A short story on teaching and learning

The case of the accidental teaching award.
Please maintain silence while you answer (to yourself only) the following question.

In your estimation, how many people in this room have been to (visited the city, not just the airport) London, England? (Which of the following is closest?)

10% of the total number of people in the room?
25% of the total
50% of the total
75% of the total
100% of the total
Write your chosen percentage in giant characters on one of the half-sheets.

Be ready to hold up your half-sheet to show your answer when you are asked to do so.
How did you arrive at your estimate?
Show of hands:

How many of you have actually been to London, England (and not just the airport)?
Now that you know the answer, reflect and self-assess: which of the following is the most accurate evaluation of your estimate?

A. Awesome (I nailed it!). I know my colleagues!
B. Not bad for a higher ed worker
C. Pretty far off base: I need to reconsider my plan for a career as an actuary
D. OMG I’m Clueless (I must live on another planet!)
Why did we do this exercise?
Work with your neighbors at your table to decide:

What’s the difference between these two ways of responding to “facts”?

“In today’s lecture the professor said that 80% of young Americans will use an illegal substance before they are 21 years old. I’m sure I’ll need to remember that.”

&

“Earlier, I estimated that 70% of Young Americans are likely to try illegal substances, because of factors A, B and C. This turned out to be an OK guess, since the actual research showed it was 80%. I may have misjudged the importance of factor B, but now I see why it was important.”
The *sine qua non* of deep learning

Ownership + Agency
Our Teaching Challenge at all levels

Generally:

How can we teach in ways that implicate students more directly, because of what they already know or how they already think?

&

Specifically:

How do we teach our disciplinary content in ways that cause students to integrate that content into their own stories (i.e. narratives) of understanding?
Where are we going?
An outline of this session

1. Case I: What did he say?
2. Principles of adult (human!!) learning
   a. Expectation
   b. Cognition
   c. Application
3. Case II: Assessment and Exit
Watch this clip of a history class:

• What do you see that is effective in what this professor is doing?

Case #1
We haven’t changed that much in 100’s of years.
Why a “public reading” ("lecture") was a cutting edge learning tool in 1200 AD:

Not many books

Not many readers
The university was born before the printing press, when the primary tools for learning were...

--sermons, parables, stories (oral traditions)
--dramatic recitations
--conversations with a mentor/master
--public readings (when there were books and readers)
--rituals, theatrical performances
--stained glass window narratives
--other church statuary and art
A liberating conception

A “lecture” (like a sermon, a statue, a fable, a pencil, a video clip, a conversation with an expert, practice problem sets, a whiteboard, etc.) is a highly valuable **tool** for learning.

But...

A “lecture” is no more a “method” of teaching than a hammer is a “method” of architecture.
Challenges for the user of “lectures” in the age of Google, Wikipedia, Youtube, etc.

(where profs are a very minor source of information)
Challenges

1. What will cause students to be attentive to what I’m going to say? (anticipation of its value beyond merely professorial authority or what can be found online)

2. What’s the shape of inherently engaging information? (cognitive process)

3. What concrete student product or action does the lecture point to? (perception of immediate application, use)
Challenges for the user of lectures

1. What will cause students to be attentive to what I’m going to say? (anticipation of its value)

2. What’s the shape of inherently engaging information? (cognitive process)

3. What concrete student product or action does the lecture point to? (perception of immediate application, use)
What is the question to which the answer is "9, W"?

**Answer:**

Do you spell your name with a "V", Mr. Wagner?

(Nein, "W")
This Joke illustrates serious, common challenges for our students (both undergrad and grad):

• Un-readiness (Missing Conceptual Context) to integrate new information
• Lack of perspective (ability to differentiate critical from trivial)
• Lack of shared disciplinary language
Let’s try again:

What is the question to which the answer is...
“...particles suspended in a fluid are continuously bombarded by the surrounding fluid molecules. This constant bombardment results in a random motion of the particles known as *Brownian motion*. A satisfactory description of this regular motion can be obtained ignoring the detailed structure of the particle-fluid molecule interaction if we assume that what happens to the aerosol fluid system at a given time $t$ depends only on the system state at time $t$. Stochastic processes with this property are known as...”
“Silent Jeopardy”

A common but meaningless, time-consuming game we play with students when we fail to activate in them the questions that our lectures are supposedly answering.

(activate questions ≠ tell them the questions)
Lectures, Textbooks = Long answers...

...to questions that students have never asked.
Activating Questions:

An example from Sociology
Work alone:
Rank the following from least offensive to most offensive

A. Mugging a stranger on the street
B. Taking a pen from work
C. A woman wearing pants
D. Failing to scoop your dog’s poop in the local park
E. Stealing food to feed your starving children
F. Coming to work drunk
G. Helping a terminally ill friend commit suicide
H. Denting the car ahead when parallel parking
I. Stealing a coat from a store

(Thanks to Erica Hunter, Sociology, University at Albany)
Write the letter of your selection of the “least” offensive act on one of the half-sheets, and be prepared to show it when asked.
Work as a group at your table

Write the letter of your group’s selection for “most” offensive act on one of the half-sheets, and be prepared to show it when asked.
We could have begun this topic another way...
Merton’s Theory on Deviance

Merton's theory on deviance stems from his 1938 analysis of the relationship between culture, structure and anomie. Merton defines culture as an "organized set of normative values governing behavior which is common to members of a designated society or group". Social structures are the "organized set of social relationships in which members of the society or group are variously implicated". Anomie, the state of normlessness, arises when there is "an acute disjunction between the cultural norms and goals and the socially structured capacities of members of the group to act in accord with them". In his theory, Merton links anomie with deviance and argues that the discontinuity between culture and structure have the dysfunctional consequence of leading to deviance within society.

The term anomie, derived from Émile Durkheim, for Merton means a discontinuity between cultural goals and the legitimate means available for reaching them. Applied to the United States he sees the American dream as an emphasis on the goal of monetary success but without the corresponding emphasis on the legitimate avenues to march toward this goal.
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Merton’s Theory on Deviance

--Could be introduced in a lecture.
--Could be introduced in a reading assignment.
--Could be introduced in a video clip.

OR,

--Could be introduced via a “STAGING” (e.g., the ranking exercise) that forces students to start by observing, reflecting and making preliminary, relevant distinctions and judgments on their own.
For more intense cognitive engagement of your students:

Don’t lecture, unless you have pushed the students to a point where they ask for (Demand! Need!) the information in order to solve a specific problem or improve a specific decision.
Example from Environmental Chemistry:

You have 2 minutes.

Work as a group at your table to answer the questions on the following slide.

(Professors of Chemistry, Environmental or Earth Sciences, please recuse yourself)
Work as a group:

Which line is temperature?

Which line is pressure?

Why?
When given the signal...

If your group thinks the curvy line is temperature and the straight line is pressure, hold up the letter B.

If your group thinks the curvy line is pressure, and the straight line is temperature, hold up the letter C.
All significant learning begins with productive frustration.

Productive frustration is the basis for CURIOSITY.
Inducing Curiosity

Frontload in your lecture a playfully frustrating thinking activity, such as...

- a naïve analysis of an image or representation of data
- a speculative or predictive challenge
- a problem beyond the familiar
- analysis of a short text (mini-case)
- analysis of a small data-set
- a blank chart or graph, where students supply estimates of data
From Psychology: Draw the curve predicting attention span over a 75 minute, traditionally taught lecture class.
From a course in geography and urban planning:

Draw lines to complete the pie chart indicating your estimate (in percentage of total) of ethnic populations in NY City: Latino; Black; White; Asian; Native American
White 42
Latino 25
Black 23
Asian 10
Native American <1.0
Forcing an action allows you to ask...

WHY?

The response to “why” is the doorway to your content.
Inquiry’s essential tool: ERROR

Authentic error
(used by experts to make knowledge)

Vs

Manufactured error
(used by teachers to make grades)
Challenges for the university lecturer
(in a world where profs are a very minor source of information)

1. What will cause students to be attentive to what I’m going to say? (anticipation of its value beyond authority structure)

2. What’s the shape of inherently engaging information? (cognitive process)

3. What concrete student product or action does the lecture point to? (expectations for application, use)
The Scientific Method is the shape of learning

1. Observe, find questions
2. Make a hypothesis or prediction to help generate data
3. Collect data, test, observe more closely, study, read
4. Draw conclusions, reflect, consider alternate theories, revise hypothesis/prediction
5. Repeat as needed

Your course CONTENT needs to help students track to this scheme.
The scientific method serves curiosity and is future-oriented: here’s a mystery; I wonder how we’ll resolve it? I wonder what’s coming!

Traditional approaches are past-oriented: here’s something that someone else has already done; it’s ready; learn it and use it

YOUR BRAIN IS FUTURE ORIENTED!!!
Where does your course point?

Past:
Everything you need is in these texts and lectures. Read/Listen and you’ll do fine.

Future:
You’re going to be surprised by what happens in this course. Let’s try this and see what happens; see what you learn. We’re going to find out if what you already know or believe holds up under testing (aim past at the future!) We’re going to look at things you’ve never seen and try to make sense of them.
The scientific method is fundamentally a narrative (story) in the making:

1. What are we puzzled by? What is the mystery?
2. How do we learn something about this unknown? What should we do?
3. What’s happens when we do something? What is revealed? What’s the surprise?
4. What are the consequences of what we did? What do we learn?
5. What’s next? What will happen in the sequel?
Sample “plot” comparison from Computer Science

Version A, from the textbook and lecture

1. Everybody study the following code sequence: XYZMPQ...etc. This is the code that you will need to use to make the robot turn around.
2. Here’s why, and here’s an example of how you can use the code to make the robot turn.
3. Now do it: put together the code sequence to turn the robot around.

Version B, from a learning sequence based on a real learning scheme:

1. Watch this robot dance. (phenomenon, data, engagement)
2. Look at these three sets of code. Which of them (A,B,C) is most likely to have caused the dancing that you saw? (mystery)
3. Now point out the specific piece of code that you think is most consequential in causing the robot to turn around. Why? What are the clues?
4. How would you change the code to make the robot turn in the opposite direction?
5. Study this code and use it whenever you want to make robots turn around.
An example from health science

What are the leading causes of death among American adults?
According to CDC data, which causes of death among American adults correspond to the above indicated death rates (data from 2007)? Match the columns above with the causes listed below. **Work as a group.**

Drowning; Fire; Radon Poisoning; Drunk Driving; Falling in the home; Carbon Monoxide Poisoning; Electrocution
On a half-sheet, write down (in big letters) the cause of death that your group determined to be the highest.

Be prepared to hold up your answer when you get the signal.
Let’s hear your reasoning.
The story

Mystery: what are the key factors/conditions leading to death among adult Americans?

Investigation/analysis: look at these possible causes of death. Rank them based on what you believe you already know.

Tell the story more completely. Explain why some factors are likely to be more significant than others.

Here is some new information. Does this alter your judgment?

Here’s a new mystery (question): what would your estimate be, given the principles you have just learned?
A narrative of understanding

I used to think X.

But now, because I understand A, B, and C, I think Y.
The Learning Sandwich

Concrete Experience (observation, action, decision)

Theory, concepts, “information”

Concrete Experience (application of theory, concepts)
Challenges for the university lecturer
(in a world where profs are a very minor source of information)

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Let’s test (apply!) what have you learned so far
Watch the following clip of a lecture from a course in philosophy.

Conduct an analysis of this instructor’s approach. In what ways does his method and technique illustrate some of the ideas from the current workshop?

Case #2
This task was an “immediate application” of what you encountered in the workshop.
Application: Use the information or perspective provided by the lecture immediately to...

• “Tell a new story”
• Solve a new problem immediately
• Develop a new question to investigate
Summary—principles of effective lecturing

1. **Curiosity**: Like you and me, students will be more engaged with your content when they anticipate its immediate value (i.e., it will respond to their individual questions, perspectives, etc.).

2. **Cognition**: Students need to “think along” by being put in the driver’s seat of disciplinary thinking: questions; predictions; speculations; educated guesses: making/experiencing the “story” of making knowledge.

3. **Purpose, Assessment, Accountability**: Students need to know that they will ALWAYS have to do something immediate and concrete with the content you are providing them.
What was on the napkin?
(How does the story end?)

1. Experience
2. Reflection
3. Information
4. Application
5. Evaluation

(Pick up a handout on “A Simple Plan” as you leave!)