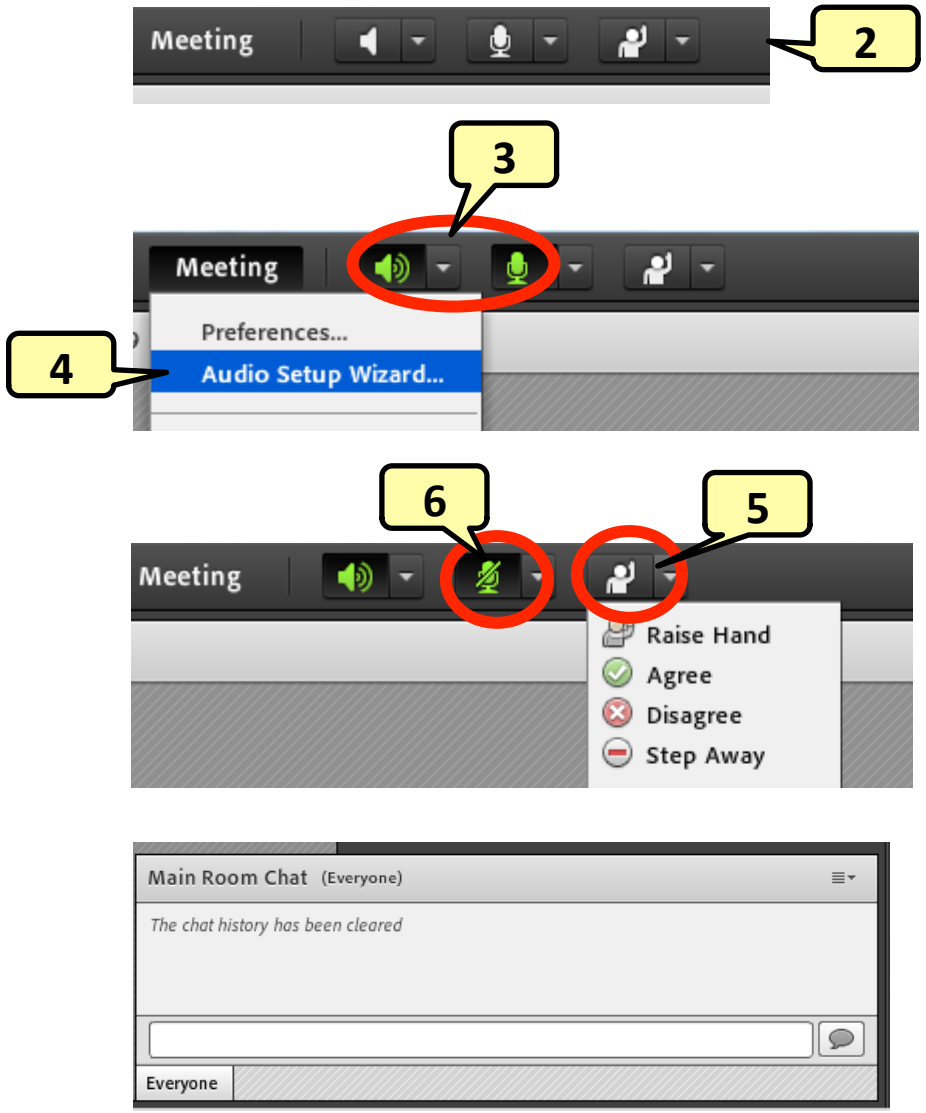
Welcome! As you enter the room, please…

1. Plug in your headset (if available).
2. Familiarize yourself with the **top bar** on the screen
3. Make sure your **speakers and mic are enabled** (the icons on the top bar should be **highlighted in green**).
4. Run the **audio setup wizard** (this option is available from the "Meeting" menu on the left right of the screen).
5. Once you have run the wizard, "**raise your hand**" by clicking on the icon available on the top bar. This will indicate hosts you are ready to test your mic.
6. After testing your mic, **mute yourself** by clicking on the mic icon on the top bar (this will help to avoid background noise).

Note: Feel free to use the chat at any time!



Record the Session

Mechanics VCP Session 6
May 9, 2013

USING HANDS-ON DEMOS AND FLIPPING THE CLASSROOM

Agenda:

(i) Objectives for today's session

(ii) Flipping the classroom

(iii) Now you have time for some interesting hands-on demonstrations and activities!

(iv) Assignments for Session 7 (16 May 2013)

A Party!

Brian

- **an ASEE in-person gathering for ALL VCP participants!**
- **When: Monday June 24, 12.30-2 pm**
- **Where: Omni Center Hotel, Willow Board Room**
- **learn more about the ASEE Annual Conference:**

http://www.asee.org/conferences-and-events/conferences/annual-conference/2013

Session 6 Learning Objectives

Brian

- **At the end of this session, participants will be able to:**
  - ***Describe the benefits of using a flipped classroom to your students***
  - ***Create flipped lessons and activities for your class***
  - ***List the characteristics of an inquiry-based learning activity***
  - ***Design a demonstration or hands-on activity to target specific learning objectives***

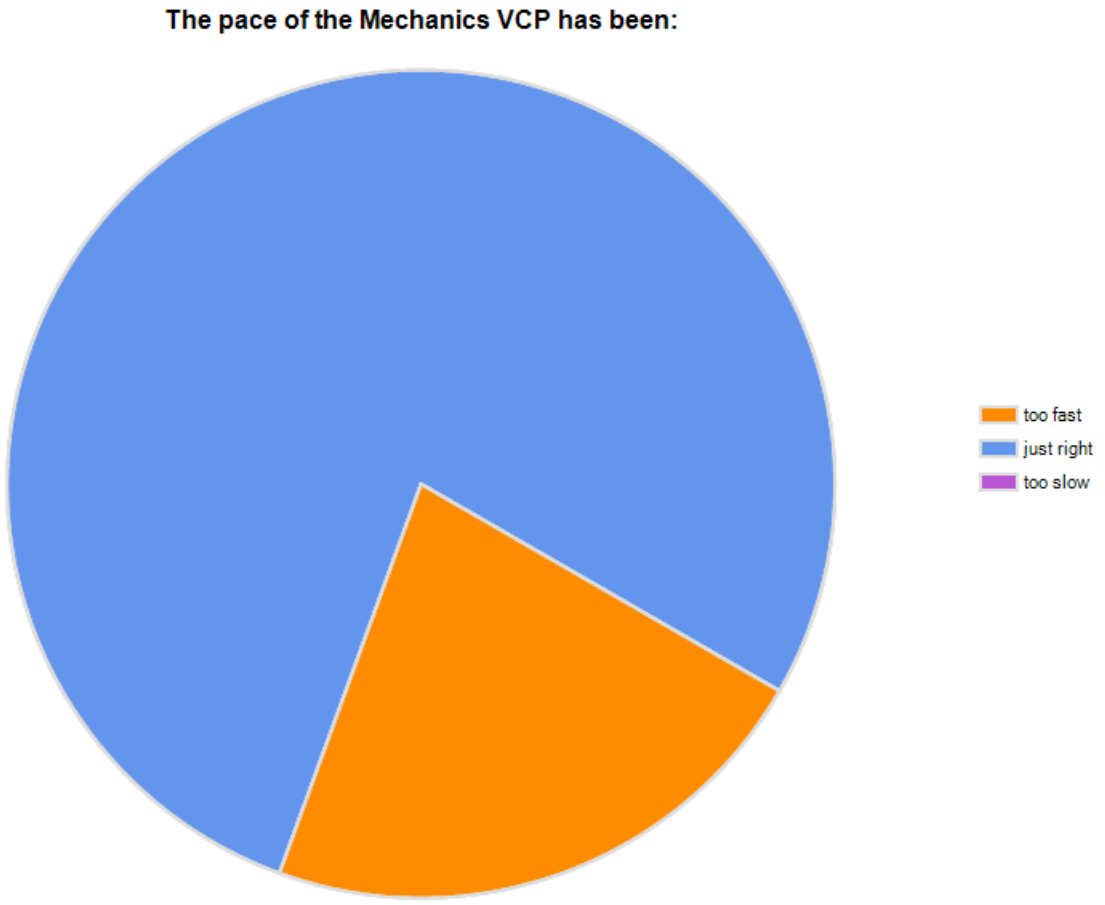
Introductions

Brian

Anyone not have a chance to introduce themselves yet?

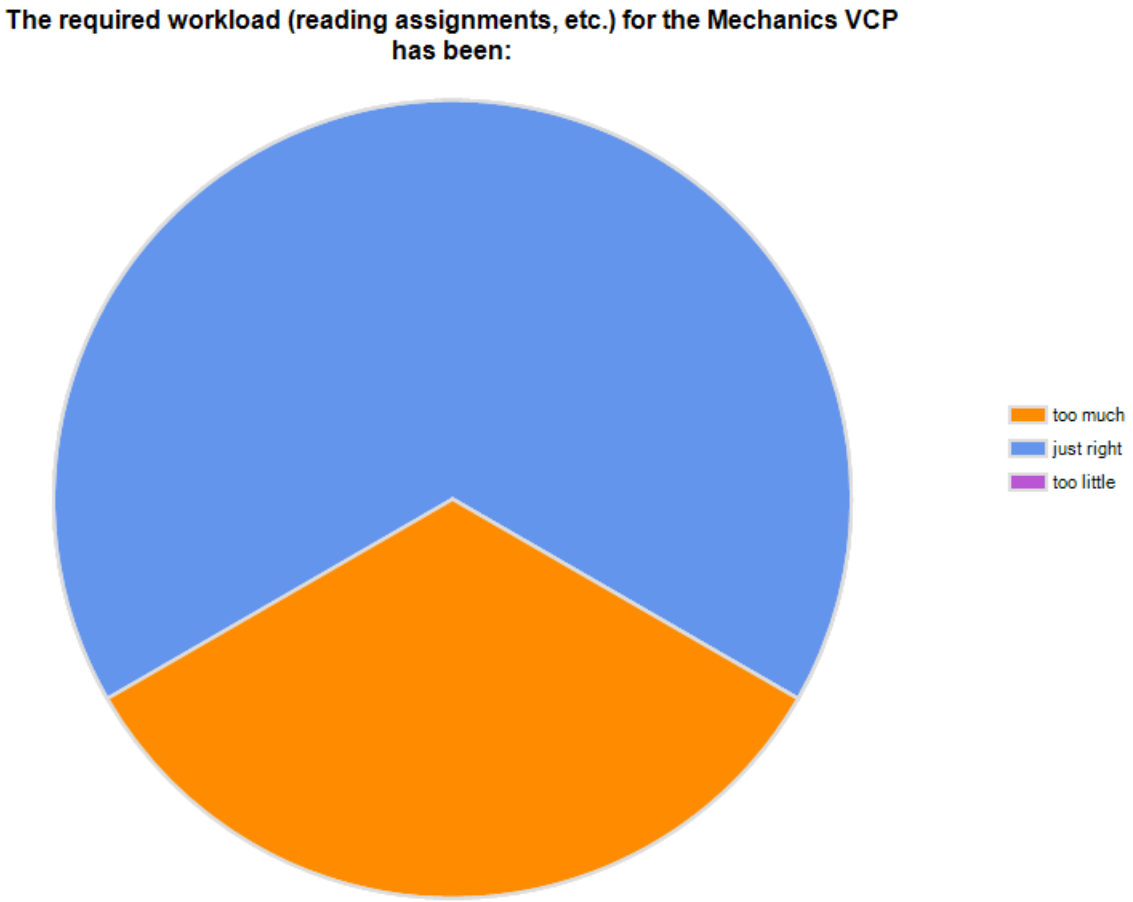
Survey Results

Ed



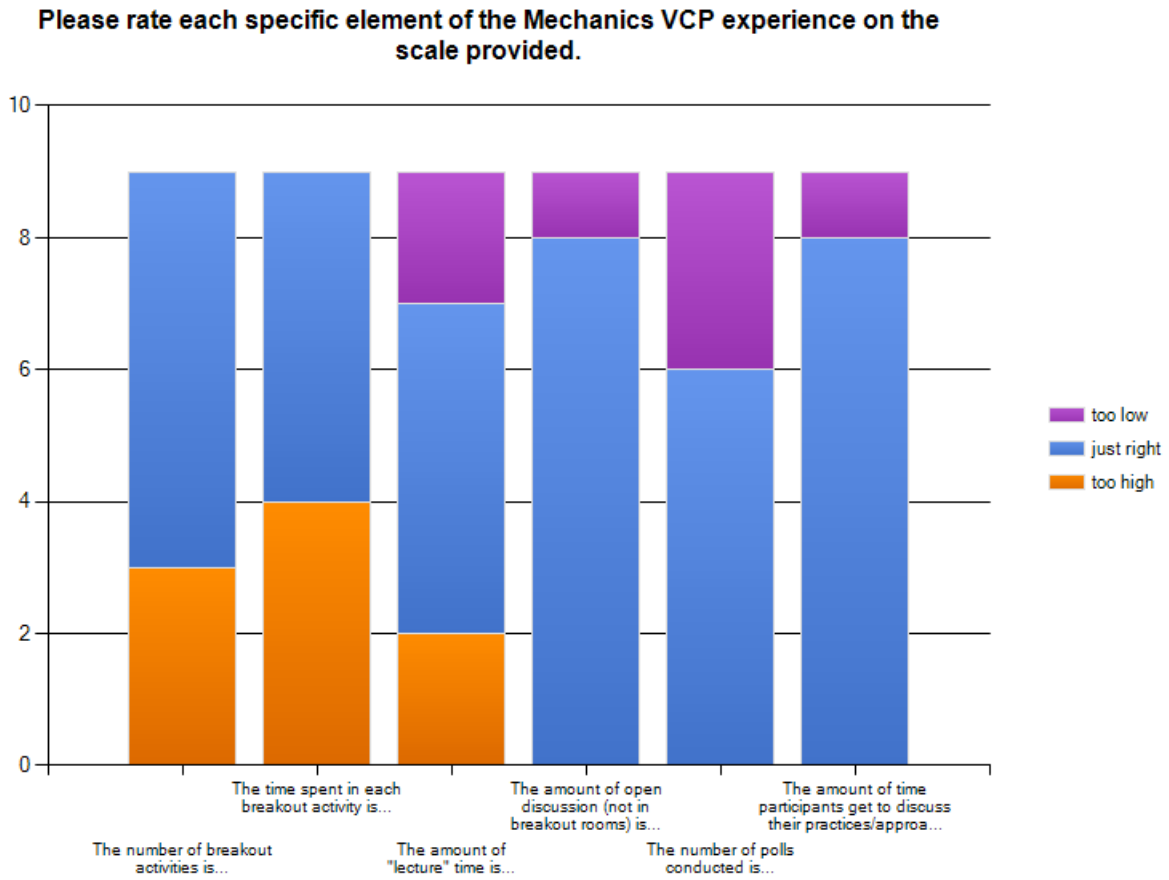
Survey Results

Ed



Survey Results

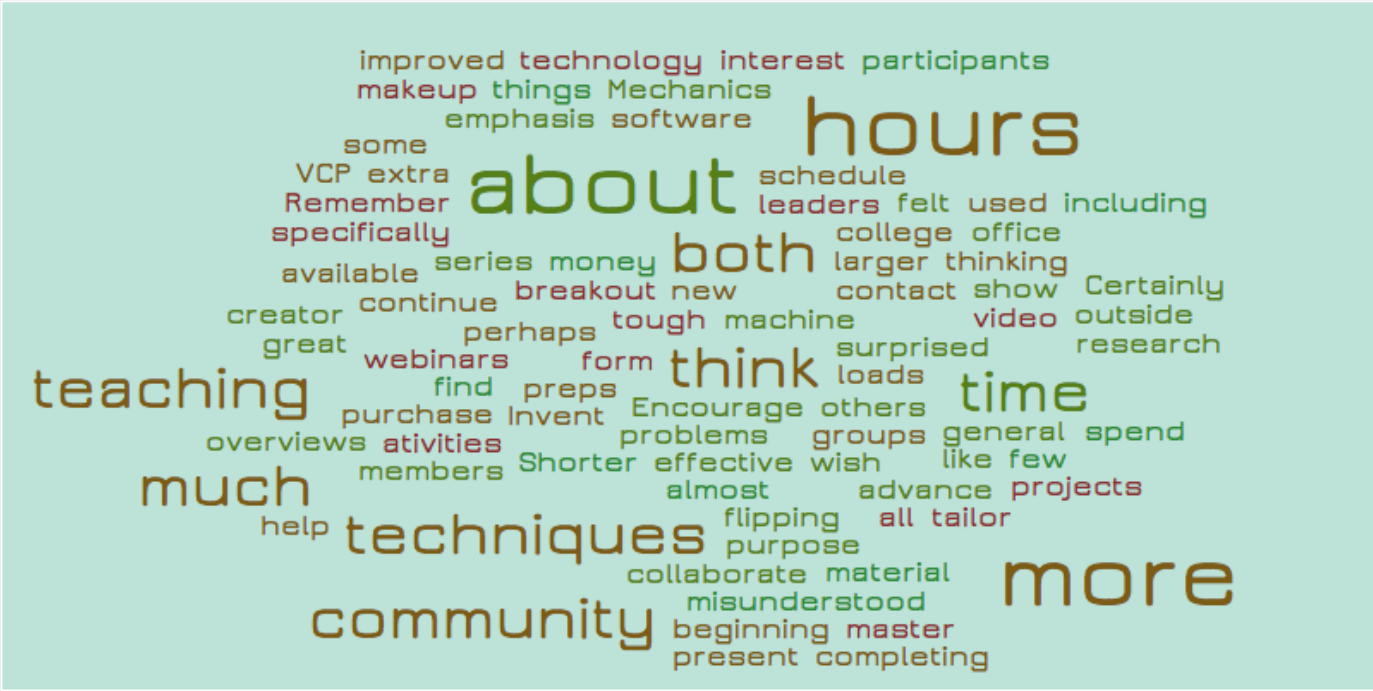
Ed



What can we do to make it better?

Ed

- ***helped*: scheduled time, intentionally stopping to think about things, collaboration and networking**
- ***hindered*: time available and scheduling (specific time for the VCP), VCP portal, want more mechanics-specific information (rather than general information)**
- ***would help improve*:**



How Learning Works*

1. **Students' prior knowledge can help or hinder learning**
2. **How students organize knowledge influences how they learn and apply what they know**
3. **Students' motivation determines, directs, and sustains what they do to learn**
4. **To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned**
5. **Goal-directed practice coupled with targeted feedback enhances the quality of students' learning**
6. **Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning**
7. **To become self-directed learners, students must learn to monitor and adjust their approaches to learning**

*Ambrose, Bridges, DiPietro, Lovett, and Norman, *How Learning Works* (2010)

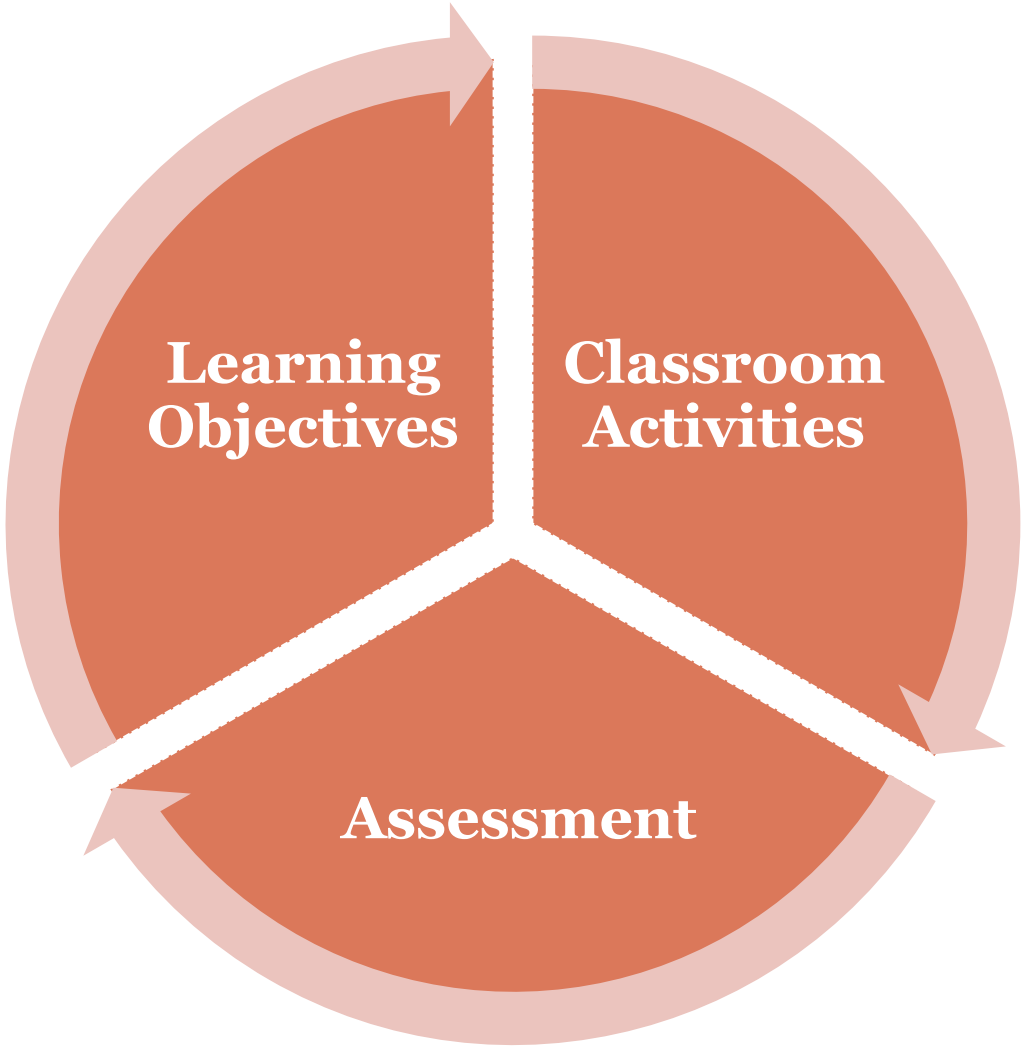
A HLW Organizing Principle

Ed

4. ***To develop mastery, students must acquire component skills, practice integrating them, and know when to apply what they have learned [acquire skills]***
5. ***Goal-directed practice coupled with targeted feedback enhances the quality of students' learning [practice with peers]***
6. ***Students' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning [socially-constructed knowledge; collaborative learning]***
7. ***To become self-directed learners, students must learn to monitor and adjust their approaches to learning [assess their learning and seek help when they need it]***

- ***Flipping the classroom*** **can target these four principles by helping students acquire skills, giving them ample opportunity for goal-directed practice, providing an avenue for a social component to their work in a positive class climate, and by challenging them to be more disciplined and self-directed.**

Course Alignment



Flipping the Classroom

Ed

- **Let's start with two short polls**
  - **Did you like, or not like, the "talking head" elements of the video?**
  - **What does the literature say about the presence of the "talking head"? Is it important? Does it positively impact learning?**

Flipping Best Practices

Ed

- **Do develop structured, collaborative activities in class**
- **Don't flip in isolation (structure in-class activities to complement the videos)**
- **Do evaluate video effectiveness with a brief assessment—then be agile in response to that assessment**
- **Do be brave, let go of your control, and let students learn from each other**

Let's Discuss Your Experiences

Ed

- ***Question 1:*** **how do you pitch this to your students?**
- ***Question 2:*** **have you experimented with flipping your course?**
- ***Question 3:*** **did you assess students' understanding of the flipped material?**
- ***Question 4:*** **how did students respond to your flipping experience?**
- ***Question 5:*** **on balance, was your flipping a success? How do you know?**

A HLW Organizing Principle

Brian

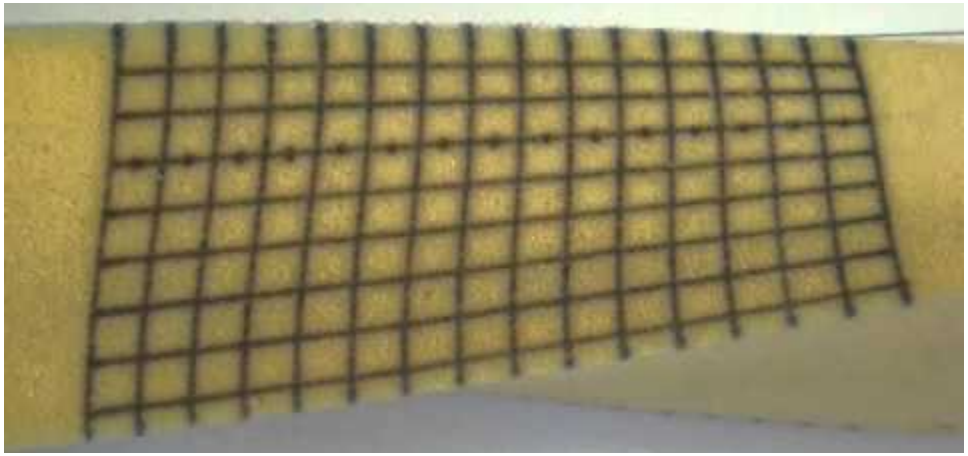
1. ***Students' prior knowledge can help or hinder learning [misconceptions?]***
2. ***How students organize knowledge influences how they learn and apply what they know [mental model of knowledge]***
3. ***Students' motivation determines, directs, and sustains what they do to learn [active demos vs. lecture]***

- **Doing *physical demonstrations* in class can target these three principles by helping dispel misconceptions, reinforce students' mental models of information, and by making the class period more lively and interesting and possibly more active.**

In-Class Demonstrations

Brian

- **Key decisions you must make**
  - **Desired learning outcome**
  - **Who does the demo, you or the students?**
  - **Introduction to the material (inductive learning), reinforcer, or extension of previous material?**
  - **Time allocation**
  - **Assessment of learning and of the success of the activity**



Inquiry-Based Learning Activities

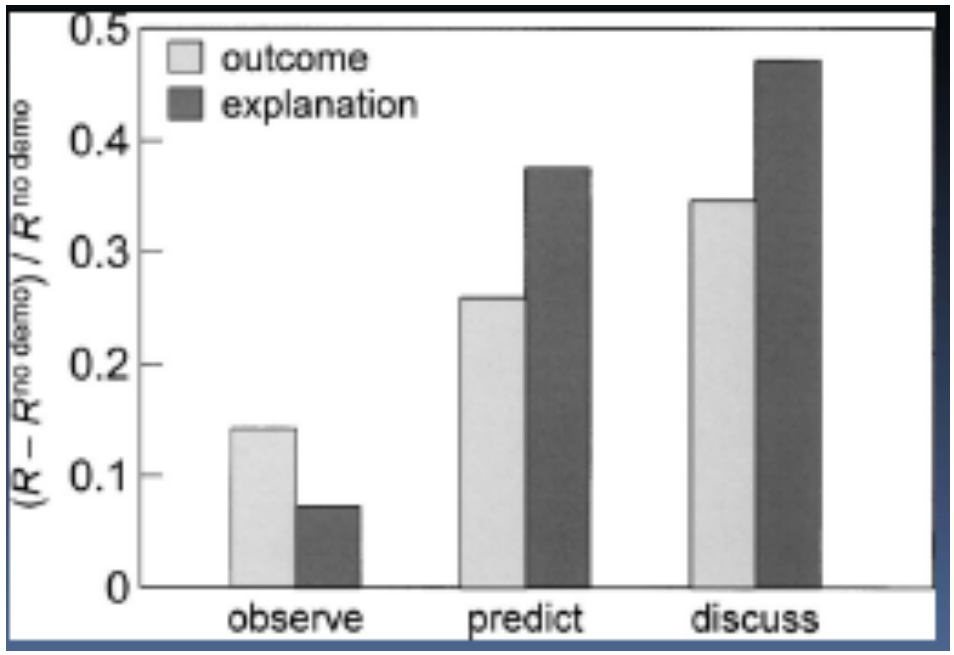
Brian

- **(a) Use peer instruction and collaborative work**
- **(b) Use activity-based guided-inquiry curricular materials**
- **(c) Use a learning cycle beginning with predictions**
- **(d) Emphasize conceptual understanding**
- **(e) Let the physical world be the authority**
- **(f) Evaluate student understanding**
- **(g) Make appropriate use of technology**
- **(h) Begin with the specific and move to the general**

Demo – Normalized to No Demo Group

Brian

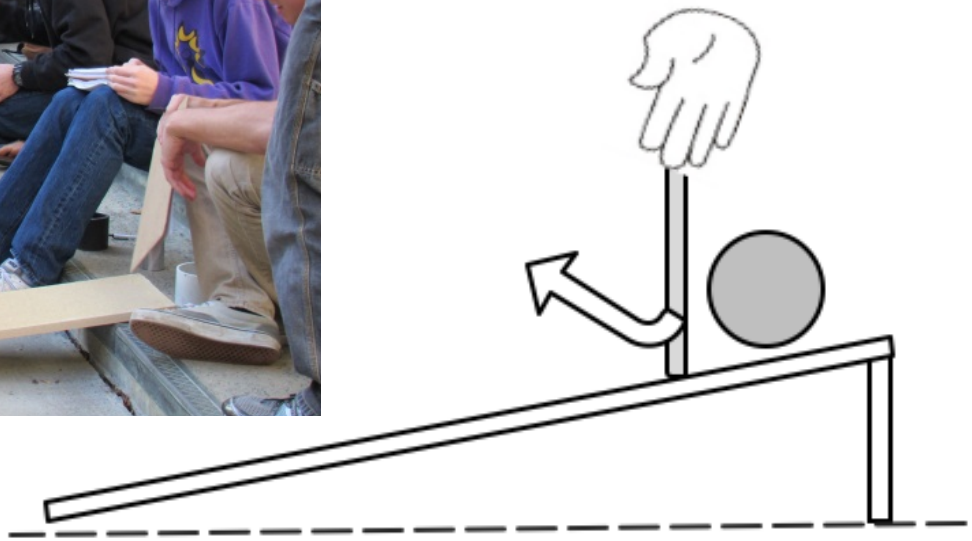
- **Crouch, Fagan, Callan & Mazur (2004) –Need the opportunity to predict and discuss the demo**



- "Classroom demonstrations: Learning tools or entertainment?" Am. J. Phys. 72(6) p. 835-838 (2004)

Rolling Cylinders

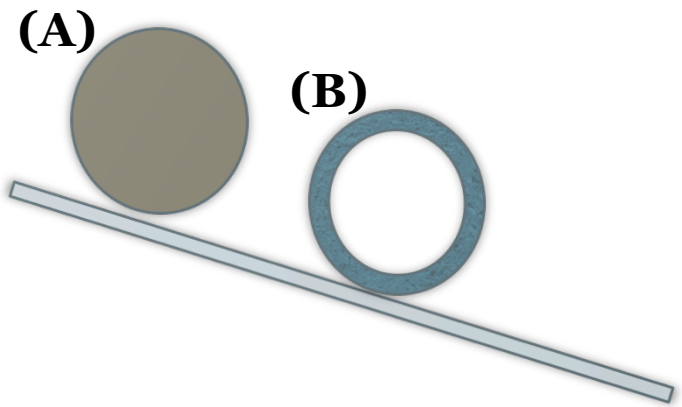
Brian



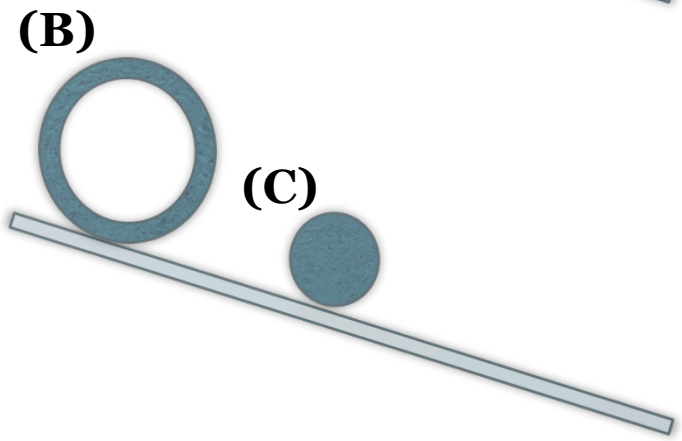
Rolling Activity

Brian

Big metal solid cylinder (A) vs. black metal pipe (B)
(Same radius, and mass, but different shape)

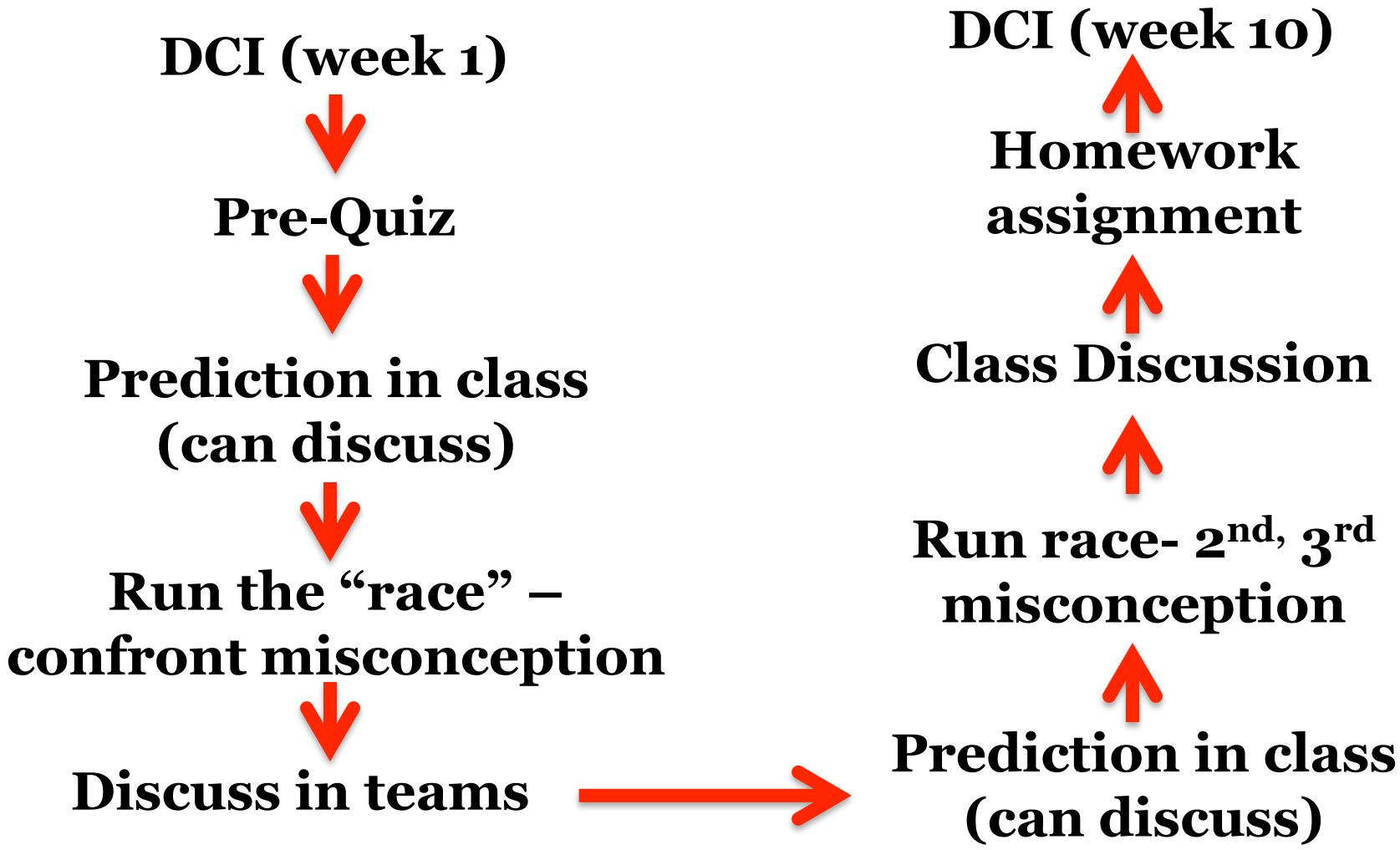


Black metal pipe (B) vs. wooden solid cylinder (C)
(Same length, but different shape, radius, and mass)



Cylinder IBLA

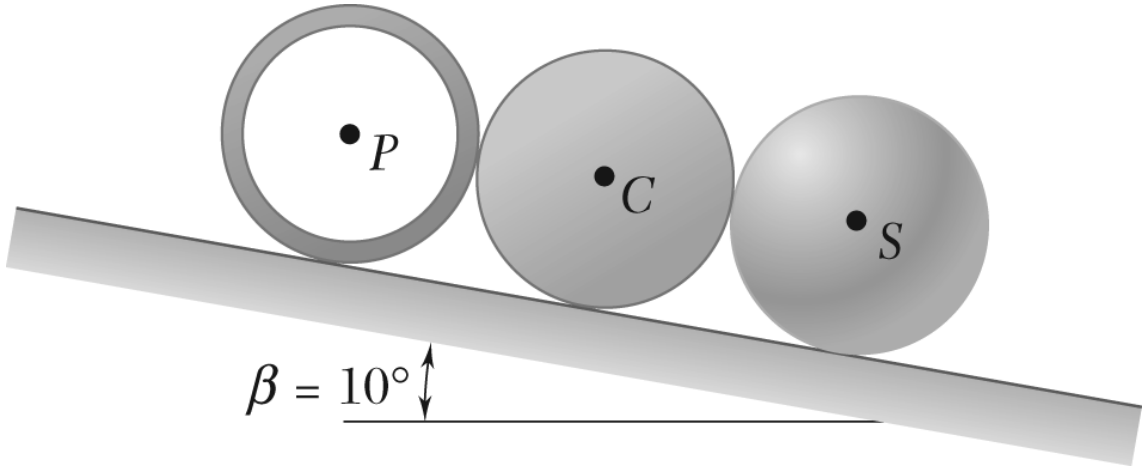
Brian



Homework Problem

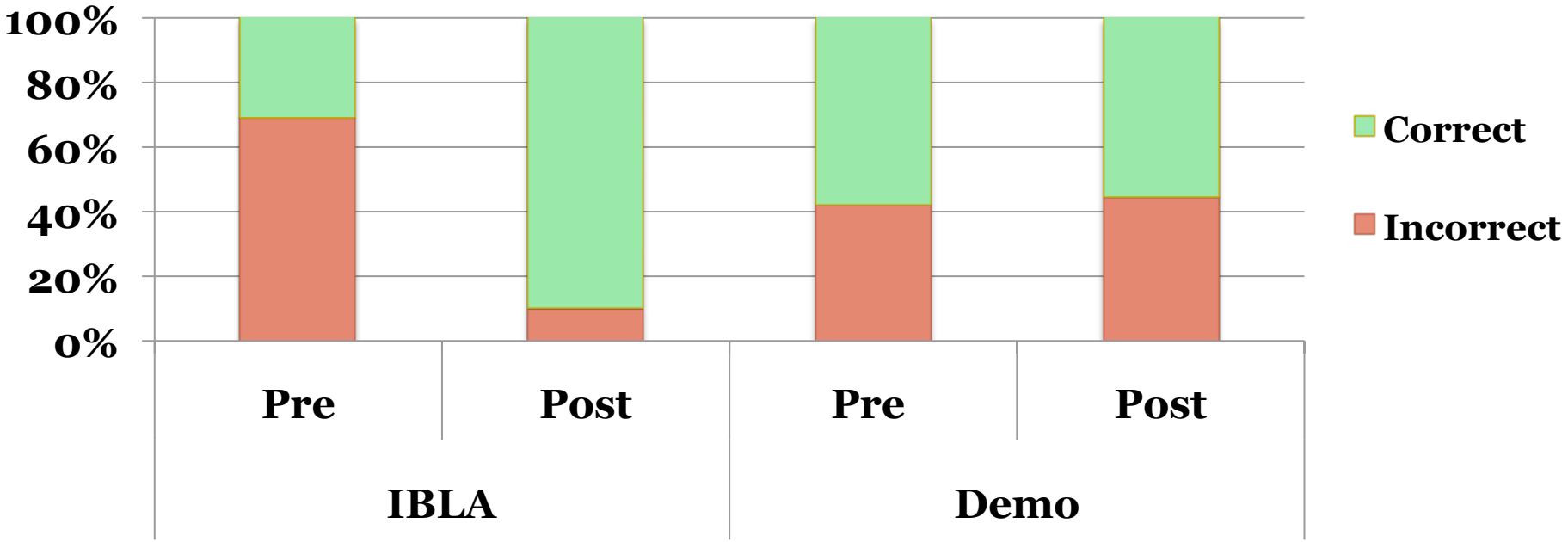
Brian

- **Knowing that all three objects roll without slipping. Each has the same outer radius of 10 cm and the same mass of 1 kg. After rolling for 3 meters, calculate the linear velocity of each rolling object.**



DCI Results

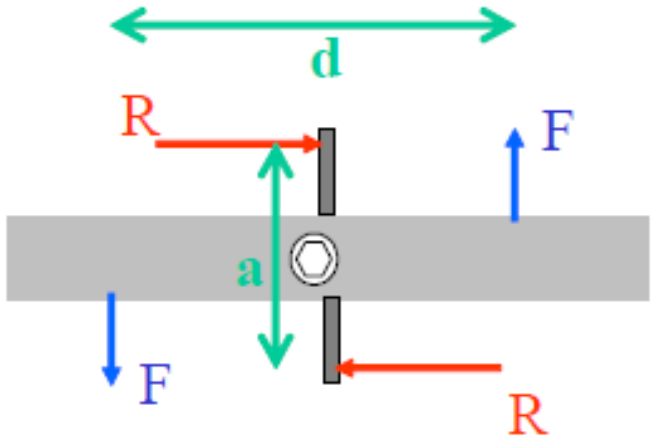
Brian

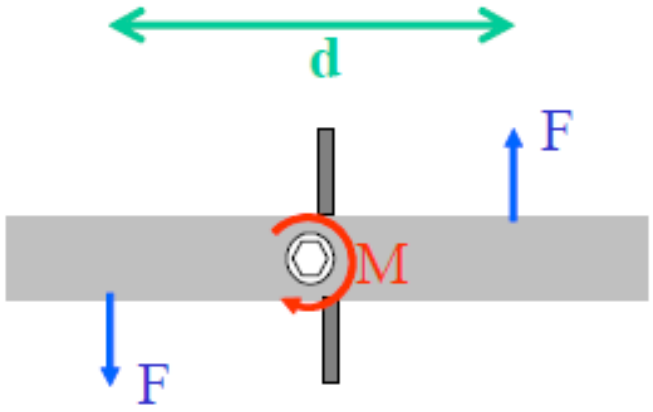


Assessment of students who took the DCI after either participating in active learning or watching the professor demonstrate the activity.

Couples in 2-D

Brian





$\Sigma M|_c = Fd - Ra = 0$

$Ra = Fd$

$\Sigma M|_c = Fd - M = 0$

$M = Fd$

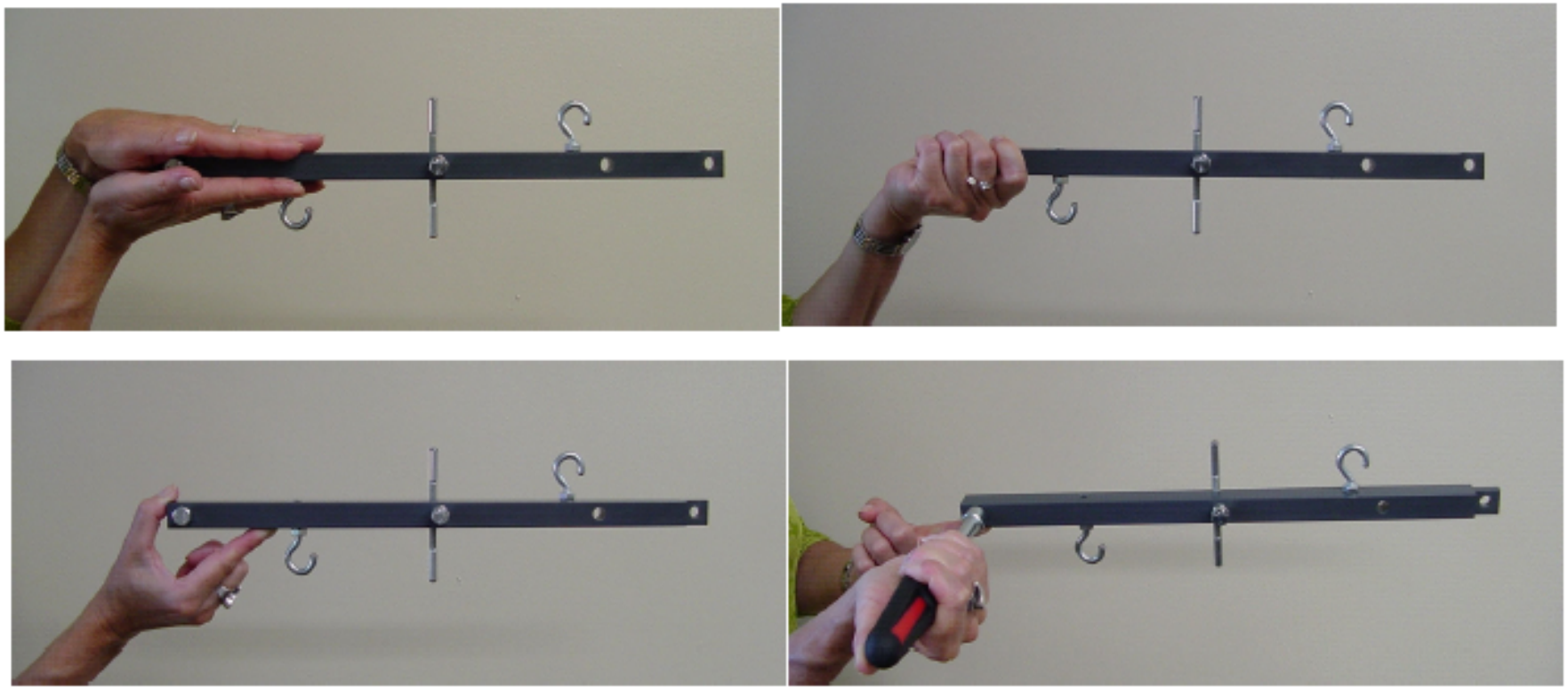
Anna Dollár, Paul S. Steif (2004) Reinventing the Teaching of Statics, ASEE

Statically equivalent loads

In all cases the "fixed support" provides:

- a force to balance weight
- and a couple to balance the moment created by weight

Brian



Anna Dollár, Paul S. Steif (2004)
Reinventing the Teaching of Statics, ASEE

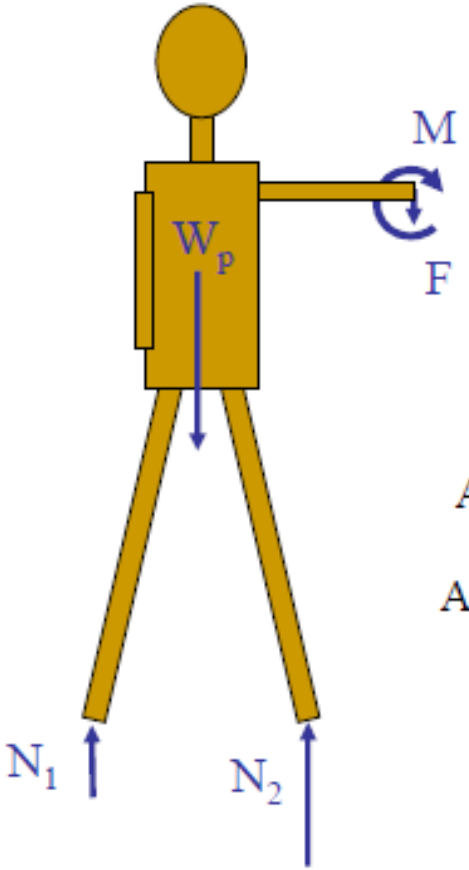
FBD of interconnected bodies

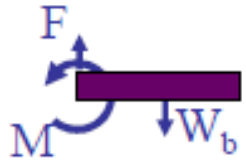
Draw the FBD of your body only and the FBD of the book.

Brian

What do you feel the book is exerting on your hands?

What do you feel you are exerting with your hands to keep the book in equilibrium?





A force? **Yes** **Gr**

A couple? **Yes** **Gr**

Anna Dollár, Paul S. Steif (2004)
Reinventing the Teaching of Statics, ASEE

Let's Discuss Your Experiences

Brian

- **when you use in-class demonstrations, what do you do?**
- **how do students react?**
- **how do you measure the impact of those activities?**
- **what ideas do you have, but have not yet tried due to lack of time or resources?**

For Session 7 (May 16, 2013)

Brian

- **<u>For Session 7</u>: based upon your feedback, we had planned to give an overview of how to engage in engineering education research (proposal writing, funding opportunities, publishing, etc).**

- ***Use the blog to indicate your specific interests around engineering education research*, and we can use a "just-in-time" process to assemble materials to answer your questions**

- **Based upon your MVCP experience, *think of three concrete new teaching ideas/techniques/activities that you plan to implement in your course next term*, and upload them to the folder Session 7>New ideas**