Slides on Writing Clicker Questions

**Dr. Stephanie V. Chasteen**

*Physics Department & Science Ed. Initiative*

*University of Colorado – Boulder*

http://STEMclickers.colorado.edu

Stephanie.Chasteen@colorado.edu

Co-presenters have included Steven Pollock, Jenny Knight, Trish Loeblein, and Kathy Perkins.
Choose a content learning goal that relates to your discipline

Write a draft clicker question that aims to help students achieve this learning goal
Examples of Learning Goals in the Sciences

- **Biology**: Recognize the components of a cell and describe why each is necessary for the function of a cell.
- **Physics**: Identify the different ways that light can interact with an object (i.e., transmitted, absorbed, reflected).
- **Chemistry**: Explain trends in boiling points in terms of intermolecular interactions.
- **Earth science**: Understand the formation of the three major types of rocks (igneous, sedimentary, and metamorphic) and the processes by which they form, relating them by the rock cycle.
- **Math**: Solve a system of linear equations in two variables using algebra or graphing.
Consider the following question. How might you improve upon this question, or write it differently? What is the pedagogical goal of this question?

What causes the seasons?

A. The change in the earth’s distance from the sun during the year
B. The tilt of the earth’s axis
C. Changes in the sun’s brightness
D. Changes in clouds
E. None of the above
What causes the seasons?

A. The change in the earth’s distance from the sun during the year
B. The tilt of the earth’s axis
C. Changes in the sun’s brightness
D. Changes in clouds
E. None of the above

Can we make a better question on the SAME topic? Yes...
What would happen to the seasons if the earth’s orbit around the sun was made a perfect circle (but nothing else changed) ?

A. There would be no seasons
B. The seasons would remain pretty much as they are today
C. Winter to spring would differ much less than now
D. Winter to spring would differ much more than now

Much better question. Requires reasoning!
Question-writing tips

- Move away from simple quizzes
- Use questions that prompt discussion
- Use questions that emphasize reasoning or process
- Use clear wording
- Use tempting distracters = plausible wrong answers
- Use questions for a variety of instructional goals
- Use questions at a mixture of cognitive depth
- Ask challenging questions – don’t just test memorized facts

See handout
How to find 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 homework 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.

D. Duncan, Univ. of Colorado
Use questions at a variety of cognitive depth

**Bloom’s Taxonomy of the Cognitive Domain**

Do the questions you use intellectually challenge your students or simply assess their factual knowledge?

**Higher order**

**Lower order**

handout
U. Colorado clicker resources...

Videos of effective use of clickers
http://STEMvideos.colorado.edu
2-5 mins long

Clicker resource page
http://STEMclickers.colorado.edu

- Instructor’s Guide
- Question banks
- Workshops
- Literature / Articles

Creative Commons – Attribution. Please attribute Stephanie Chasteen / Science Education Initiative/ CU-Boulder
This presentation is copyrighted under the Creative Commons License
Attribution Non-Commercial Share-Alike

That means: Please watch it, share it, and use it in your presentations. Just give us credit, don’t make money from it, and use the same kind of license on the works that you create from it.

More information about Creative Commons licenses here: http://creativecommons.org/licenses/

Credit should be given to: Stephanie Chasteen and the Science Education Initiative at the University of Colorado, http://colorado.edu/sei