Advanced Clickers: Practical Classroom Issues & Question Design

David Vakil
April 18, 2009
On Course National Conference

Professor Vakil teaches astronomy & physics at El Camino College in Torrance, California.

Contact info:
dvakil@elcamino.edu – 310-660-3593 x3134

For more clicker information or a copy of this presentation, please visit: http://www.elcamino.edu/faculty/dvakil/clickers.htm

Presentation outline

- Uses for clickers (3 min)
- Suggested reading (2 min)
- What are your questions and concerns? (up to 15 min)
- Grading suggestions, pre-empting cheating (5 min)
- Types of questions (3 min)
- Write your own clicker questions (10+ min)
- Simulate class with your questions (20+ min)
- Final tips (2 min)
What can you do with clickers?

- Pre- and post- instruction questions. (Did they learn?)
- **Taking attendance** (automatically calculated if any question is asked)
- **Classroom demographics**
  - Who are your students?
  - How does performance relate to various characteristics?
- Gathering feedback about class or getting opinions
  - like/dislike activity
  - useful/useless
- Quick assessment of **recently covered material**
  - Ask about facts or conceptual understanding.
  - No question is too easy to ask students. You’ll be amazed.
  - Build their confidence or shake yours!
- **Ice-breakers**
- **Discussion starters**

---

Uses, continued

- **Data gathering** – very useful for accountability reports
- **Cooperative learning: Think-pair-share**
- **Quizzes**
  - End of class summary
  - Beginning of class review
  - Determine if students did reading/homework
- Full-length tests
- Ranking choices, putting lists in order
- On-the-fly questions to suit whatever comes to mind during class.
  - Some of my best & worst questions were done on the fly.
  - Sometimes students ask a question. DON’T ANSWER! Click!
- Fastest responses
- Team questions/answers
Suggested Reading - Books

- I VERY STRONGLY RECOMMEND:
  - Derek Bruff’s *Teaching with Classroom Response Systems, Creating Active Learning Environments.*
  - 200 pages of everything you need to know. Useful Table of Contents. Well organized. Has everything EXCEPT for info about clicker manufacturers and software help.
  - Written for most disciplines about generic clickers.

- QUICK READ:
  - Doug Duncan’s *Clickers in the Classroom.*
  - Centered mostly on science, especially astronomy/physics.

- THE BOOK THAT STARTED IT ALL:
  - Eric Mazur’s *Peer Instruction: A User’s Manual.*
  - Centered mostly on physics

Suggested Reading - Journal Articles

- *Physics Teacher,* April 2008, “Clickers or Flashcards” by Nathaniel Lasry
  - Clickers & flashcards result in same amount of learning
  - Clickers are better because clickers are both a learning AND teaching tool. Flashcards are just a learning tool.

- *Life Sciences-CBE,* Spring 2007, “Clickers in the Large Classroom” by Jane E. Caldwell

- Doug Duncan’s 2 page clicker tips handout:
  - [http://casa.colorado.edu/~dduncan/clickers/Tips.pdf](http://casa.colorado.edu/~dduncan/clickers/Tips.pdf)

- Check YOUR discipline’s journals. More articles appear every day.
Your questions & concerns

- Topics:
  - What are your biggest concerns about using clickers?
  - What are your unanswered questions?

- YOUR TASK:
  - Work in small groups
  - Write 3-5 questions
  - In 5 minutes we will share them with the room

Clicker grading

- Doug Duncan’s book: *Clickers in the Classroom*
  - Align grading with course goal (e.g. participate vs. correct)
  - Use clickers consistently if part of grade
  - Drop some scores – tech problem, forgot clicker, etc.
  - Make worth 10% (maybe less)
    - Small effect on grade, big effect on attendance

- Patrick Len’s article: *Astronomy Education Review*:
  - Offer bonus points if class gets it 80+% correct
    - Increases participation and discussion
  - High stakes grading DISCOURAGES talking with neighbors.
Cheating

- Doug Duncan’s book: *Clickers in the Classroom*
- Paraphrased:
  - Discuss cheating at start of the semester
  - Using another clicker = taking their exam for them
  - Little to gain, lot to lose
  - Small part of grade, big hindrance to learning
  - Most students LIKE the feedback
  - Students say feedback improves grade

Types of Questions

- Fact check
- Conceptual
  - Easy: one concept
  - Medium: assemble two concepts
  - Hard: assemble 3+ concepts
- Think-Pair-Share (next slide)
- Discussion starter / opinion gathering
- Pre & Post test (identical question)
Think-Pair-Share

- (My personal favorite, the kind I use most often)
- Ask the question, students respond individually
- If results are between 50-75% correct, consult with your neighbor and vote again.
  - If 40% correct, coach them a little first.
  - If less than 40% correct, coach a lot or review.
- Usually results improve noticeably, often 80+ %.
- Students understand and remember concept better
- Takes only 2-3 minutes, for rich conceptual questions.

Write your own clicker question

- Write question(s) on your own for YOUR class.
- Then share them with group
- Estimate your questions’ difficulty level
- We’ll try your questions in here
- We’ll assess your difficulty level
Your questions

- Insert participant questions in the slides below

Asking the question in class

- Two thoughts:
  1. Don’t read the question out loud.
     - The students reread it to themselves anyway.
  2. Don’t show the vote results if you may do a Think-Pair-Share
     - Seeing the majority influences decision/discussion
     - Try not to reveal if you’re happy or sad about results
     - Guide students if <50% correct on first question
Q

1. A

How difficult was that question?

1. Easy (1 concept)
2. Medium (2 concepts)
3. Hard (3+ concepts)
Feedback

- What did the question author(s) do well?

- What suggestions do you have for this question?

Q

1. A
How difficult was that question?

1. Easy (1 concept)
2. Medium (2 concepts)
3. Hard (3+ concepts)

Feedback

- What did the question author(s) do well?

- What suggestions do you have for this question?
Q

1. A

How difficult was that question?

1. Easy (1 concept)
2. Medium (2 concepts)
3. Hard (3+ concepts)
Feedback

- What did the question author(s) do well?

- What suggestions do you have for this question?

Q

1. A
How difficult was that question?

1. Easy (1 concept)
2. Medium (2 concepts)
3. Hard (3+ concepts)

Feedback

- What did the question author(s) do well?

- What suggestions do you have for this question?
Q

1. A

How difficult was that question?

1. Easy (1 concept)
2. Medium (2 concepts)
3. Hard (3+ concepts)
Feedback

- What did the question author(s) do well?

- What suggestions do you have for this question?

Q

1. A
How difficult was that question?

1. Easy (1 concept)
2. Medium (2 concepts)
3. Hard (3+ concepts)

Feedback

- What did the question author(s) do well?

- What suggestions do you have for this question?
CONCLUSION

I hope you wrote the useful tips down! That was the entire point of today’s session!

Some final advice:

- Pay attention to difficulty level & Bloom’s taxonomy
- Discussion questions are most memorable and lead to longer term learning
- Don’t write questions all by yourself or at the last minute!
- We all write bad questions. Learn from mistakes. Try to use the “bad” question as a teachable moment. “How should this question be worded if we were trying to XXXXX?”
- Get student input on improvements! Some of my favorite questions were drafted by students!