Can 3 wrongs make a right?

Using Test Items to Drive Student Thinking

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NCTM 2010 Annual Conference, San Diego

What is assessment?

- Voodoo
- Punishment
- The bane of my existence
- A sadistic plot
- A process of reasoning from evidence
- All of the above
- None of the above

My answer, and some other points

- Assessment is a process of **reasoning** from **evidence** about **student understanding**.
- Assessment is an essential part of instruction.
- **Teachers** can learn from assessment.
- **Students** can learn from assessment too.

Introductions

- Why are we here?
  - What assessment is for and how to do it well
  - How we as teachers can learn from assessment
  - Using items to spur higher-order student thinking
- Why *aren't* we here?
  - Test prep, theory, large-scale or high-stakes tests
- Who are you?
- Who am I?

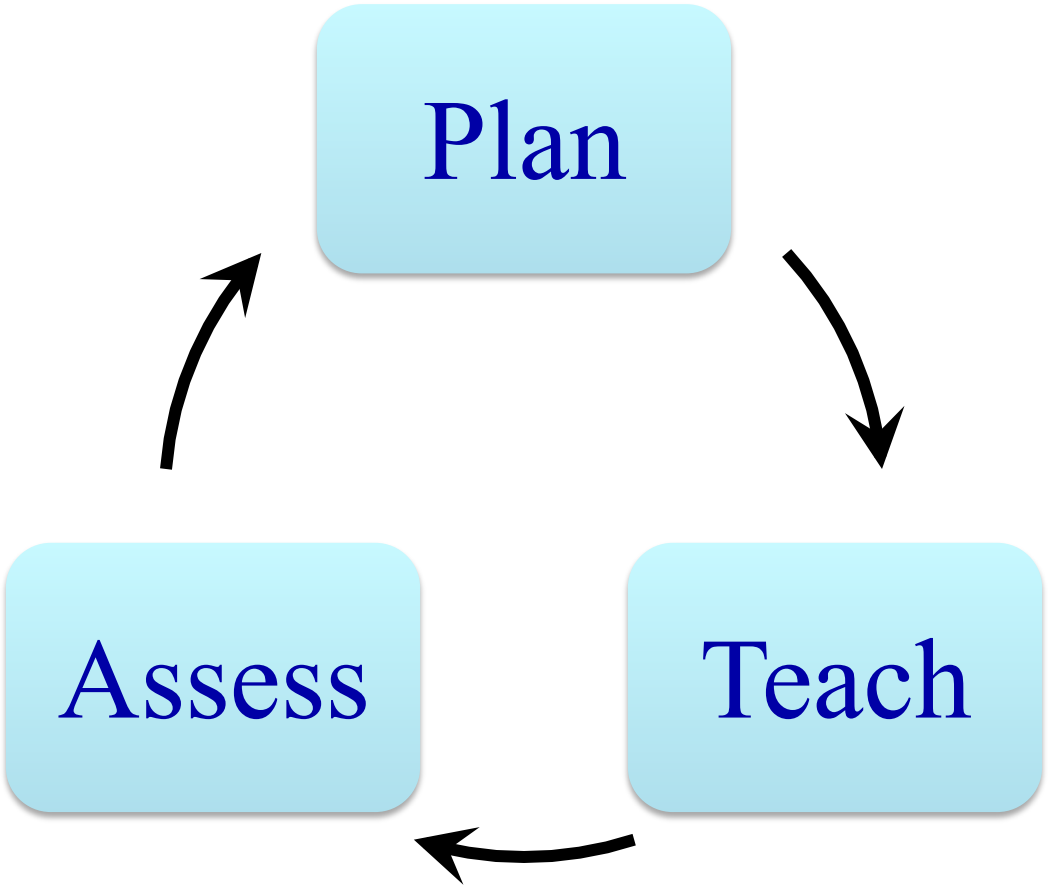
Let's get ready

- Pick a course you're teaching…
- … pick a topic you'll teach in that course…
- … and write:
  - One thing you want students to know
  - How they could show you they know it
  - Ways in which you think they might go wrong

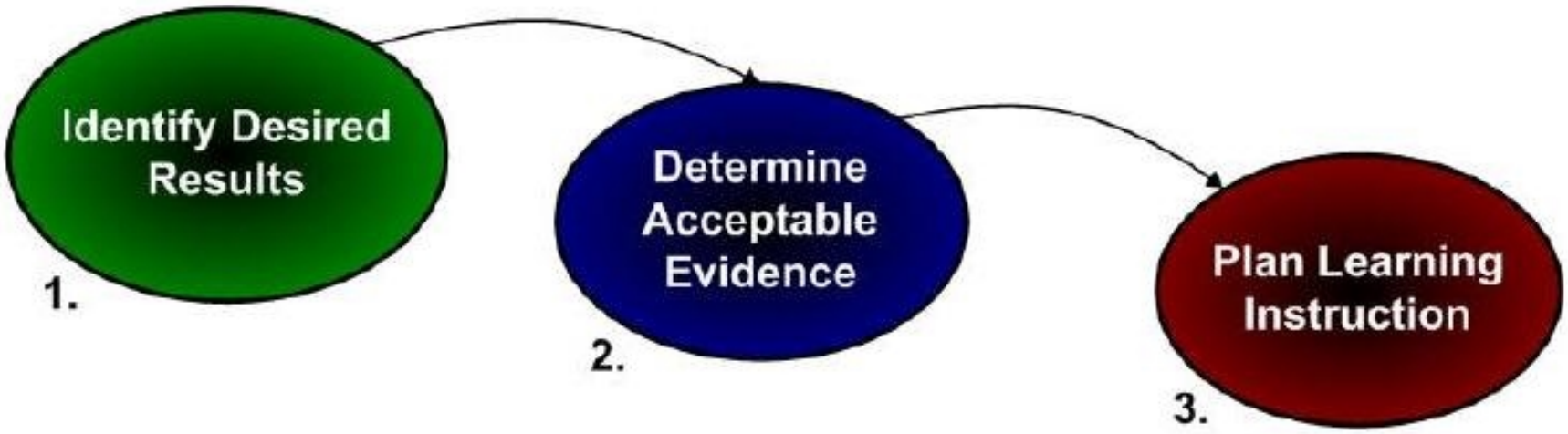
I: Foundations, in brief

- What is assessment for?
  - … and, who is assessment for?
- What makes assessment good?
  - … for what?
- How do we do it well?
  - … given our context and constraints?

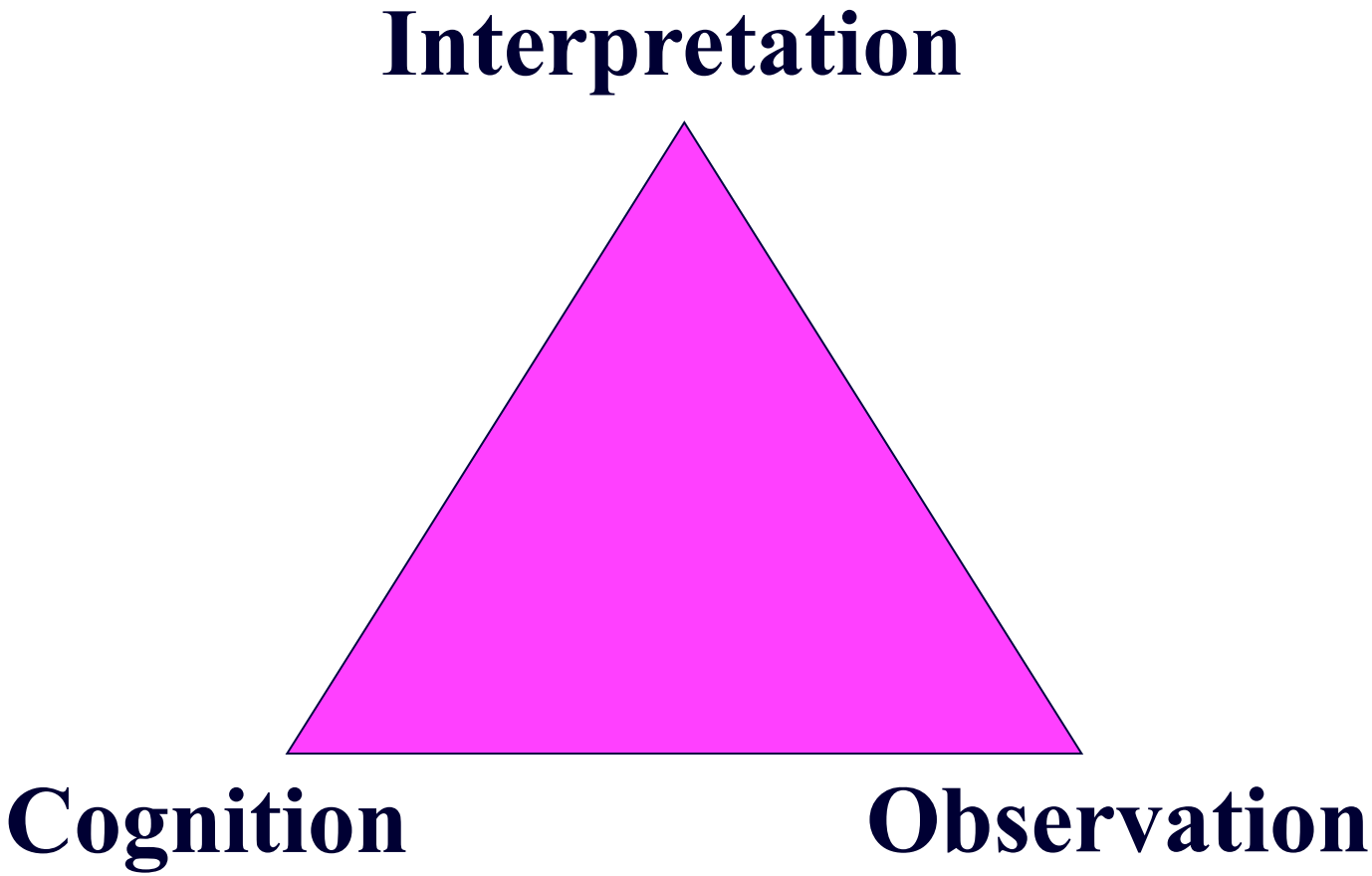
Assessment is part of teaching



Understanding by Design



The assessment triangle



The goal for assessment items

Kids get the item **right** for the right reason, and **wrong** for the right reason.

The right reason is ***understanding of the objective***.

What's involved in the process?

- Creating items and assessments
- Understanding the results of assessments
- What we do in the classroom around this

- What about our students?
  - What should they **know** about this process?
  - What are some important **feelings** to reinforce?
  - Could this improve their **math understanding**?

What makes a good item…

- … on a classroom test?
- … on a large-scale assessment?

- In what ways would the answers be the same?
- In what ways might they differ? Why?

- One helpful criterion: **alignment**

A rectangle has length 3.7 cm and width 5.4 cm. What is its perimeter?

A. 8.1 cm

B. 9.1 cm

C. 16.2 cm

D. 18.2 cm

A. 18.2 cm

B. 18.2 cm^2

C. 19.98 cm

D. 19.98 cm^2

Build a multiple-choice item

- Figure out what you're trying to assess
- Make a task (stem or prompt) and answer it
- What misconceptions most concern you?
- Create distractors based on misconceptions
- Clean up your item and options
- Is it still aligned with the objective?

Building good tests

- Start with good items
- Items, learning goals, and inference
- Using multiple items on a learning goal…
  - at one sitting
  - through time
- Cumulative testing
- Novel learning goals, or asking in a novel way

II: Can teachers learn from tests?

- What can we, as teachers, do with the results?
  - … on our own?
  - … with our colleagues?
  - … with our students?
- Do the results change anything?
  - Instruction?
  - Future assessment?
  - Something else?

You wrote a test. Now what?

- Now that we have good items, how do we as teachers learn from the assessment results?

- All data gets meaning through **comparison**
  - Across domains for one student at one time
  - Across time for one domain for one student
  - Across students for one domain at one time

Grading

- Why do we grade?

- What do **we** really want to know?
- What do we want **students** to know?

- Do we need to grade the way we do?

Growth through time: Proficiencies

VANGUARD HIGH SCHOOL

Geometry — Fall Proficiencies

Student name: Year: **2006/7**

	Angle Relationships		Area and Perimeter		Similarity	Right Triangle Trigonometry		Volume and Surface Area	
Assessments	**Angle A** – *recognizes angle relationships and can find missing angles*	**Angle B** – *can find interior and exterior angles in polygons*	**Area A** – *can determine when area and perimeter are relevant and can find for various polygons*	**Area B** – *determines when to use trig and P.T. in complex problems that don't directly ask*	Can determine if two shapes are similar and find missing lengths in similar shapes	**Trig A** – *can apply trig ratios to find missing lengths in right triangles*	**Trig B** – *Can decide when, where, and how to apply trigonometry in situations beyond right triangles*	**Volume A** – *can explain the difference between (surface) area, perimeter, and volume*	**Volume B** – *knows when volume and surface area should be used, and can find both*
1.23.07	NY	NY	**P**	NY	**P+**	NY	NY	**P+**	NY

P+ means 'Expert'

P means 'Proficient'

NY means you are 'Not Yet' proficient

More comparison: Item analysis

		Identify relation as function from ordered pairs	Evaluate composition of functions	Identify function from graph	Represent function as table from arrow diagram	Solve quadratic trigonometric equation	Apply trig identities to evaluate expression	Identify function from equation	Write rule of composition of functions	Identify absolute value function from graph	Identify equation of inverse of function	Application problem with direct variation	Application problem with inverse variation	Find range of function givenrule and domain	Identify graph of inverse variation	Identify one-to-one function from graph		
Last	**First**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Total**	
		4	**6**	**6**	**6**	**12**	**12**	**5**	**7**	**5**	**5**	**6**	**7**	***6***	**4**	**6**	**91**	**%**
###	###	4	6	6	5	8	12	5		5	4	0					**55**	**60%**
###	###	4	4	6	5	10	12	5	6	5	5	6	7	0	4	5	**84**	92%
###	###	4	6	6	4	8	8	5	7	5	5	6	2	1	4	6	**77**	85%
###	###	3	1	5	4	12	12	2	7	5	4	6	2	6	4	3	**76**	84%
###	###	4	1	5	4	8	12	4	2	3	4	6	2		0		**55**	**60%**
###	###	4	6	4	5	10	12	4	7	5	4	6	2		0	6	**75**	82%
###	###	4	4	6	6	10	7	3	7	5	5	6	2	3	0		**68**	75%
###	###	4	6	6	6	12	12	5	7	5	5	6	7	6	5	9	**101**	111%
###	###	4	6	6	5	12	12	3	7	5	5	4	2	5	0	8	**84**	92%
###	###	4	2	6	6	4	2	2	4	5	5	6	7			4	**57**	**63%**
###	###	4	2	6	5	12	12	4	3	5		6	2	6	0	2	**69**	76%
###	###	4	6	6	5	10	4	3	8	5	5	6	2		4		**68**	75%
	Avg	98%	**69%**	94%	83%	81%	81%	75%	**77%**	97%	85%	89%	**44%**	38%	**44%**	**60%**	12	87%
	SD	7%	35%	11%	12%	20%	30%	23%	28%	12%	10%	30%	33%	42%	56%	*40%*		

Comparisons: the next level

- Increasing the **scope** of comparisons
  - The power of common goals and/or assessments
- Combining **multiple dimensions**
  - Action research
  - More distilled learning goals make this easier
- Shifting the load onto **students**

III: Promoting student thinking

- How can assessment items, and our practices and use of them, promote student thinking?

- What are our ideas?
  - Might think of these as “feel” / “think” / “act”
  - Or, as “before” / “during” / “after” assessment
  - What are some common themes?

An interesting quote

- Students who have been able to explore why the wrong idea is wrong have a more secure and deeper understanding of why the right idea is right.

— Jonathan F. Osborne

Build foundational MC knowledge

- Grading for *work*, not just for the answer (also a way to give more feedback per minute)
- Build understanding of distractors as *errors linked to misconceptions* (not random choices)
- Build effective test-taking habits (really, this is about *critical reading*)
  - Anticipating options
  - Using the information provided

Students can analyze items

- Explain the errors behind distractors
- Devise distractors and write rationales

- Can lead up to writing items, if scaffolded:
  - at the end of a unit
  - for prior learning topics (review)
  - in groups
  - for more “procedural” topics

Students can analyze performance

Algebra 2 Test 8 Analysis					Date
Name:					
#	**Topic of the problem**	**Possible**	**Earned**	**Journal**	**Class %**	**Key Ideas for Problem**
1	**Evaluate composition of functions**	6			**49%**	
2	**Solve quadratic trigonometric equation**	12			80%	
3	**Identify absolute value function from graph**	5			77%	

Which problems did *the class* have the most issues with? Which ones can *you* help with?

What topics should you review? What should you add to your summaries? What do you expect on the next test?

Assessment and cognitive demand

- Low: Recall, recognition, perform procedure
- Medium: Represent, multi-step, integrate, apply, solve a problem, compare, justify
- High: Plan, analyze, judge, create, abstract, generalize, formulate a problem
- (How) does this item make students think?
  - What kinds of items can do each?
  - What kinds of activities can do each?

The growth mindset (Carol Dweck)

Students [with] a growth mindset… believe **their intelligence can be developed over time through their effort and learning**… [and] that everyone can learn and become smarter. [It] creates a framework in which students… see **effort as a good thing** and as a tool for learning and becoming smarter… that setbacks mean that they must… ramp up their effort and look for new study strategies.

Educators need to send a message that intelligence and talent are developed through passion, learning, and persistence… that challenges are fun, effort is satisfying, mistakes are welcome clues, and even failures can put people on the path to success.

Studying: From event to process

- Anticipating test content
- Reworking troublesome items
- The bottom line: Creating agency in students

Other classroom practices

- What methods have you used?
- Sharing challenges and successes
- What are your open questions?

How will this affect your teaching?

- What's one idea you've gained
  or one connection you've made?
- What's one thing you're going to try?
- What's one thing you'll tell someone about?

Thank you!

- Please email with feedback, corrections, questions, ideas, comments, and resources!
- I'm happy to send you these slides

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