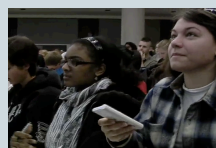
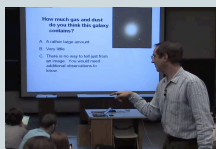


Writing Effective Clicker Questions



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Handouts

<http://www.colorado.edu/sei/fac-resources/workshops-clickers.htm> (at bottom)

Faculty resources on teaching

<http://www.colorado.edu/sei/fac-resources/>

Clicker resources and videos:

<http://STEMclickers.colorado.edu>

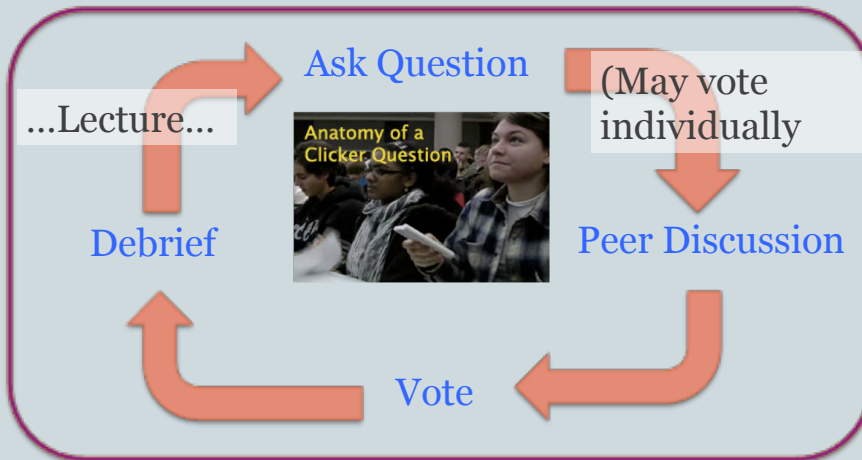
<http://www.colorado.edu/oit/services/teaching-learning-tools/cuclickers>

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What is Peer Instruction?

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See supplementary handouts (Ready Set React, Tips for Successful Clicker Use) for information about facilitating Peer Instruction successfully.

Question Cycle: Before/During/After

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BEFORE **Setting up instruction**

- Motivate
- Discover
- Predict outcome
- Provoke thinking
- Assess prior knowledge

AFTER **Assessing learning**

- Relate to big picture
- Demonstrate success
- Review or recap
- Exit poll

DURING **Developing knowledge**

- Check knowledge
- Application
- Analysis
- Evaluation
- Synthesis
- Exercise skill
- Elicit misconception

Credit: Rosie Piller and Ian Beatty.

Question Cycle

Courtesy of Rosie Piller

Before Instruction

- ✎ **Motivate** students
 - Why is it important to...?
 - What might we want to...?
 - What kinds of things can go wrong?
- ✎ Help them **discover** information
 - What do we have to take into account when we...?
 - What needs to happen when you...?
 - Predict: Since X causes Y, what do you think will happen when...?
- ✎ Assess **prior knowledge** or **provoke** thinking/discussion
 - What do you think about...?
 - Would you/do you...?
 - What do you think will happen if...?

During Instruction

- ✎ Test **knowledge** of facts
 - What are the three types of...?
 - Can you define...?
- ✎ Test **comprehension** of concepts
 - Which statements support...?
 - What examples can you think of?
- ✎ Test **applications** of concepts
 - What would happen if...?
 - Which of the following are X?
- ✎ Help them **analyze** what they are learning
 - Based on the symptoms, what would you say is going on?
 - What is the relationship between...?
- ✎ Test their ability to **evaluate**
 - Here are two solutions. Which is more appropriate and why?
 - Which of these is more important?

- ✎ Provoke them to **synthesize** their understanding.
 - How would you test...?
 - Propose a way to...
- ✎ Elicit a **misconception**
 - Ask questions where a common student misconception will result in a particular response
- ✎ Exercise a **skill**
 - How would you...?
 - What is the next step in this problem?

After Instruction

- ✎ Have students **recap** what they have learned
 - What steps did you go through to solve the problem?
 - What are the most important things to remember?
 - Exit poll: What did we learn today?
- ✎ Ask them to relate information to the **big picture**
 - How does this lead into the next topic?
- ✎ Demonstrate **success** and **limits** of understanding
 - Ask questions that students have built an understanding of during the class.
 - Ask questions that go beyond what was done in class

¹ Rosie Piller, *Making Students Think: The Art of Questioning*. Short papers published in: *Computer Training & Support Conference, 1995; ISPI International Conferences, 1991 and 1996; ASTD National Conference on Technical & Skills Training, 1990*. Related workshop description at <http://www.educationexperts.net/mstworkshop.html>.

Various question types



1. Conceptual “one right answer” questions
2. Discussion “no one right answer” questions
3. Predict an outcome (e.g., of experiment)
4. Survey questions / personal opinion
5. Embed reasoning in answers (“Slower, because gravity is acting against it.” “Slower, because it loses energy to friction.”)
6. Use images as answer choices

See TEFA handout

What makes a good clicker question?

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clarity	Students should waste no effort trying to figure out what’s being asked.
context	Is this topic currently being covered in class?
connection to learning goals	Does the question make students do the right thing to demonstrate they grasp the concept.
distractors	What do the “wrong” answers tell you about students’ thinking?
difficulty	Is the question too trivial? too hard?
Stimulates thoughtful discussion	Will the question engage the students and spark thoughtful discussions? Is there potential for you to be “agile”?

(see "Tips for Writing Questions" handout)

Effective multiple-choice questions have *believable* “distracters.”



- 1) Talking with other instructors that have taught the course in the past.
- 2) Talking with your students one-on-one before class, after class, during office hours.
- 3) Using student responses to open-ended questions that you include in HW and exams.
- 4) Asking your students to come up with answers that will be used as the choices.
- 5) Use researched and documented student misconceptions.



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Bloom's Taxonomy

