

What are clickers and how can we effectively use them?

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What are clickers and how do they work?

Clickers are an interactive technology that enables instructors to pose questions to students and immediately collect and view the responses of the entire class. This is how clickers work:

1. Instructors present multiple-choice questions (verbally or with presentation software or with the i>clicker software).
2. Students click in their answers using remote transmitters, available at the bookstore (i>clicker, the system supported at Carnegie Mellon, uses radio frequency transmitters, which are more reliable than previous versions of this technology).
3. The system instantly collects and tabulates the results, which instructors can view, save, and (if they wish) display anonymously for the entire class to see.

How might I use clickers?

Instructors generally use clicker systems to augment lectures. Here are some of the ways they have been used:

A physics instructor checks students' comprehension of the material by posing questions at several points in every lecture, and asking students to click in their answers. The system immediately displays a graphic representation of students' answers to the instructor, who uses it to determine whether he should slow down, repeat information, clarify a concept, provide an alternative example, pick up the pace, etc.

An engineering instructor delivers a mini-lecture and then poses a conceptual question using clickers. She quickly scans the display of students' answers and if she notices that a number of students are answering incorrectly, she asks them to discuss their answers with the classmate sitting next to them. Then students are given the chance to modify their answers based on what they have discussed. After students have clicked in their final answers, the instructor displays the results, and discusses them with the entire class.

A philosophy instructor has redesigned his entire course around what Beatty et al (2005) call "question-driven instruction." The instructor begins the class by posing a meaty philosophical question. He then puts students into small groups to discuss the question before asking them as a group to click in their answer. After they do, the entire class discusses the results, and then the instructor follows with a short lecture.

An art history professor with a large lecture class uses the clicker system at the beginning of class to give a short quiz on the assigned readings. The quiz accomplishes a number of purposes: it ensures that students come to class prepared; it focuses their attention and primes them for the upcoming lecture; it allows the instructor to quickly take attendance; and it encourages punctuality, since students who come late miss the quiz along with the points.

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What is the pedagogical value of using clickers?

No technology automatically enhances learning; rather, it must be used thoughtfully and deliberately to advance the learning objectives of a particular course. For example, an instructor in a large or medium-size class might choose to use clickers to:

- Elicit student participation and engagement to prompt deeper thinking about a particular question or problem.
- Monitor students' understanding of course content in real time, in order to identify and address areas of confusion and adjust the pace of the course appropriately.
- Provide students with instant feedback on their comprehension to help them monitor their own understanding.
- Spark discussion among students as they compare, justify, and (perhaps) modify their answers.
- Efficiently deliver and grade in-class quizzes, to hold students accountable for readings and lecture material and assess basic factual knowledge.

What are the potential trade-offs to using clickers?

Research across a wide range of disciplines has demonstrated learning advantages to using clickers. However, there are potential "costs" to consider along with potential benefits. For example:

- It can take an initial investment of time to learn to use the system and manage the data it generates.
- Monitoring students' understanding and responding appropriately requires on-the-fly flexibility and some loss of some predictability when delivering lectures.
- Using clickers takes class time, though the amount of class time depends on how you choose to use the technology.
- Creating good concept questions (in particular, questions that help you diagnose misconceptions) can be challenging.

For more teaching resources, such as creating good concept questions, visit <http://www.cmu.edu/teaching/> or contact us to talk with an Eberly colleague in person.

For more resources on clickers, such as sample language to include in your syllabus that explains the system to students:
<http://www.cmu.edu/teaching/clickers>

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