There are some very good reasons to lecture when you are teaching—and equally good reasons why you’ve heard that lecturing does not work for student learning. The key is “strategic activation” of the information and ideas that you are trying to communicate, so students are engaged in what you are saying.
What are the reasons for which anyone would want to listen to a lecture?
What are the reasons for which a student would want to listen to a lecture?
The purpose of a warm-up:

Get buy-in from students:

• Bring students into the framework of the lecture by assessing what they already know/believe/think.

• Validate students’ role by publicly acknowledging their words.
Where are we going?
An outline of today’s lecture

1. 1st Case: What did he say?
2. Micro-history
3. Managing student motivation
   a. anticipation
   b. cognition
   c. application
4. 2nd Case Study: Does size matter?
5. Assessment and Exit
Watch this clip of a history class:

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

• What would you like to tell this professor?

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

Not many books

Not many readers
Before the printing press and the internet there were...

--sermons, parables, stories (oral traditions)
--dramatic recitations
--public readings (when there were books and readers)
--rituals, theatrical performances
--stained glass window narratives
--other church statuary and art
Student motivation challenges for the lecturer
(in a world where profs are a very minor source of information)

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

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

3. What concrete student product or action does the lecture point to? (expectations for application, use)
Student motivation challenges for the lecturer 
*(in a world where profs are a very minor source of information)*

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

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What is the question to which the answer is “chicken teriyaki”?

Answer:
What is the name of the only living kamikaze pilot?
"...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
“Silent Jeopardy”

A boring quiz game we risk playing with students when we fail to activate in them the questions that our lectures are supposedly answering.

(activate ≠ tell)
Lectures & Textbooks = Long answers...

...to questions that students have never asked.
Tips for avoiding “Silent Jeopardy”

1. Develop your lecture as a Q&A—a series of answers to questions based in student perception and need.

2. Even better: Elicit from students (via a short task) the questions that you want them to ask, so you can answer them.
One technique that will cause students to be curious about what I’m going to say:

**Frontload a thinking activity, such as...**

a Conceptest *(Mazur)*
a speculative or predictive challenge
a problem beyond the familiar
analysis of a short text (mini-case)
analysis of a small data-set
analysis of an image or representation of data
Sample front-end activities
Speculation:
Draw the curve showing student attention over a 50 minute class.
Sample Front-End Activity: **Fermi Problems**

On a Saturday afternoon, you pull into a parking lot with unmetered spaces near a shopping area. You circle around, but there are no empty spots. You decide to wait at one end of the lot where you can see (and command) about 20 spaces. How long do you have to wait before someone frees up a space?

(Mazur, Eric, The Problem with problems, Optics and Photonics, June 1996)
Fermi problems ask us to

a) Make assumptions
b) Make estimates
c) Develop a model
d) Work out the model
Sample front-end activity from sociology (Subjects = university professors)

What might explain these data? What questions do you have about the research process used to generate these data?
One historian’s awakening

“The irony, of course, is that I had always considered myself quite savvy when it came to using images in my teaching. In fact, it was a slide of an electric-shock machine that had stimulated my students’ questions. But like many of my colleagues, I used those images as background wallpaper. They helped students visualize the past, but we did not analyze or explore any of the objects or images in detail...Why didn’t I push my students to delve deeper?”

Techniques for “Frontloading”

“Puzzling” tasks that feed into the lecture topic help students formulate the questions needed to make the lecture relevant.
Student motivation challenges for the lecturer
(in a world where profs are a very minor source of information)

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

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

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

1. Observe, find questions
2. Make a hypothesis or prediction to help generate data
3. Collect data, test, observe more closely, study
4. Draw conclusions, reflect, consider alternate theories, revise hypothesis/prediction
5. Repeat as needed
The scientific method is fundamentally a narrative (story):

1. What were we puzzled by? What was the unknown, the mystery?
2. How did we learn something about this unknown? What did we do?
3. What happened? What was revealed? What was the surprise?
4. What were the consequences of what we did? (denouement)
5. What’s next? What will happen in the sequel?
What’s the intrinsic “story” of the information in your lecture?

What’s the mystery?
Who are the “actors”?
What’s the plot?
What happened when X did Y?
What are the consequences?
What’s next?
Sample “plot” comparison from Computer Science

Compare Version A, from the textbook and lecture

1. Everybody memorize the following code sequence: XYZMPQ...etc.
2. This is the code that you will use to make the robot turn around.
3. Here’s an example of how you can use the code to make the robot turn.
4. Now do it: write the code sequence to turn the robot around.

With Version B, from a creative active-learning lecture:

1. Watch this robot dance. (phenomenon)
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 pieces of code that you think are most likely to cause 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. Memorize this code and use it when you want to make the robot turn around.
Stories are interesting because they are inductive: evidence gathers toward an event

Compare a DEDUCTIVE sequence
1. Here is the concept X
2. Here is an example of X
3. Here is a new example: apply the concept

With an INDUCTIVE sequence
1. Here is an example of something: what is it?
2. It might be X. It might be Y. What’s the difference?
3. Here is another example: is it similar?
4. What seems to be the concept that causes these items to be similar/different?
Brain’s Learning cycle (diagram from Paul Zull)

Sensory cortex
Sense

Action
Motor cortex

Connections / meanings
Back integrative cortex

Ideas/Plans
Front integrative cortex
• Another reason why the slow-growing, inductive narrative works better than the top-down deductive “explanation”...
“...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
Broadbent Model
Motivational challenges for the lecturer

1. What will cause students to be curious about and want to listen to what I’m saying?

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

3. What concrete student product or action does the lecture point to? (expectations for application, use)
Application: Use the lecture information to...

“Tell a new story”
Solve a new problem immediately
Develop a new question to investigate
The case of the newbie instructor

You have a new colleague who is about to teach a large freshman-sophomore class in your department for the very first time. This class is key for recruitment of students into your academic program. Your colleague has a quiet, retiring personality. You are concerned that he/she will not be able to engage students effectively in your discipline. Based on today’s workshop, what are you going to recommend that he/she do?
Techniques for immediate application of lecture content

- Minute paper (See Angelo and Cross’ CATs)
- 1-2 question “application quiz”
- Clicker questions
- Students write quiz questions on the lecture
- Small group problem/task
- Analysis of a new but related object/piece-of-data/text, for example...
Watch the following video clip of a large lecture (n=500+) on the topic of “Utilitarianism”

Ask you watch, consider:

How does this lecture demonstrate some of the concepts presented in this workshop on interactive lecturing?

What would you suggest to this professor that he could do in addition to what he’s already doing?

Case #2
Assessment

Your discussion of the second clip was an application (& assessment task) based on the ideas of the workshop.
Summary—principles of effective lecturing

1. Motivation: Like you and me, students will be curious about the content of the lecture when they anticipate that it will be of 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 have to do something immediate and concrete with the lecture’s content.
Mastering the Interactive Lecture
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