Making Clickers Work for You
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Workshop developed using materials from SEI and Rosie Piller

CLICKER RESOURCE PAGE:
http://STEMclickers.colorado.edu

- Workshop handouts will be on my blog, http://blog.sciencegeekgirl.com
- Cited research: See http://STEMclickers.colorado.edu for literature.

Clickers are a tool for questioning
But not a magic bullet!

They can be just a gadget for simple quizzes, or an opportunity to deepen your students’ learning

Agendas:
1. About clickers and peer instruction
2. Best practices in question writing
3. Example questions
4. Writing questions

When can we ask questions?

BEFORE
Setting up instruction
Motivate
Discover
Predict outcome
Provoke thinking
Assess prior knowledge

DURING
Developing knowledge
Check knowledge
Application
Analysis
Evaluation
Synthesis
Exercise skill
Elicit misconception

AFTER
Assessing learning
Relate to big picture
Demonstrate success
Review or recap
Exit poll

When to ask questions 1: Before & After

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 and observe: We have seen that X happens when we do 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...?

After Instruction
- Have students recap what they have learned
  - What steps did we 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 on understanding of during the class.
    - Ask questions that go beyond what was done in class.

See also the Bloom’s Taxonomy handout for question stems
When to ask questions 2: During

- 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?
- Elicit a misconception
  - Ask questions where a common student misconception will result in a particular response

See also the Bloom’s Taxonomy handout for question stems

Exercise #1: Core Philosophies

- In groups of 3-5, brainstorm your answers to the question, “What are the underlying principles that make this work?”.
  - Why might this be an effective teaching strategy?
  - What must the instructor believe in order to embrace this strategy?
  - What must the students believe in order to “play the game” effectively?

Tips for writing clicker questions*

- Don’t make them too easy. You can ask multiple choice questions at higher levels of Bloom’s. Don’t just test memorized facts.
- Use questions that will prompt discussion. Interesting questions that students can’t answer on their own are more likely to spur productive discussion.
- Use questions that emphasize reasoning or process over the right answer. Students need to be convinced that understanding strategies will get them a good grade.
- Use clear wording so that students understand what they are being asked. Keep revising.
- Write tempting distractors using your knowledge of student difficulties. For example, look at student answers on exams or quizzes, or first give the question as an open-ended question to generate common wrong answers.
- Consider creative questions. You can survey your students, ask them how well they understand, break problems into parts, or use pictures or graphs in the answer choices.

Good sources of questions:

- Questions your students ask you or that you overhear
- Common analogies you use as a teacher
- A series of connected questions to lead students through reasoning
- Interpret graphs, data, pictures, etc.
- Discussion questions where there is no one right answer

* See also: Tips for successful clicker use handout

Anatomy of Peer Instruction

...Lecture...
Class Discussion
Peer Discussion
(Vote)
(Maybe vote)

* See also: Peer Instruction, A User’s Manual. E. Mazur.
Some core philosophies of mine

- Students learn by teaching each other
- Students learn by articulating their ideas
- It’s important for me to hear student ideas
- I need to know what my students understand during the course of instruction, before the test
- I value and respect student ideas
- I want students to know that I value student ideas
- I want students to feel safe sharing their ideas
- Clicker questions are an integral part of my lecture

Exercise #2: What could possibly go wrong?

- In groups of 3-5, brainstorm some of the challenges or outstanding questions you have about peer instruction and clickers. How can your core philosophies help you to come up with solutions?

1. Ask Question

What are some challenges/ philosophies / solutions related to asking the question?

Philosophies
- Questions are integral to lecture
- Students can learn by considering a question

Best practices
- Ask several times during lecture
- Ask challenging, meaningful questions
- Don’t post until ready & give time to read

2. Peer Discussion

What are core philosophies in peer discussion?

Philosophies:
- Students learn through discussion
- Students need to know that you value their ideas & that it’s safe to share

What are challenges / how can you help make it work?

Solutions:
- Make it clear why you’re doing this
- Circulate and ask questions / model
- Use questions they want to discuss
- Allow enough time (2-5 mins)
- Focus on reasoning in wrap-up
PI Step #3. Wrap-Up Discussion

What might you do to facilitate an effective wrap-up discussion?

- Establish culture of respect
- Consider whether to show the histogram immediately
- Ask multiple students to defend their answers
- Why are wrong answers wrong and why right answer is right

Action Plan

What will you do to implement ideas you heard about in this workshop? OR what key ideas will you share with a colleague? (See Clicker Tips sheet for summary!)

1.

2.

3.