Effective use of Classroom Response Systems ("Clickers")
Stephanie Chasteen, sciencegeekgirl enterprises & University of Colorado at Boulder

"Clickers" are electronic devices that allow for real-time polling—often with multiple choice questions. They offer you and your students an instant display of the students' responses. Use of clickers can help your students to learn key concepts, improve their enjoyment of class time, and let you (the teacher) better gauge what they are ready to learn.

But clickers are not a magic bullet!

The following factors hugely impact how clickers play out in your classroom: the way that you use clickers, the kinds of questions you pose, and the type of classroom structure you use. Listed below are some key strategies—based on research and experience—on how to make sure students get the most out of your use of clickers.

1 Go beyond quizzes.
While it’s tempting to use clickers as a quick fact-check of student learning, this is just one potential use. As you gain expertise, you’ll find that sprinkling clicker questions throughout class can:

- Motivate and drive student learning
- Develop students’ ability to communicate and explain their thinking
- Help students become more aware of what is difficult for them
- Help you adjust your teaching according to student feedback

Think of the wide range of questions you already ask your students on the fly (e.g., to get them to draw on their personal experience or get them to connect what they’re learning to the bigger picture). With some careful thought, most of your existing questions can be used with clickers.

2 Get your students talking.
Students learn more from clicker questions when they have a chance to discuss and debate the questions with one another, before casting their final vote and participating in a whole-class discussion. This method of teaching, called “peer instruction”, helps students to clarify their thinking, and allow students with a stronger grasp of the material to explain the material at a level more easily understood by their peers. Even if students do not arrive at the “right” answer, this discussion is valuable to students to help them to articulate and clarify their thinking. Of course, in order for peer instruction to be successful, the questions must be both challenging and interesting – if students aren’t curious about the answer to the question, or have no trouble answering it on their own, then why discuss it?

3 Use questions that challenge student thinking.
The limitations of understanding are revealed only when it is applied. Questions that are too simple, or just ask students to recall basic facts, are less useful than questions which challenge students’ ability to explain key ideas. Carefully chosen questions, including distracters based on common misconceptions, can call students’ attention to gaps in their understanding. Questions about which even well-prepared students can disagree, and generate discussion about the reasoning behind the answers (rather than “you know it or you don’t” questions), or even questions without a clear right answer, can yield a stronger understanding of the material.
Mix up your questions.

It's important to use clickers frequently and to ask a wide variety of types of questions. Simple questions give students a chance to feel successful; challenging questions push them to stretch their thinking (and help target the top-level of the class). Consider a wide variety of question strategies to assess what students know about a topic, provoke thinking about something new, predict an outcome, stimulate discussion with a disputable question, or survey your students about their beliefs or experience. Looking at existing question banks or working with colleagues is helpful as you learn to write questions.

The technology is not the pedagogy.

Nothing about this pedagogy requires the use of a clicker and low-tech options exist. However, there are several benefits to the use of technology, including: Anonymity, accountability, all students must commit to an answer, being able to hear from all students, accurate data on student responses that can be displayed to the class and archived for the future, and increased engagement and participation. There is a definite benefit of students making an answer choice, in that they are more interested in the conversation in order to see how “their” answer holds up. (We recommend giving little or no credit for correctness in order to encourage open discussion.)

Keep the mystery.

After students have voted, you hold a powerful tool in your hands; the results of the class voting. Be savvy about when to show the histogram of student responses. Displaying these results often cuts short student thinking about the question (since they now feel they know the answer). Use their curiosity to drive a rich whole-class discussion about the question, focusing on the reasoning behind the different answer choices. Then, once you are satisfied with student understanding of the question content, you can whip back the digital curtain to show how the class voted overall.

Start small.

Incorporating clickers into your class is a process and does require some preparation. Start with a few questions per class and gradually increase your use. Don’t be hard on yourself (or your students!) if things don’t work as you expect immediately. Typically, teachers first concentrate on getting the technology working for them, then on creating good questions. Then they are able to work on more effectively facilitating the whole-class discussion and finally on using student responses to direct their teaching. Experiment and discuss with other users. Talk to your students. Learn from them what they find helpful, and what they don’t like. With time you can learn to flexibly integrate clickers into your teaching in a way that stimulates student learning and is an enjoyable part of class – for the students and for you.

References:

While most formal studies have been done in the college setting, many of the best-practices in clicker use are drawn from the broad literature of what helps people learn, regardless of level. Additionally, Penuel et al. have shown that K-12 teachers and college teachers approach clicker use in a similar manner.

1. The Peer Instruction Network can connect you to other new or experienced users: http://www.peerinstruction.net/
2. Literature on best-practices, videos, and question banks available at http://STEMclickers.colorado.edu