

Writing Good Clicker Questions

Credit: Science Education Initiative – Contact Stephanie.Chasteen@Colorado.edu

Consider question

Mechanics
Depth
Goals

The best clicker questions

Are often focused on conceptual understanding
Deal with important ideas in class
Have common student mistakes (consider answers from past exams or quizzes) as the wrong answers.
Result in a lot of discussion and debate among the students.
Require analysis and reasoning (not simple memorization).

	Poor question	Better question
CONTENT	Trivial detail	Important and central idea
DIFFICULTY	Tests memorized fact. Yes/no questions. Plugging in numbers.	Interesting and challenging (but not overly difficult). Qualitative.
DISTRACTORS	Wrong answers are easily recognized among alternatives	Tempting distractors, based on what students often struggle with in material. "Not enough information" is often good to include.
CLARITY	Confusing, unclear, uses jargon.	Clear and conversational.

Different Goals of Clicker Questions

Credit to Ian Beatty, U. Mass-Amherst

1. Setting up instruction
 - a. Assess prior knowledge
 - b. Provide feedback to teacher about student ideas
 - c. Provoke thinking about something new
 - d. Stimulate discussion
 - e. Predict and show
 - f. Induce cognitive conflict
 - g. Give students a voice (i.e., survey on their opinions/preferences)
2. Developing knowledge
 - a. Elicit misconception
 - b. Exercise cognitive skill
 - c. Build conceptual structure
 - d. Drive assimilation
 - e. Provide feedback to students about their own learning
 - f. Provide feedback to instructors about student learning
 - g. Focus students on the key ideas
 - h. Improve motivation (keep student confidence and interest)
3. Assess learning
 - a. Status check / exit poll
 - b. Find limits of knowledge
 - c. Demonstrate success
 - d. Review a topic
 - e. Increase student accountability (e.g., reading quiz)

Question design goals and tactics (Beatty et al., 2006)

Beatty et al. have discussed tactics to use in designing relatively advanced clicker questions. These are primarily of use to instructors experienced at using clicker questions.

Question design goals	Tactics
Direct attention and raise awareness	<ul style="list-style-type: none">- Remove nonessentials- Compare and contrast- Extend the context- Reuse familiar question situations- Oops-go-back
Promote articulation/discussion	<ul style="list-style-type: none">- Qualitative questions- Analysis and reasoning questions- Multiple defensible answers- Require unstated assumptions- Trap unjustified assumptions- Deliberate ambiguity- Trolling for misconceptions
Stimulate cognitive processes	<ul style="list-style-type: none">- Interpret representations- Compare and contrast- Extend the context- Identify a set- Rank variants- Reveal a better way- Strategize only- Include extraneous information- Omit necessary information
Formative use of response data	<ul style="list-style-type: none">- Answer choices reveal likely difficulties- Use "none of the above"
We add: Connect to the real world	<ul style="list-style-type: none">- Apply to real world setting- Pose in terms of real world problem

I.D.Beatty, W.J. Gerace, W.J. Leonard, and R.J. Dufresne. "Designing effective questions for classroom response system teaching," American Journal of Physics, 74(1): 31-39 (2006).