

Active Learning

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Learning outcomes for this session

Participants will be able to:

- Define active learning
- Describe the difference between the transmissionist and constructivist models of learning
- Present arguments for the use of active learning
- Identify ways to apply active learning in the classroom

(Presentation adapted from Handlesman and Wood)



As a TF, I want to...?

1. Keep students actively engaged and interested in the material.
2. Review the material in the same format as lecture.
3. Give my students all As so that they will like me.
4. Give my students all Cs so that they will respect my authority!
5. Reduce my section size by weeding out those not capable of doing science.

Passive versus Active Learning

Passive learning: Traditional lecturing, instructor centered.

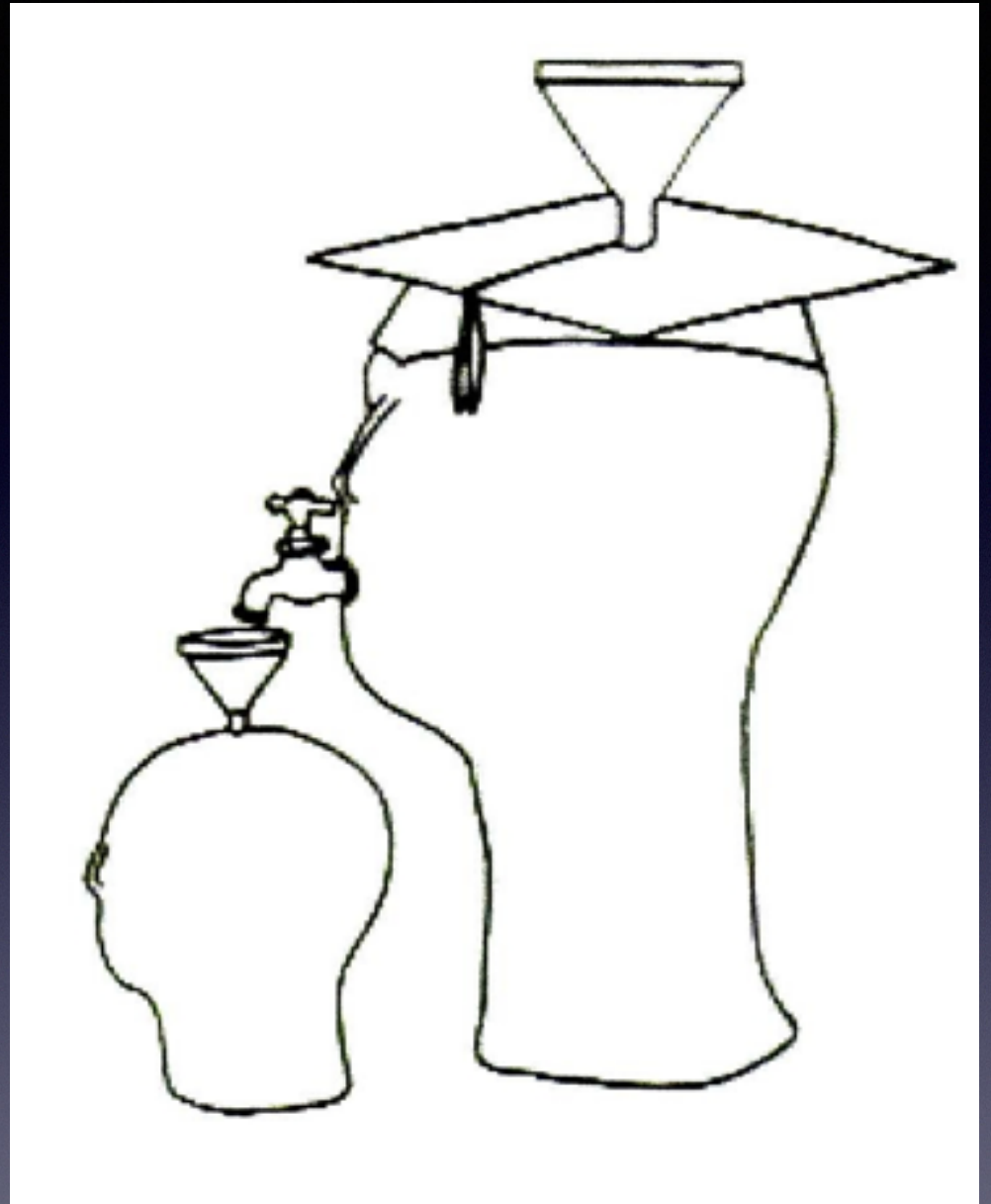
Active learning: engaging students in activities, student centered.

Active Learning

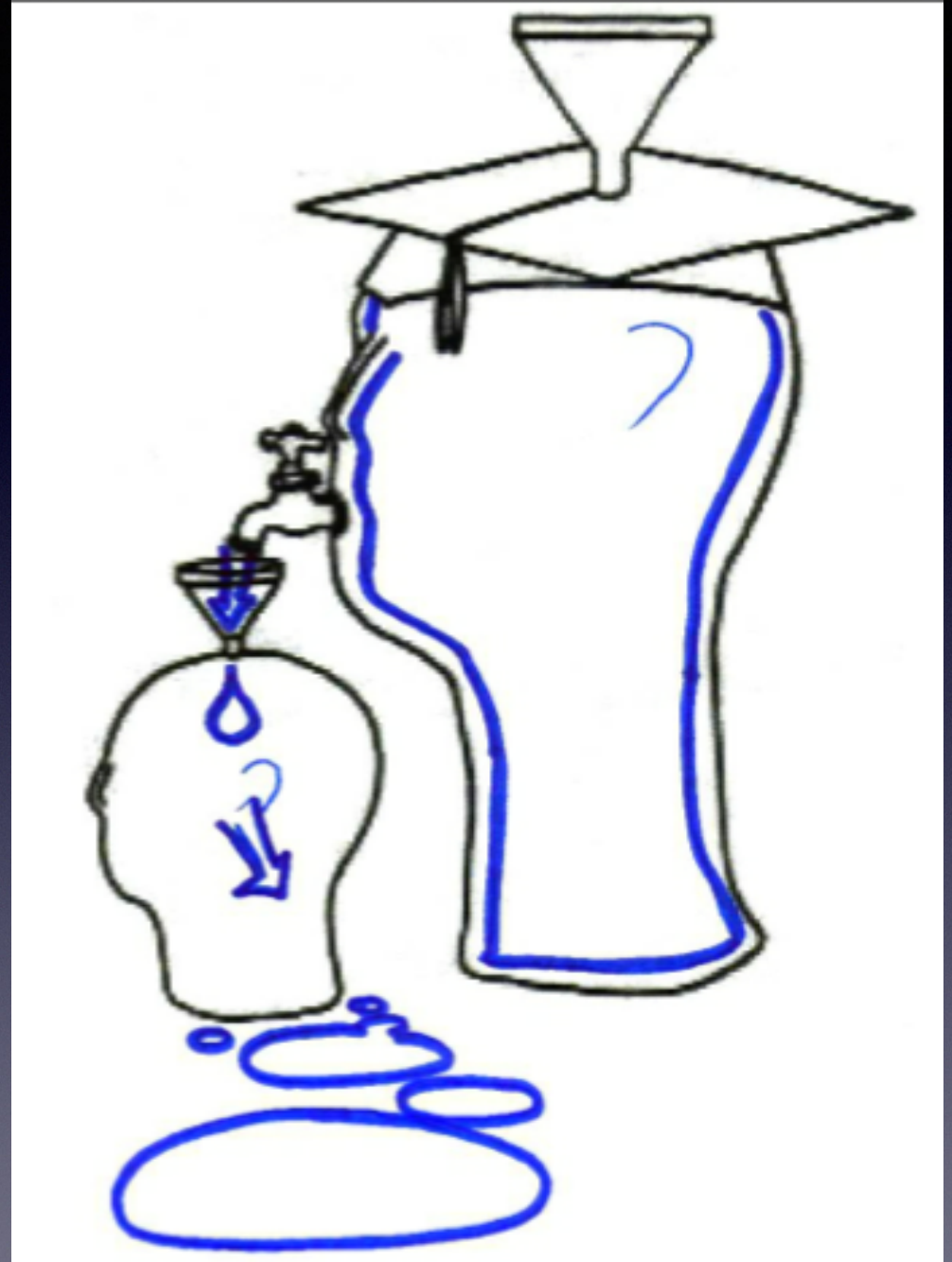
Almost any activity, **preferably one that is cooperative and with timely feedback**, that requires students to recall, think about, apply, and verbalize concepts.

As students participate in these activities, they construct new knowledge and build new scientific skills.

"Transmissionist"
method of learning.



"Transmissionist"
method of learning.



Transmissionist

vs

Constructivist

Lecturer: I know a lot about this topic, so I will transmit my knowledge to you by telling you about it.

Facilitator: I know a lot about this topic, so I will create situations and present challenges for you so that you construct your own knowledge and understanding.

Compelling evidence supports the constructivist view of how learning works.

Yet most instructors in large classes teach mostly by lecturing!

I have concrete ideas on how to keep my students actively engaged.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

How do students construct their own knowledge?



Active learning allows students and instructors to gauge students' progress during learning.

Passive vs. Active Learning

On your own:

Imagine that you observe a randomly chosen STEM lecture. Write down three ways you can tell whether that class uses active learning (2 minutes).

Then, with your table:

Discuss these ideas and pick one that best characterizes active learning (3 minutes).

Be prepared to make your case to the entire group.



In general, students learn more through active learning methods than they do in traditional lectures.

1. Yes, there is a lot of convincing data in support of this approach.
2. Yes, I've taken (or taught) classes that use active learning, and it works. That's enough to convince me!
3. Yes, but I think you lose a lot of content.
4. Maybe: there is a lot of data out there, but it's not convincing.
5. Maybe, but I'm not familiar with the literature.
6. No, the data do not support this idea.

Education Research

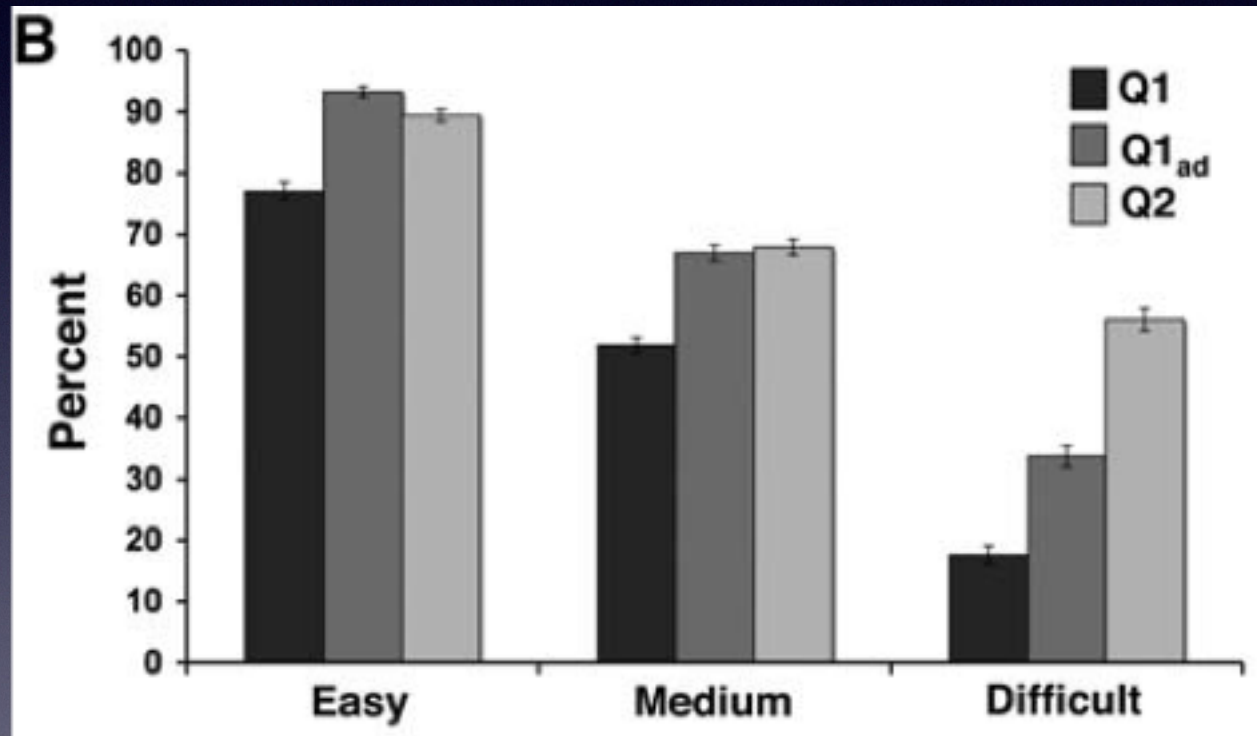
Read quietly for 10 minutes, then discuss the paper with your group for 10 minutes.

The prompt questions are intended to guide your reading.

Select representatives to present the key figure.

Why Peer Discussion Improves Student Performances on In-Class Concept Questions

Figure 1



Graduate students' teaching experiences improve their methodological research skills

Figure 1

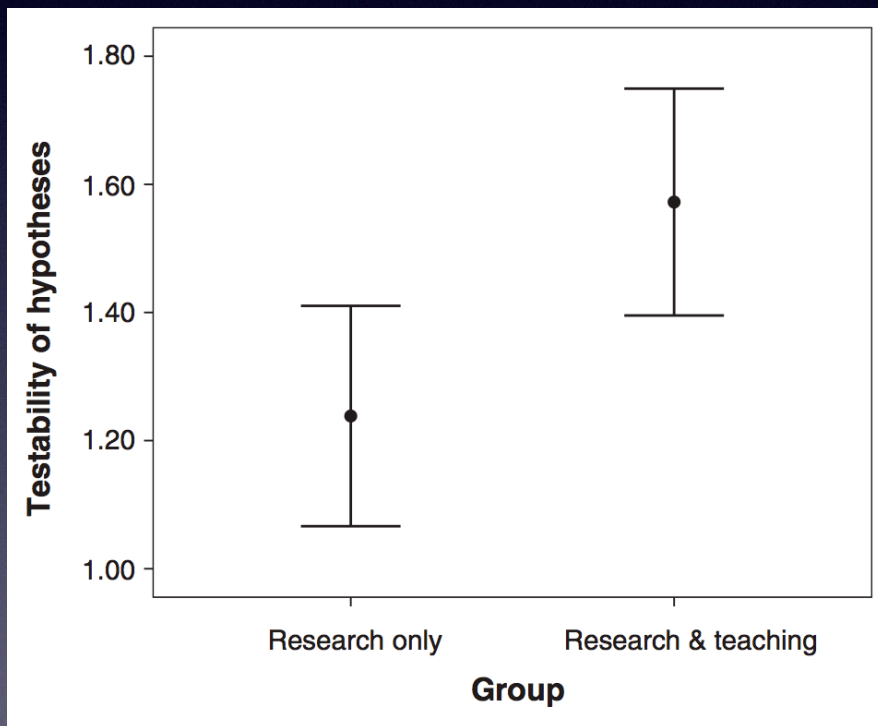
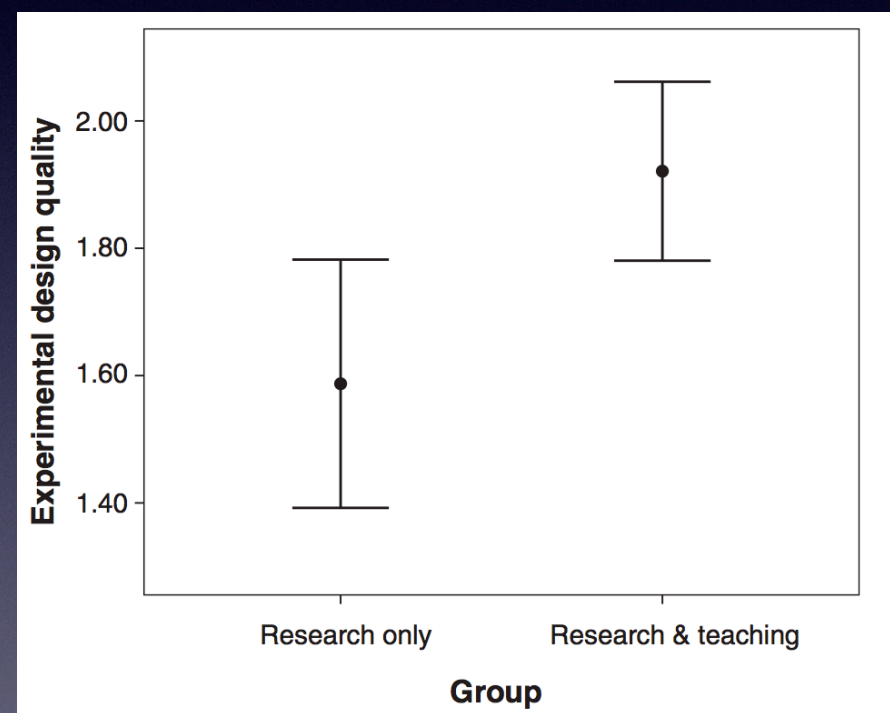
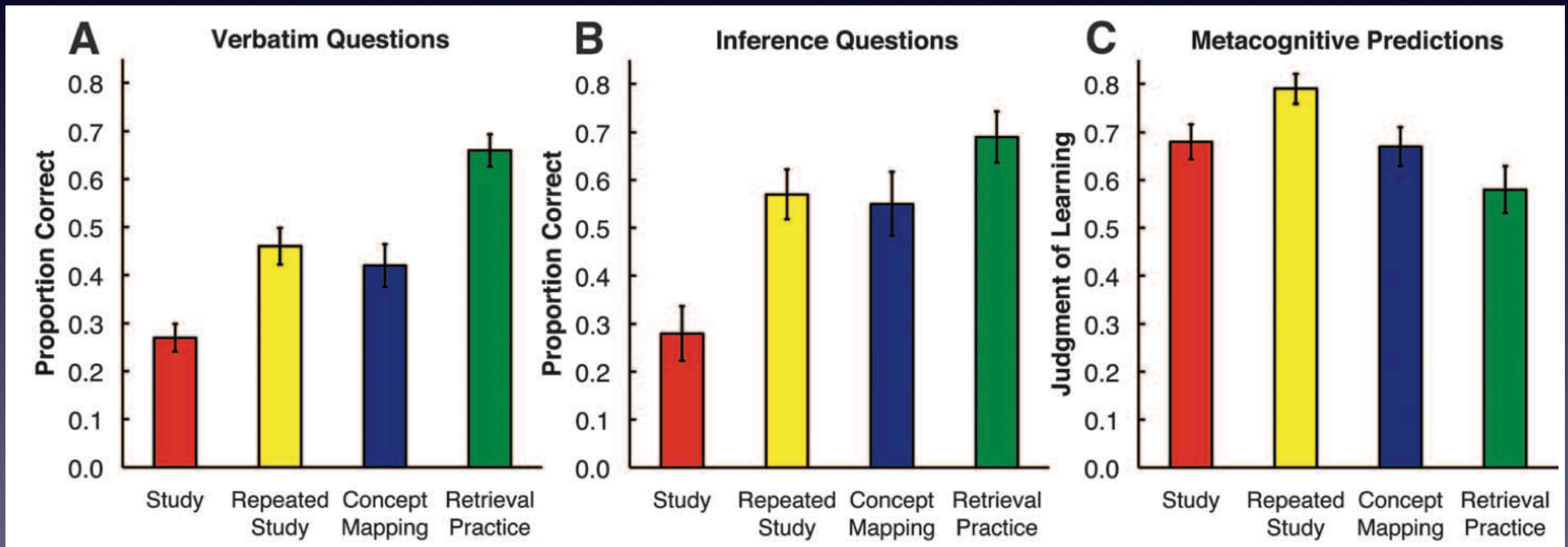


Figure 2



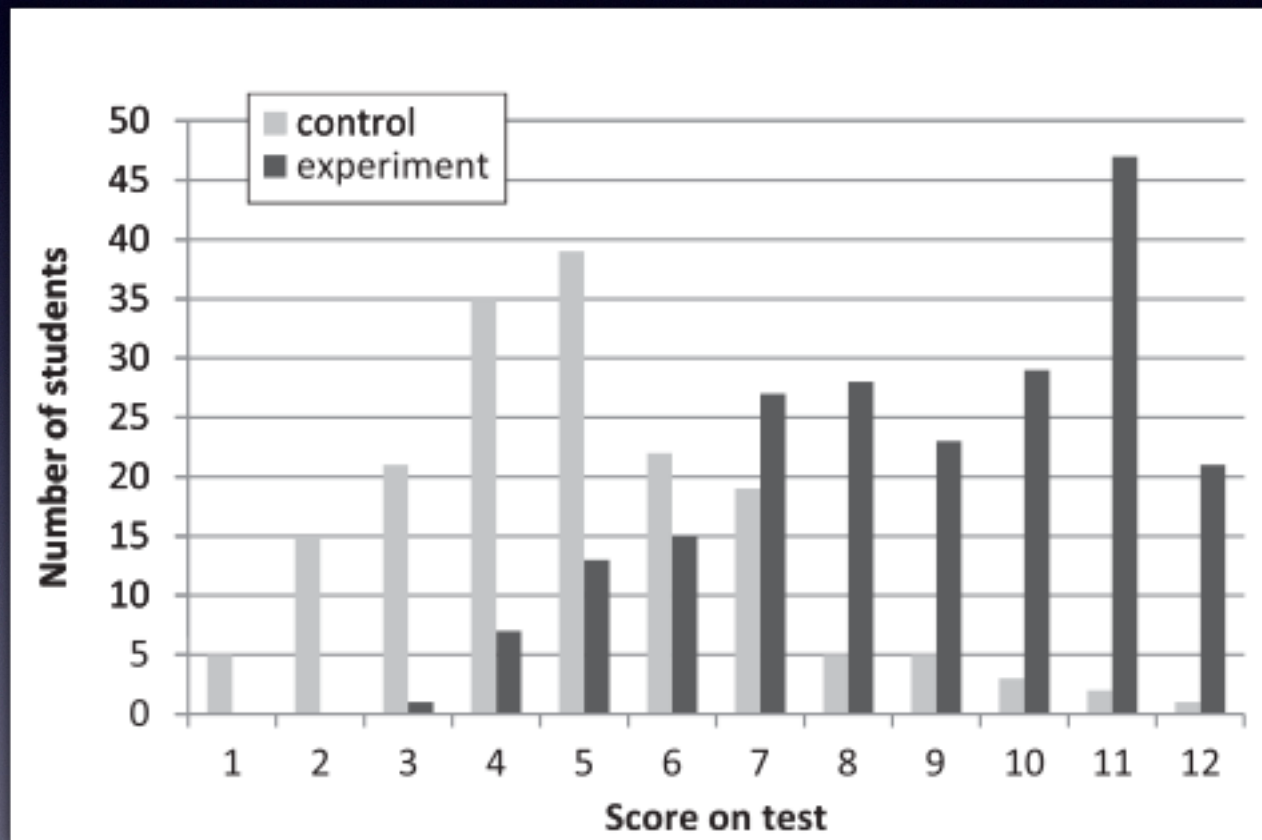
Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping

Figure 1



Improved Learning in a Large-Enrollment Physics Class

Figure 1



Education Research

The number of publications that support the value of active learning is constantly growing.

<http://cst.yale.edu/>



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What kinds of activities have you done during classes that kept you interested and engaged?



Use Active Learning

Statement Correction

Strip Sequence

One-minute paper



Jigsaw!



Share your experiences for each active learning technique that you used.

Discuss the following:

- What technique (minute essay, statement correction, or strip sequence) did you try?
- How do you think you could apply that technique in your classroom?

Active Learning in Practice

Active learning encompasses many different approaches, including:

- One minute essay
- Think-Pair-Share
- Ask Questions
- Have a discussion
- Concept mapping
- Group work problem solving
- Brainstorming
- Strip sequencing
- Case study
- Statement correction
- Clicker questions

A Recap of Key Concepts about Active Learning:

- Students are not empty vessels to be filled up.
- With active learning, instructors facilitate activities that engage students in the construction of their own knowledge.
- There is growing evidence that active learning is an effective method for student learning.
- It does not take a tremendous amount of effort to move a classroom from passive to active.
- There are many tools for implementing active learning.
- We should all try to create learning environments that reflect the process of science.

I have concrete ideas on how to keep my students actively engaged.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

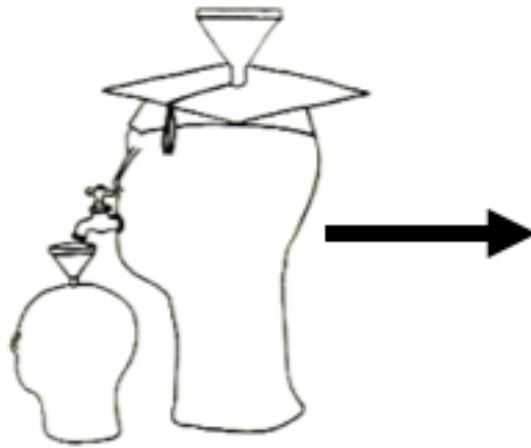
Active Learning in Practice

As a group, discuss what kinds of active learning methods you have used in the classroom.

What challenges have you encountered in using those methods in the classroom, and how have you overcome those challenges?

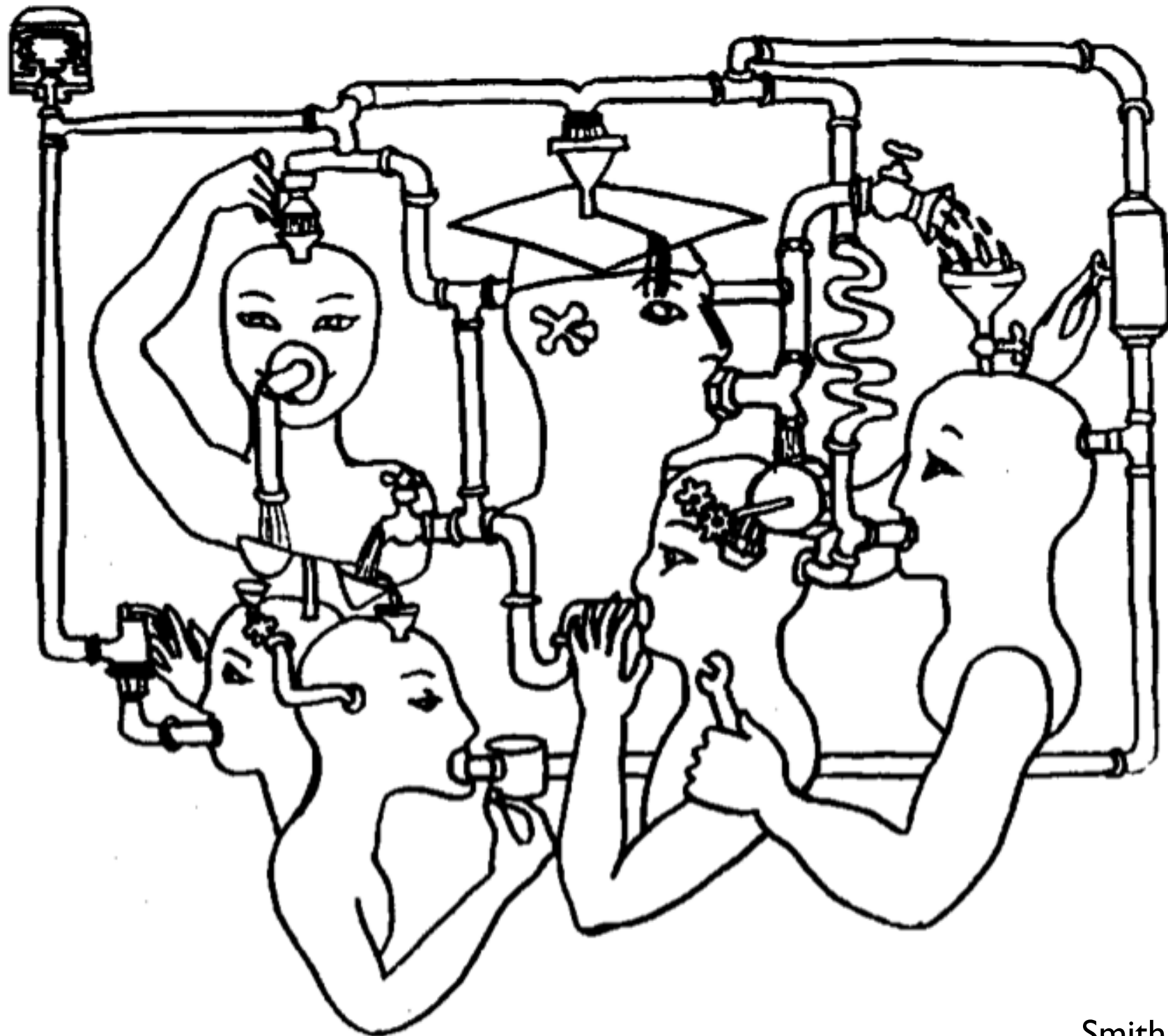
Moving from a Teacher-Centered to a Learner-Centered Classroom

**Begin with
this
drawing . . .**



**As a table, sketch
what it would look
like if it were
learner-centered**

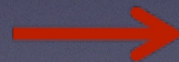
How does active learning promote this transition?
5 minutes!



The constructivist view of learning

Jean Piaget, John Dewey, D. Ausubel, et al.

Each of us must grow our own knowledge structure from experience.



Instructors can't put their knowledge into our heads: the process must be learner-centered!

Passive vs. Active Lectures

In your group, propose an idea for an active lecture for one of the following topics.

Mitosis:

A eukaryotic cell separates its sister chromatids during mitosis, resulting in two identical sets of chromosomes in two nuclei. The process is divided into four stages: prophase, metaphase, anaphase and telophase.

Natural selection:

The process by which biological traits become more or less frequent in a population.

What defines a learner-centered classroom?

- 1) Level of noise / movement
- 2) Amount of time students vs. instructor spend talking
- 3) Degree to which students contribute to their own learning

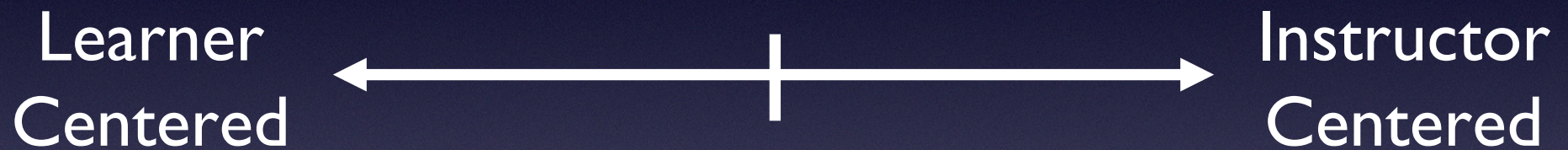
Active Learning in Practice

As a group, discuss the benefits and challenges to using one of these techniques. What are some ideas for dealing with the challenges? Select a representative to share the group's ideas.

- One minute essay
- Think-Pair-Share
- Ask Questions
- Have a discussion
- Concept mapping
- Group work problem solving
- Brainstorming
- Strip sequencing
- Case study
- Statement correction
- Clicker questions

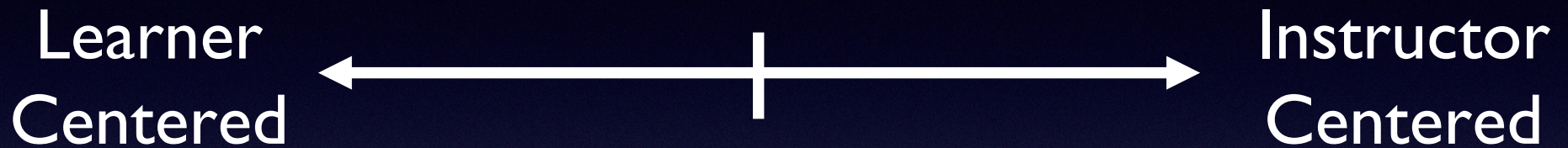
Reflect on your own teaching.

On average, how learner-centered is your classroom?



Use a GREEN post-it and place yourself on the continuum that is on the wall.

Videos: Teaching in Practice



After viewing each video, determine how learner-centered the classroom is. After we watch all the videos, place them on the continuum.

VIDEO 1: Yellow post-it

VIDEO 2: Pink post-it

VIDEO 3: Blue post-it