

25 August 2017

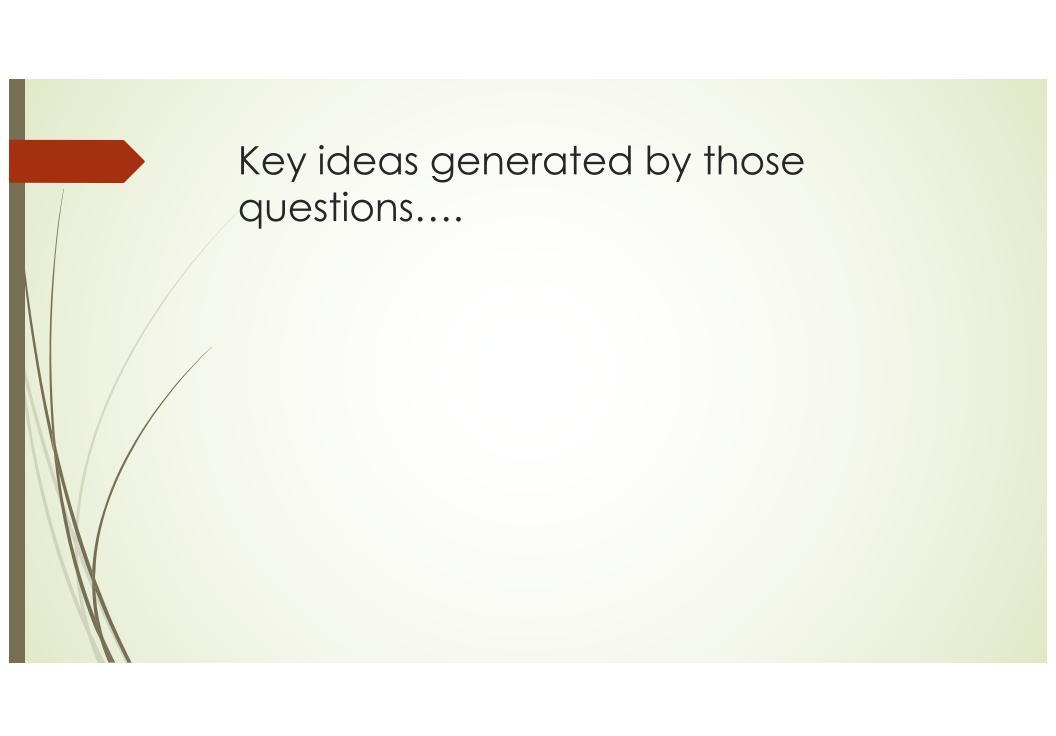
Betsy Bolton

Swarthmore College

Fulbright Scholar, Yonphula MA in English Literature

Please take 2 minutes to write a beginning answer to each of these questions...

- 1. What should my students be able to do intellectually, physically, emotionally, as a result of their learning?
- 2. How can I best help and encourage them to develop those abilities and the habits of heart and mind to use those abilities?
- 3. How can my students and I best understand the nature, quality, and progress of their learning?
- 4. How can I evaluate my efforts to foster that learning?



Recent research into learning

- James Lang, Small Teaching (2016)
- Bernard Carey, How We Learn (2014)
- Peter Brown, Henry Roediger III, Mark McDaniel, Make it Stick: The Science of Successful Learning (2014)
- Ron Ritchart et al, Making Thinking Visible (2011)
- Susan Ambrose et al, How Learning Works: Seven Research-Based Principles for Successful Teaching (2010)
- Grant Wiggin and Jay McTighe, Understanding by Design (2005)
- Ken Bain, What the Best College Professors Do (2004)

Ken Bain,
What the Best College Teachers Do (2004)

Teacher sampling based on evidence...

- that students were satisfied by teaching and inspired to continue learning
- of critical thinking, problem solving, creativity, curiosity, ethical concern, breadth & depth of field-specific knowledge

Ken Bain, What the Best College Teachers Do (2004)

The best teachers

- Have a full understanding of field (active and accomplished scholars)
- Are aware of the history of their discipline and controversies within field—understand how knowledge is constructed in field
- 3. Engage effectively with models of human learning

Please write for 2 minutes a first response to these questions...

What is your understanding of how people learn?

- e.g. learn material and then apply?
- or revise existing understandings?
- or...

What ideas about how people learn are built into the way you were trained to teach?



- 1. Knowledge is constructed, not received
- 2. Questions are crucial
- 3. Mental models change slowly
- 4. Caring is critical

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Teaching = stimulating construction of knowledge (vs. transmitting / absorbing)
We all use mental models to understand new data

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--cognitive science: if memory doesn't ask the question, it won't know where to index the answer

--more questions = more ways to index material; better indexing = greater flexibility, easier recall, richer understanding

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- 2. care enough to grapple with the issue
- 3. handle emotional upset that accompanies challenges to longstanding beliefs

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The trouble with people is not that they don't know but that they know so much that ain't so!

--Josh Billings

Arizona State University introductory physics class (Newtonian laws of motion)

Researchers: Ibrahim Abou Halloun and David Hestenes

Pre-and post-test for students of 4 different professors

- Pre-test: students have Aristotelian + 14thc. impetus understanding of physics
- Post-test: most, including top students, retain original understanding of physics

- Researchers probe results through individual interviews
- Questions ask for predictions about motion: answers = Aristotelian
- Halloun and Hestenes perform experiment
- Students argue that results do not apply to the principle in question

When researchers pointed out the contradiction between belief and result, students (including those who received top scores in the class) "tended at first not to question their own beliefs, but to argue that the observed instance was governed by some other law or principle and the principle they were using applied to a slightly different case."



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Small Teaching

"Much of what we've been doing as teachers and students isn't serving us well, but some comparatively simple changes could make a big difference."

Brown, Roediger, McDaniel

Make it Stick (Harvard UP, 2014)

Motivating student learning (James Lang)

- Purposeful Learning
 - Self-oriented + self-transcendent
- Mastery Orientation
 - Learner in charge of learning
- Growth Mindset (Carol Dweck)
 - Intelligence fixed or malleable?

Self-Transcendence

Motives	<u>Persistence</u>
• Weak self-transcendent	30%
 Moderate self-transcendent 	57%
 Strong self-transcendent 	64%
"Boring But Important" (2014)	
Yeager, D'Mello, et al	

Motivating student learning (James Lang)

- Purposeful Learning
 - Self-oriented + self-transcendent
- How can you increase your students' commitment to learning, both on their own behalf and on behalf of a larger community? (2 min)

Motivating student learning (James Lang)

- Purposeful Learning
 - Self-oriented + self-transcendent
- Mastery Orientation
 - Learner in charge of learning

Mastery Oriented Classes

1) They "give students **a sense of** control over either the process or product."

2) They "[allow] students to **have a say** in establishing priorities in task completion."

Journal of Educational Psychology

Creating Mastery Orientation

"Where possible, allow students to choose among options and make **choices** that are consistent with their goals and the activities that they value."

Susan Ambrose et al

"One important rule for helping people learn is to help the learner feel she is in **control**."

James Zull

Motivating student learning (James Lang)

- Mastery Orientation
 - Learner in charge of learning
- What small changes might you make in your teaching to increase students' sense of mastery in the classroom? (2 min)
 - OR: Why might you not want to make such changes? (2 min)

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Fixed Mindset Communications

- "He said: 'You either know the formulas and concepts or you don't. You either are the kind of person how has the skills to understand math or you don't."
- "My professor said: '30% of you will fail, 20% of you will get D's. It happens every year and it will happen this year to you."

Growth Mindset Communications

• "I had one math professor who described a student from a previous semester who he said was not naturally good at math, however, he regularly attended office hours and asked questions, and ended up getting the highest grade in the class. He told the story to encourage students to ask questions and attend office hours."

Mary Murphy

"Faculty Mindsets: How Faculty Signal Fixed and Growth Beliefs to College Students"





- Before class begins
- ■1st 5 minutes
- Making connections
- Last 5 minutes

Before class begins...

- How are you? (Build relationships—most important and memorable aspect of college.)
- Show the framework. (Post class agenda on board and refer back to transitions.)
- Create wonder. (Image/quotation: What do you notice? What do you wonder? Move from informal to brief guided discussion.)

1st 5 minutes: writing exercises

- Open with questions (return to them at the end of class). Important, provocative questions.
- Retrieval practice: What did we learn last time? Outline on board, revising and giving feedback to ensure accuracy. No notes, computers or memory aids.
- Re-activate previous knowledge. What do you know about x? What have you heard about it?

Making connections

- Commonplace books (10 minutes once per week):
 - Most important thing learned that day & why matters to them or society
 - One way day's content manifests in daily lives
 - Describe how today's material connects to last week's.

Last 5 minutes of class:

- One-minute paper (2 minutes)
 - What was the most important thing you learned today?
 - What question still remains in your mind?
- Metacognition: discuss options for study/learning.
- Close the loop: return to opening questions.

One-minute paper (write for 2 min)

- Which small teaching techniques and principles seem most useful to you and why?
- What kinds of research into learning do you want to know more about?

Principles:

Purposeful learning Mastery orientation Growth mindset

Techniques:

Before class: build relationship, post agenda, create wonder

1st 5 min: important questions, retrieval practice, reactivate prior knowledge

Making connections: what's most important and why, connect to daily lives,

connect to previous material

Last 5 min: one-minute paper, metacognition, return to opening questions

Return to opening questions: How might today's discussion affect your answers?

- 1. What should my students be able to do intellectually, physically, emotionally, as a result of their learning?
- 2. How can I best help and encourage them to develop those abilities and the habits of heart and mind to use those abilities?
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Small Teaching (and Learning) Bibliography

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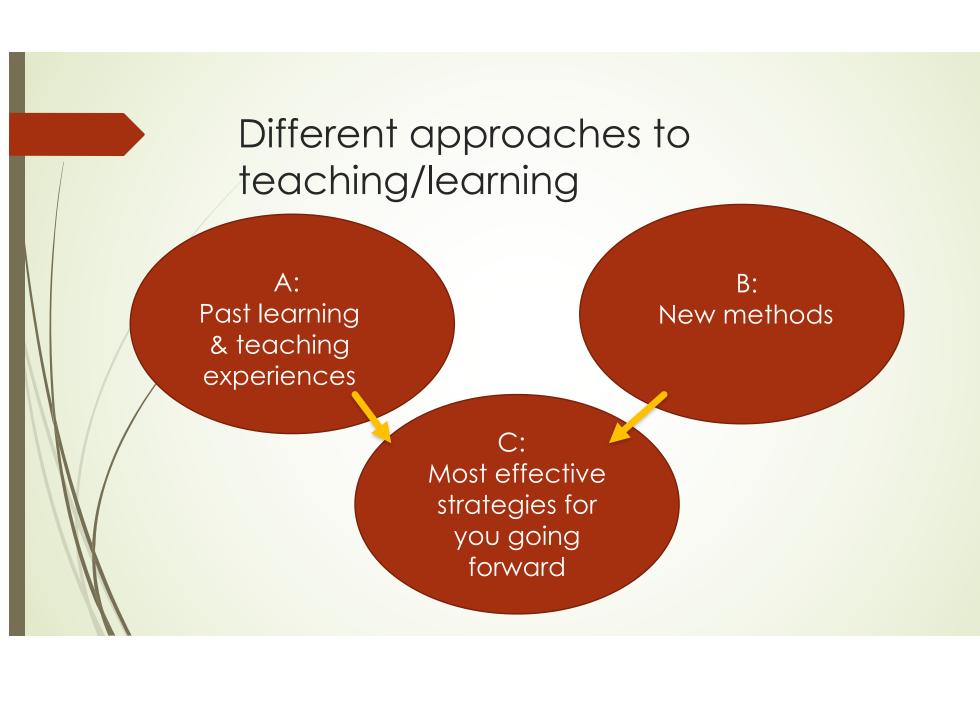
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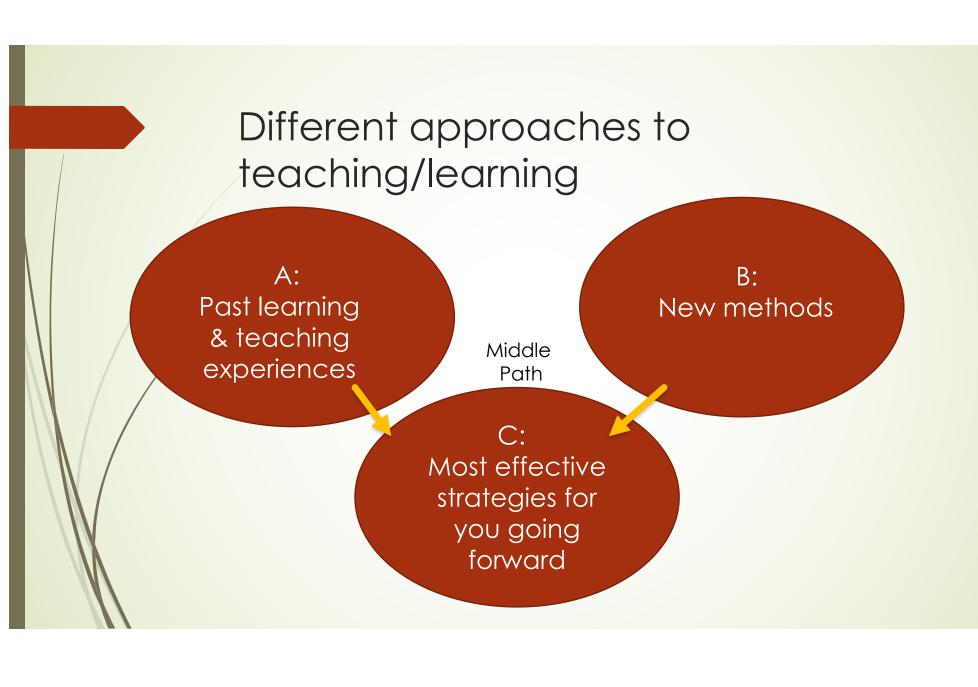
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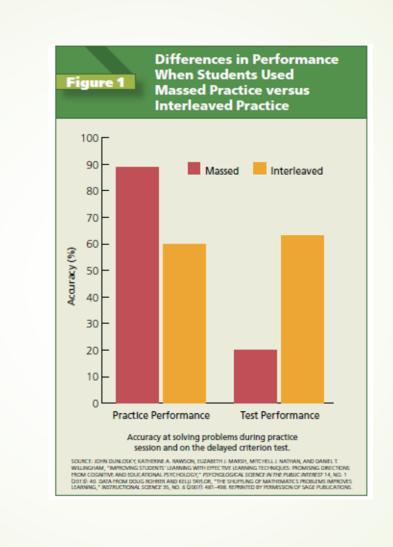




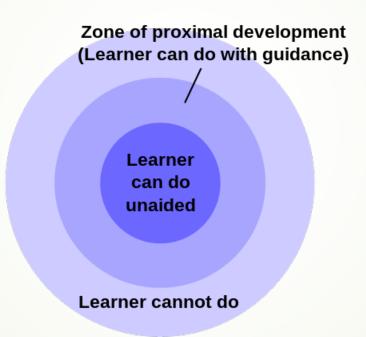


from Bernard Carey, "How we learn"

- Retrieval practice improves memory
 - Taking a position heightens attention and increases learning
- Breaking up study time: repetition and reinforcement over time
 - 30 minutes vs. 3 x 10 minutes = 11/20 vs. 15/20 correct answers
- Interleaving slows learning but improves comprehension
 - Dunlowsky, Strengthening the student toolbox (figure)
 - Volume of wedge, spherical cone, spheroid, etc.



Zone of proximal development (Vygotsky)



Scaffolding: creating structures that help students learn in the zone of proximal development

Classroom as a community of practice (Vygotsky)

- We support one another in developing new skills and understanding.
- Many eyes see more broadly and more deeply than a single perspective.
- If, as Shelley, argues, imagination is a fundamentally moral act—a going out of oneself into the experience of others—then listening to one another is an important echo of that creative and moral action.

Design Thinking (education and innovation centers like Google)

1. Discovery

Choose an affirmative, strategic topic. Gather data. Understand & empathize with unmet needs.

2. (Re)Frame opportunity

Look for patterns & insights. Question assumptions. Frame your POV. Define your scope.

3. Incubate

Switch gears. Feed your brain with diverse stimuli. Meditate. Sleep on it.

8. Iterate & Scale

Evaluate. Learn. Create. Innovate.

7. Deliver

Final testing, approval and launch.

6. Rapid Prototype /test

Think big, act small, fail fast; learn from end-users and refine.

5. Evaluate/Refine ideas

What is desirable, feasible, viable about your ideas? What are the constraints?

Experiment. Explore possibilities. Envision a desired future. Co-create in diverse team. Make your ideas visible.

4. Ideate/

illuminate

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