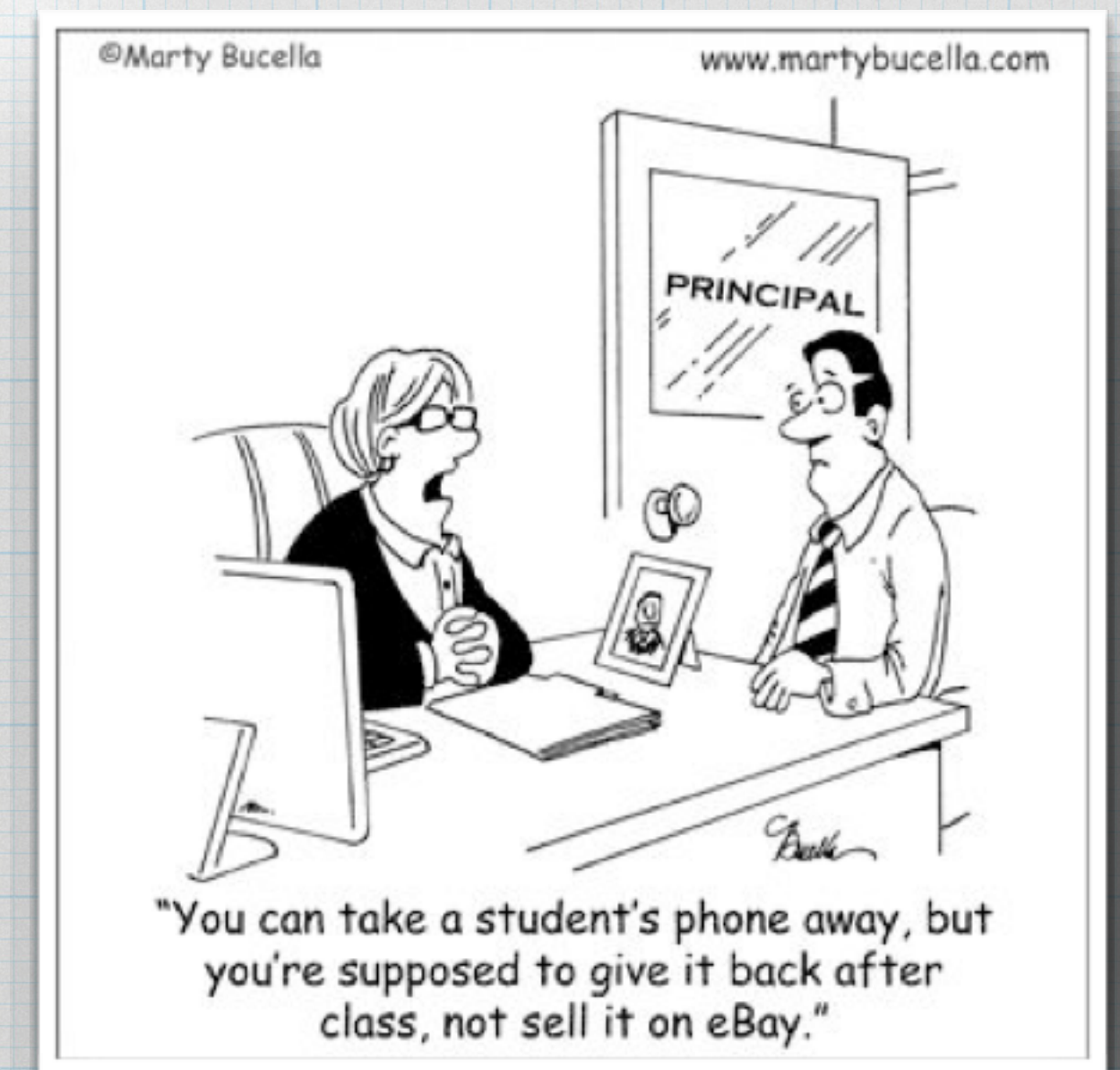
- * E.g., **sensors** like data, facts vs **intuitors** like concepts
- * Ideas?



Sensing and Intuitive Learners

Gap between engineering education and what would be effective

- * E.g., **sensors** like data, facts vs **intuitors** like concepts
- * Solution: blend concrete information with abstract concepts



Visual and Auditory Learners

Visual vs Auditory vs Kinesthetic (taste, touch, smell)

- * Most college teaching is verbal
- * Result - serious learning/teaching style mismatch



Visual + auditory modalities reinforce learning for more students

- * Solution: blend figures, graphs, logic/information flow into the text

A Note on Kinesthetic Learning

- * My spouse teaches Montessori at the elementary level (6—11 yrs old)
- * They cover math topics through algebra
- * Introduced kinesthetically!
- * Then generalize to symbolic manipulation



Inductive vs Deductive Learners

Induction - observations to laws/theory

E.g., Scientific method rooted in inductive reasoning

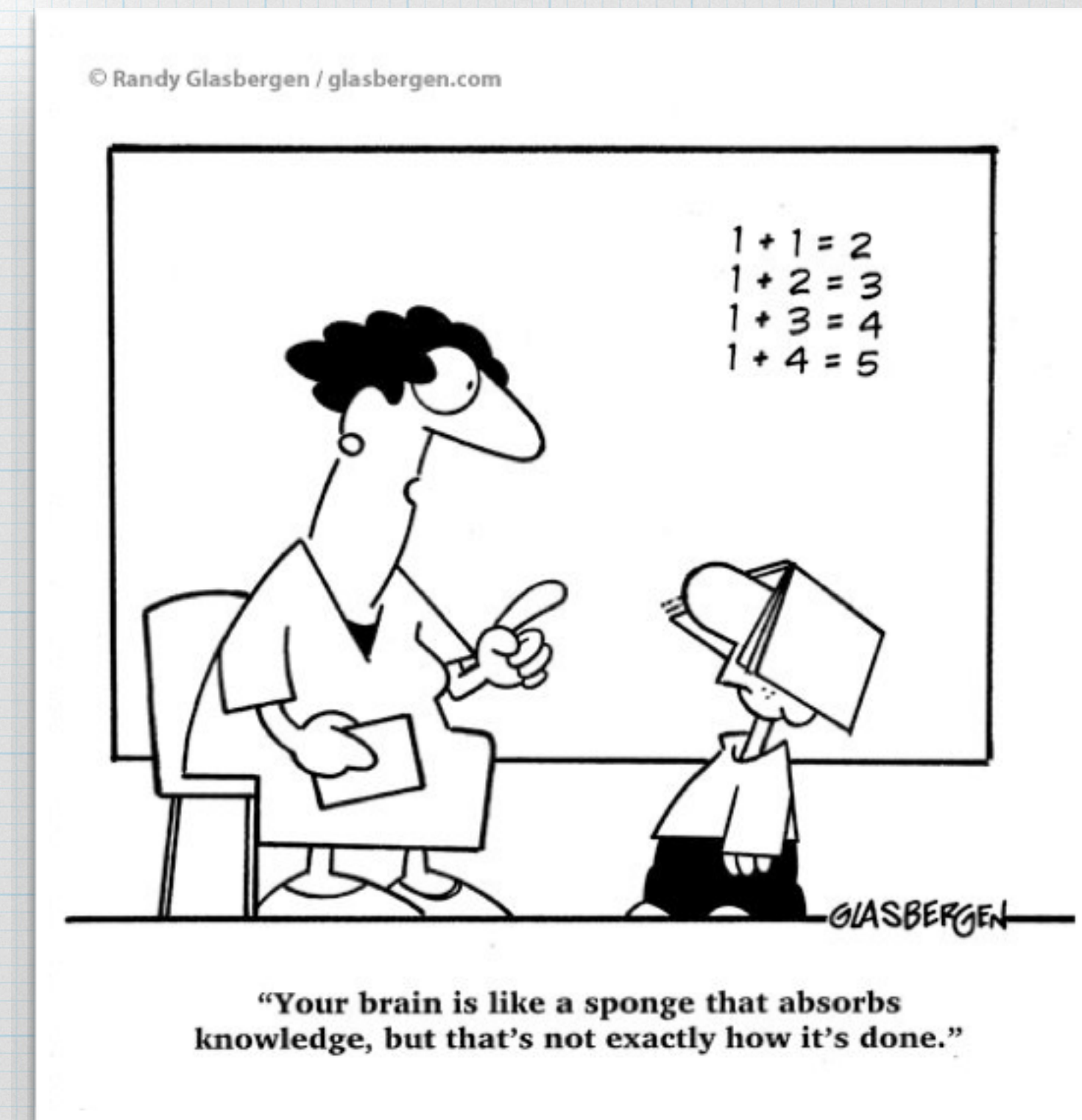
Deduction - theory to consequences

E.g., Mathematical proofs rooted in deductive reasoning

CS is a rare field where we get some of both!

Engineering education - “fundamentals” for sophomores
“applications” later (if ever)

- * Research says that inductive teaching better promotes effective learning
- * Solution: First induction, then deduction. Let the students deduce the rules



Active vs Reflective Learners

Active - doing something with the information

Reflective - examine information introspectively

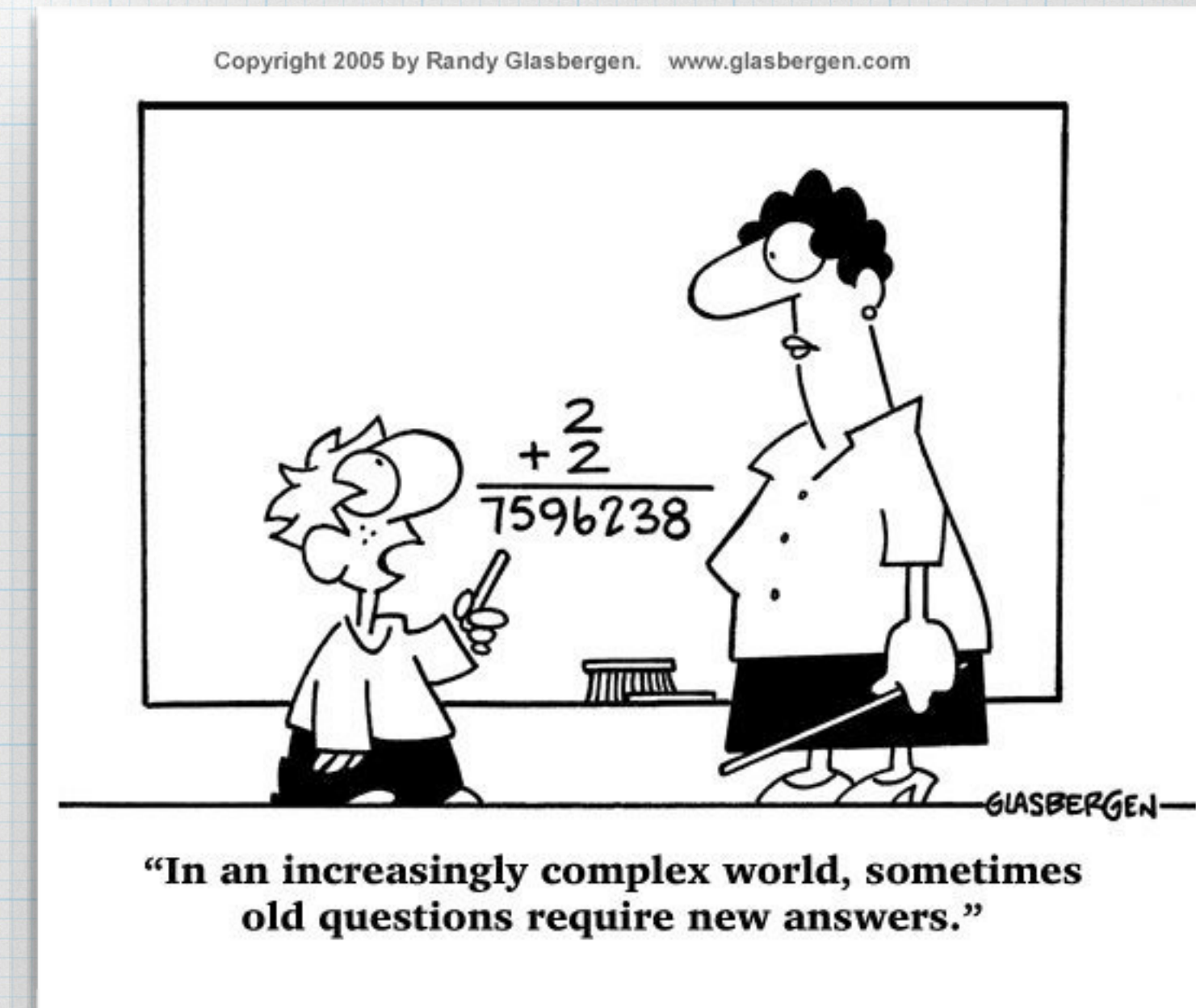
Effective teaching strategy:

- * Interleave lectures with pauses for thought and discussions & problem solving
- * Emphasize both - fundamental understanding (reflective) & problem solving (active)



Sequential vs Global Learners

- * Sequential learners can work with material they understood partially/superficially
- * Global learners require a fuller picture



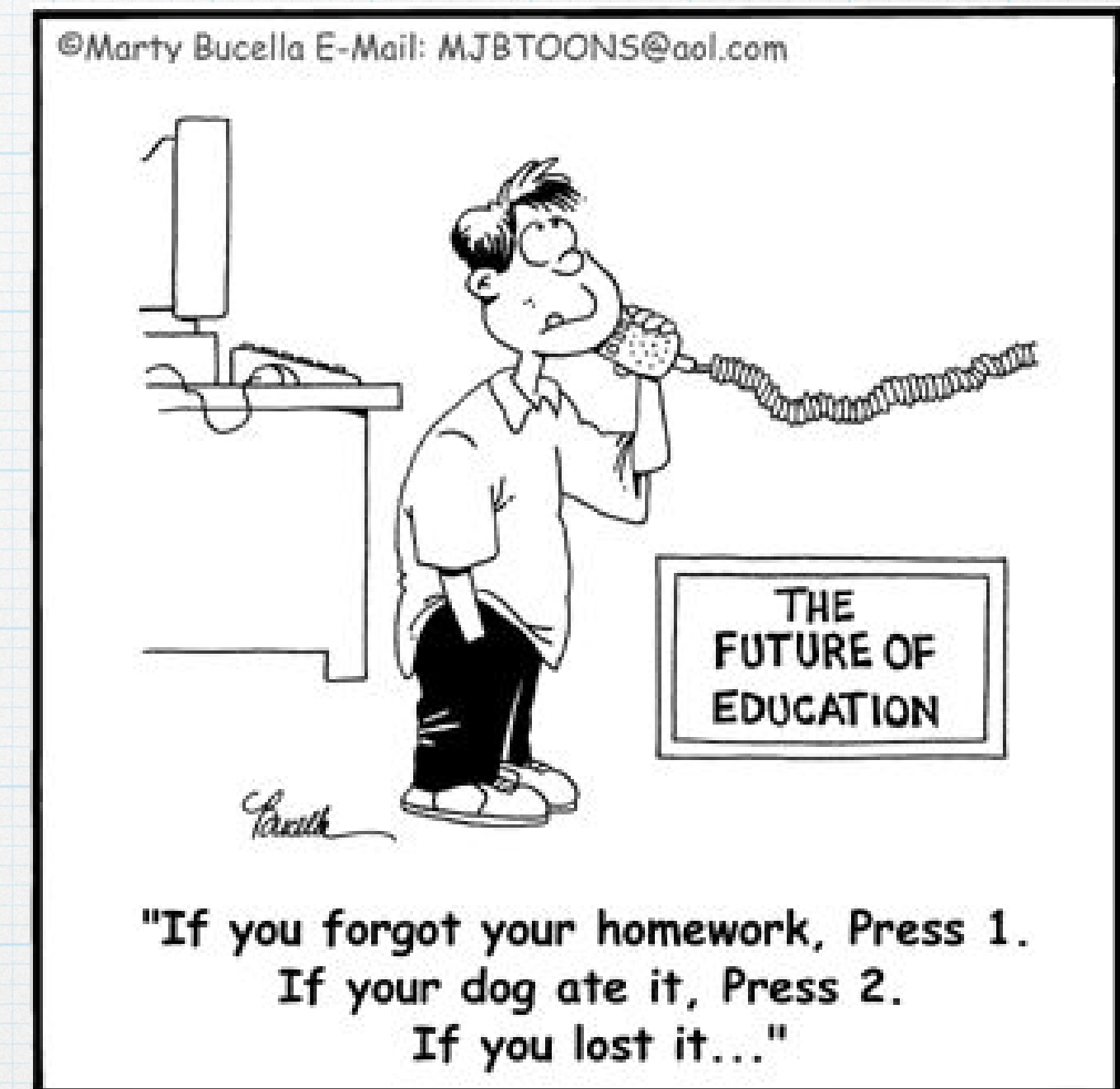
Standard curriculum follows sequential flow

- * Instructors should pay special attention to help global learners
- * How? Provide more context, relate to previous courses, assign creativity exercises, encourage alternative solutions

Challenge in COMP 530: No sequential path through an OS

So how will you incorporate all the 32 styles?

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reflective			
sequential	} understanding	sequential	} perspective
global			



You probably can't all the time

- * But covering a few strategies (poles of each dimension) should help a very large section of students
- * Experiment and evolve ...

Finding Science in Education

- * In OS research, the lag between idea and data is measured in years
- * In teaching, the lag between course meeting and assessment can be as short as days, or even minutes!

Disclaimer

- * Recent research has somewhat challenged learning styles as the absolute truth
 - * Most people learn via most styles, and need all styles
 - * Even if they have preferences
- * Again, “some models are useful”
- * And, these slides will likely need updates in future years, as humans collectively learn more about learning

Course Planning and Evaluation

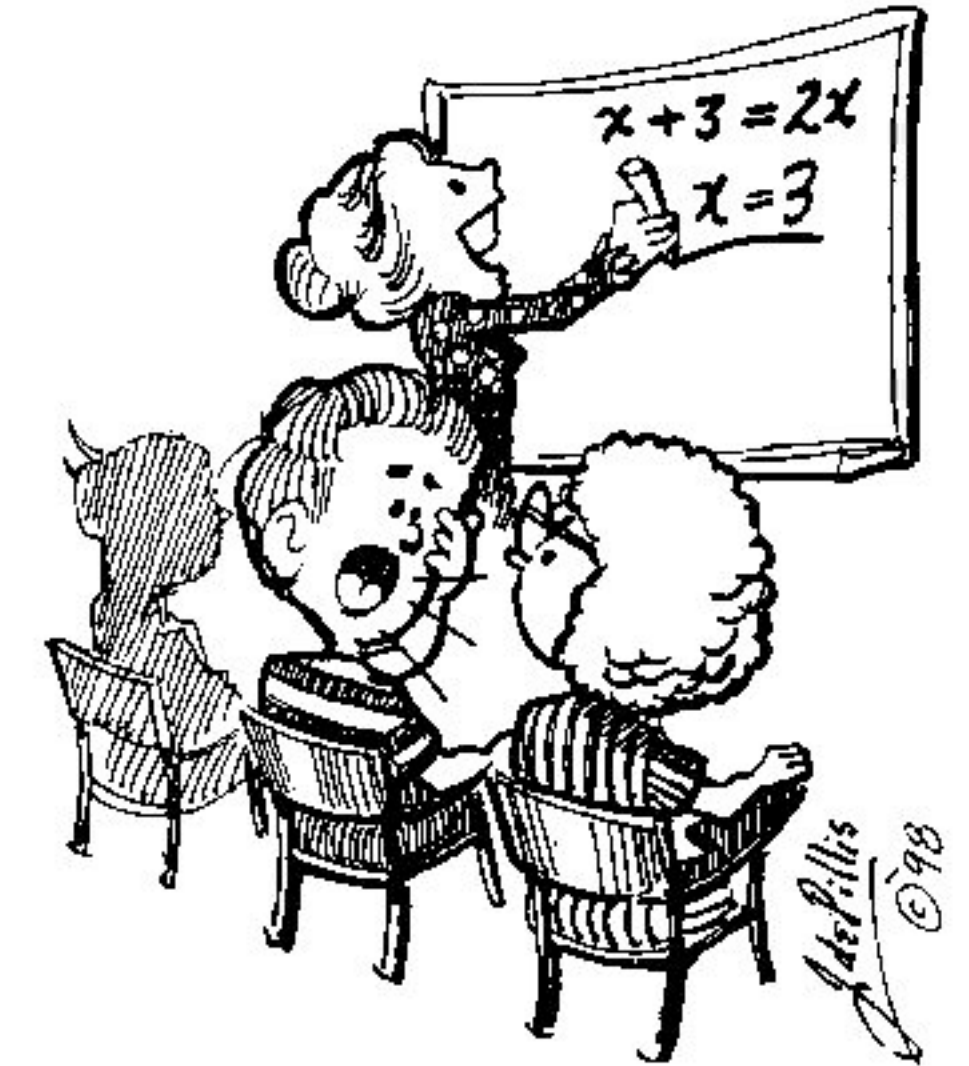
- * What is your first step towards preparing a talk or writing a report?



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Why are you teaching this?

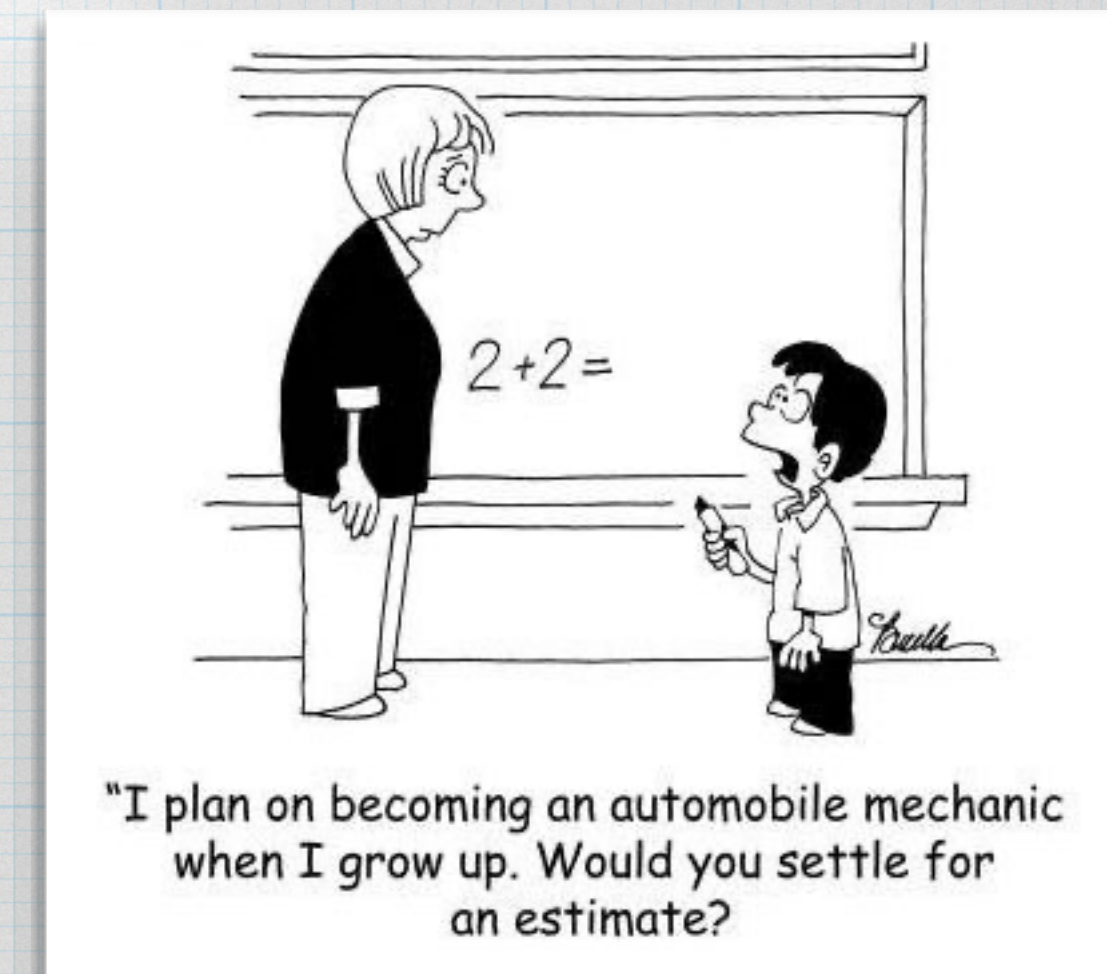
- * A new course
- * A talk at a conference



"HEY, WAIT A MINUTE. JUST YESTERDAY,
SHE SAID THAT X WAS EQUAL TO 5!"

Why are you teaching this?

- * Goals tied to outcomes (e.g., what will the students be able to do?)
 - * Your goals vs goals of the student (e.g., employment)
- * Listing the goals will serve as a basis for designing the course/talk
- * Evaluation will be easier - have you achieved those goals?
- * Methods of assessment - operational definition of your goals



Bloom's Taxonomy

Bloom's Taxonomy (levels of educational objectives)

- * Remember
 - * Understand - interpret, infer
 - * Apply
 - * Analyze - how different components relate to each other
 - * Evaluate - make judgements based on criteria
 - * Create
- * My test questions:
 - * Some simple definition questions
 - * Some simple word problems
 - * Some challenging problems
 - * Some performance analysis
 - * Some "what if?" questions

Bloom's Taxonomy Lessons

- * Different learning objectives have different assessment methods
- * In courses, students realize different degrees of mastery
 - * Good to measure at each level
 - * Builds confidence, if nothing else!