

# 7 things you should know about...

## Clickers

### Scenario

Elizabeth enters her General Chemistry lecture and takes her place along with another 400-plus undergraduates. As they settle into their seats, they fish their “remote personal response system” devices—clickers—out of their backpacks in preparation for the lecture.

Today’s lecture begins with a review of an important chemistry concept that everyone must understand for the upcoming midterm exam. After Professor King reviews the concepts, he asks the class to answer a multiple-choice question designed to determine how well the students understand the topic he just reviewed. Out come the clickers.

Displaying the question to the class on the overhead projector, he tells the students they have 90 seconds to answer the question. “Think before you click,” he reminds them. Elizabeth reads the multiple-choice question and selects her answer by pressing the corresponding button on her clicker. As the other students enter their selections, a running tally of student responses is projected on the screen.

At the end of the 90 seconds, Professor King displays a bar chart of the poll results. It is immediately obvious that there is confusion; responses are fairly evenly split across all 5 options. Although the students are surprised, King isn’t; he used a question designed to test for common misconceptions. Now he’s got everyone’s attention—a teachable moment. He asks the students to pair up and convince their partner that they have the right answer. After a few minutes of boisterous discussion, Professor King polls the class again. The responses are better, but still not perfect. Now he really has their attention; he explains the concept, highlighting the source of confusion.

Elizabeth now knows three things: 1) although she thought she understood, she really didn’t, 2) she had some fundamental misconceptions that had to be cleared up, and 3) she now knows what to study to improve her performance. On top of all that, she has now met a new potential study buddy.

### What is it?

The simplest remote personal response systems (clickers) resemble pared-down TV remote control units, and they work in the same way. Clickers use infrared or radio frequency technology to transmit and record student responses to questions. A small, portable receiving station is placed in the front of the class to collect and record student responses. Each clicker can be registered to a student (or not, depending on the teacher’s prerogative) and generates a unique, identifiable signal. The system allows for active participation by all students and provides immediate feedback to the instructor—and the students—about any confusion or misunderstandings of the material being presented. Clickers are available for a nominal charge at campus book stores and are increasingly a required item, along with text books and calculators. More complex clickers are also available, resembling a telephone-like keypad, which can be used for more complex responses.

### Who’s doing it?

Clickers have been making inroads in college and university courses since about 1998, as faculty explore how to increase student interaction. Interaction and feedback are particularly challenging in large lecture environments, where class size limits faculty-student interaction. Clickers can be used to ensure students understand fundamental concepts; getting the answer right is less important than identifying a knowledge gap or misconception. Faculty—across all disciplines—use these devices to help keep their students motivated and engaged in what’s going on in class. Although they are particularly valuable in large lecture classes, they are also useful in small classes. Some faculty rely on clickers to bring small group discussions to their large lecture classes.

[more](#) ➞

## What makes it unique?

Clickers give faculty the ability to fine-tune their instruction based on student responses. Some faculty refer to this as just-in-time teaching—making adjustments or adaptations to their course as needed in any given situation. Personal-response technology works well both for large lecture halls and for smaller classes. Regardless of the class size, the instructor is always able to gauge student understanding due to the immediate feedback the technology provides. Results from class responses can be saved and then displayed in a variety of formats (histograms, pie charts, and so forth) or saved to spreadsheet programs for semester-long analyses that may inform subsequent curriculum development.

## Why do we think it's significant?

Clickers represent an easy-to-adopt technology that can enhance the learning experience. For faculty, clickers are being used extensively to evaluate student mastery of content and to identify concepts that are proving difficult for students to grasp. For students, they provide a quick way to validate their own learning, helping them identify areas that need improvement. Clickers can also be used to gauge student opinion on controversial or sensitive issues. They are often used to catalyze debate and discussion, turning a passive lecture into an interactive exchange. And, significantly, students say they are fun! Clickers are easy to use and inexpensive to acquire and can be used for more than one class.

## What are the downsides of clickers?

The cost of acquiring and using clickers can be a downside. Some remote response systems have specialized keypads (not just a simple five-button unit) that can be expensive to purchase. In addition, the receiver, connection wires, and related software for the system may cost several thousand dollars. Other costs can be incurred in staff and/or administrative overhead. For example, systems used in large lecture halls (300–400 students) might require an on-site technician or staff member to operate and maintain them during lectures. Some costs are passed on to students. For the smaller, individual keypads, students typically must purchase the remote unit (typically about \$10) and then register it for use in a course. If lost, the student has to buy and reregister the new device. And it is possible to use clickers incorrectly—good questions are important for their effective use.

## Where is it going?

Clickers, by virtue of their simplicity, are finding broad applicability in virtually any instructional setting and any discipline. Faculty are increasingly using (and advocating) these remote response systems as an integral part of their instructional repertoire.<sup>1</sup> The underlying technology is also rapidly advancing to the point where we might imagine the ubiquitous cell phone being able to not only transmit a clicker response in any given class but also download and save the results of each interactive session.

## Implications for teaching and learning

Interaction and engagement are often limited by class size and human dynamics (a few students dominate the conversation; most avoid interaction). Interaction and engagement, both important learning principles, can be facilitated with clickers. But asking the right questions is more important than the technology. Poorly structured questions or ones that don't focus on key concepts and reveal misunderstandings can undermine the value of personal response systems. Identifying misconceptions and providing frequent feedback is important. Clickers can also facilitate discipline-specific discussions, small work-group cooperation, and student-student interactions. Clickers—plus well-designed questions—provide an easy-to-implement mechanism. Clicker technology enables more effective, more efficient, and more engaging education.

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<sup>1</sup> For example, use of clickers by CU-Boulder faculty has grown from 7 in 2002 to about 40 in 2004. Source: Office of News Services, University of Colorado at Boulder, November 18, 2004.