What is Student Engagement?

- **Self-determination**  
  (Deci & Ryan, 1985)

- **Academic Intrinsic Motivation**
  - Participation Through Curiosity
  - Desire to Contribute
  - Interaction with the Environment

- **Cooperative Learning**
  - Learning as a cooperative, social activity
  - Students learn from each other
What is Peer Instruction/Peer Discussion?

- Type of cooperative learning
- Means for engaging students in large classes
- Promotes Interaction
- Eric Mazur [http://www.youtube.com/watch?v=lBYrKPoVFwg](http://www.youtube.com/watch?v=lBYrKPoVFwg)

Method

- Pose conceptual, thought-provoking/high level question
- Poll students, display results
- If responses vary, direct them to discuss
- Re-poll, display results
- Have a student articulate why answer is correct
Describe Results

- Students engage
- Answers typically cluster
- Understanding, retention increase

WHY?

- Gains in understanding during discussion?
- Got answer someone else in group?
- Other explanations?
New Study- University of Colorado, Boulder

- Undergrad Genetics course- 350 students
- Average 5 clicker questions during 50 minute lecture through semester

Assessed 16 times during semester by adding a 2\textsuperscript{nd} isomorphic question; did not reveal answers or histogram until after Q2

**Fig. 2.** Underlined entries represent students who initially did not answer Q1 correctly but did so after group discussion.

**entries with an asterisk represent students who did not answer either Q1 or Q1\textsubscript{ad} correctly, but nevertheless were able to correctly answer the isomorphic question Q2. Of the 32 questions in our 16 question pairs, 7 had 5 answer choices, 5 had 4 choices, 3 had 3 choices, and 1 had 2 choices.

Fig. 1. The percentage of students who can correctly answer a question as individuals increases after peer discussion of a similar (isomorphic) question. Q1: One question of an isomorphic pair was voted on individually; Q1ad: the same question was voted on again after peer discussion; Q2: the second isomorphic question was voted on individually.

(A) Results for all 16 question pairs were averaged for each individual ($n = 350$ students), and the class averages of these scores are shown.


B) The 16 paired questions were grouped according to difficulty based on the percentage of correct answers for Q1 (five easy questions, seven medium questions, and four difficult questions), and performance results were again averaged for each individual ($n = 343$ students for easy, 344 for medium, and 337 for difficult) before computing the averages shown. Error bars show the SEM.

Collecting responses

- clickers
- flashcards
- hands  
  
http://www.youtube.com/watch?v=qQra4baNwP8

Best Practices for PI

- Explain to students how you expect process to work - may be difficult to get them started initially
- If using points, award for both responses, may use differential
- Probe/challenge students explanation of correct answers
- Circulate during discussion
- A good question will result in 40-80% correct response (Mazur)
Thoughts? Questions?

Are teachers ready to give up control of the learning environment?

Are students ready for teachers to give up control?

What changes do we need to make in our philosophies and practices?

Sources