

## Best Practices

Student response systems can promote active learning, allowing the physical classroom to become a collaborative work space. Instructors ask questions via PowerPoint or other multimedia and students respond using their clickers. The instructor can display the results as soon as the poll is closed, so the class can see a visual representation of all student responses. To help facilitate the use of clickers in the classroom, here are some best practices, which should smooth the transition.



### Creating questions and answer choices:

**Consider the following questions when drafting clicker questions:**

- What student learning goals do I have for the question?
- What do I hope to learn about my students by asking this question?
- What will my students learn about each other when they see the results of this question?
- How might this question be used to engage students with course content in small-group or class-wide discussions?
- What distribution of response do I expect to see from my students?
- What might I do if the actual distribution turns out very differently?

**Look for potential answer choices in student responses** to open-ended questions asked on assignments in previous courses, in homework, or during class. This can lead to answer choices that better match common student misconceptions and perspectives.

**Use a variety of types of clicker questions.** Some courses lend themselves to particular types of questions but experimenting with different kinds of questions (application questions, critical thinking questions, perspective/opinion questions, monitoring questions) can help instructors use clickers in ways that engage students and meet course learning goals.

**Experiment with on-the-fly questions.** Often discussions lead to spontaneous clicker questions; other times rhetorical questions can be turned into productive clicker questions.

**Engineer questions deliberately**

- Design ambiguous questions to help students reason and think defensively
- Design questions for a broad spread histogram of responses, indicating several popular choices - It provides good material for discussions

**Each question should have a pedagogical goal:**

- Reviewing core concepts covered during class
- Review pre-class reading and post-class homework
- Multi-pass learning

**Avoid simple factual questions or those that rely on memory recall as opposed to understanding.**

- Strive for questions that get students to reason qualitatively and to draw conclusions from a conceptual model
- Design questions to “catch” students in likely misunderstandings and points of confusion
- Such questions can generate effective class discussions
- Questions are less effective if they answer is obvious

**Use a sequence of related questions to develop a complex idea or set of related issues** – present a concept in different contexts.

- Use familiar situations for new concepts to develop understanding

**Consider when and how a question is presented:**

- If a question is posed before presentation of subject material, students will draw on preexisting knowledge, apply intuition, and extrapolate from prior course material
- If it is presented after, they will draw on whatever was just covered regardless of its relevance

**Refining questions:**

- Immediately after class, take a few notes about how particular clicker questions played out during class. A little reflection right after class can help in refining and improving clicker questions over time.
- Find other instructors who teach with classroom response systems and share experiences.



### Using clickers in your classes:

**Explain to students the learning objectives of the course and the reasons behind particular assignments.**

- Questions are for learning not for evaluation
- Give students responsibility for their learning

**Use clickers for purposes other than quizzes and taking attendance.**

- Aim for ways more directly connected to students' learning
- Use questions to generate discussions, whether class-wide or in small groups

**Use clickers anonymously on difficult or controversial questions to generate discussion.**

- Allows for honest answers when students know they aren't being tracked
- Allows students to see how their peers feel about certain topics

**Have students respond to clicker questions several times throughout a class session.** Although questions at the beginning and end of class sessions can serve particular and useful functions, questions asked every ten to fifteen minutes can help focus students' attention throughout class.

- For some questions, have students think of their own answers before showing them the answer choices, as generating these choices is more challenging than selecting answers from a given list.

**Have students respond individually before discussing a question in small groups.**

- Re-poll after discussion and compare the results.
- Discuss why answers may have changed.

When discussing the results, **focus on the reasons behind why an answer is correct** and why the others are not.

- Have students share their rationale behind why they chose as they did. It gets them critically thinking about why they picked a certain answer.
- If the students find a question difficult, have them re-engage with the question in small group discussion.

**Consider using games**, especially those based on popular game shows, or other forms of competition to further engage students with the material.

- Games are particularly useful for pre-exam reviews
- Use questions from previous exams or questions featuring similar language to that found on the exam



### Running a lecture:

**Prepare the audience with a warm up question.**

- These can be simple ice breaker questions or fun trivia related to the course material.

**Allow adequate time for discussion of the results.** Build in one or two minutes for presenting and polling each question and at least 2-3 minutes of discussion. Never leave a polling slide without responding to the distribution of responses.

- Include the students in the discussion of the results. Have them explain why they chose what they did.

**Don't ask too many in one session but use them sparingly to highlight certain points.**

- A few questions effectively discussed are better than a lot that are glossed over (three to four questions in a 50-minute lecture to highlight key points).
- Ask 2-4 questions per 50 minute class – if that doesn't fill class, there isn't sufficient discussion or sufficiently divisive questions

**Use question slides when the understanding of a concept is critical to proceeding with new content.**

- This can help you verify that the students understand the concept before moving on.

**Use question wrap-up:**

- Summarize key points or arguments students put forth, possibly adding ones they missed
- Make connections to related questions and topics, pose “what if” alternative questions for future pondering, and segue into next question
- Use before and after polls to see how students changed their minds after discussion
- Deliver mini-lecture if students’ answers reveal gap in knowledge or understanding
- Keep this section short and tied directly to students’ recent and upcoming learning activities

**Avoid the “instructor-centric” classroom.**

- Allow class discussion and student questions to clarify the question and any potential ambiguities
- Allow students to find error and flaws in an argument
- Tolerate silences while students ponder
- Use sound cues to identify the progress of small group discussion: noise rises as they discuss, drops when they reach a resolution, and rises again in small talk

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