Writing Effective Questions


There is overall a consensus that it takes some time and practice to develop good questions and that they must be carefully designed and "woven" into lecture (Burnstein and Lederman, 2001; Elliot, 2003; Beatty et al., 2006; Simpson and Oliver, 2006).

If properly designed, clicker questions may enable courses to be more attuned to the way human learning and memory works than simple lecture. Traditional lectures may produce poor results because they fail to account for the "chunking" of information into categories, linking of new information with familiar concepts or creation of new categories, and the use of examples and practice to learn new concepts (Middendorf and Kalish, 1996). If the way we learn is kept in mind, however, it is possible to design clicker questions that favor learning. By this criterion, examples of good questions include presenting a new concept and asking which ideas (or categories) it is most closely related to, showing an example of a new concept, or applying a mastered concept to a new situation.

There is general agreement that a good clicker question is different from a good exam question, but exam questions can be modified for this use (Beatty et al., 2006). Some detailed treatments of question design are available in the literature (e.g., Beatty et al., 2006). Generally speaking, qualitative questions (that avoid calculations, memorization, or facts) are favored because they guide the student to focus on the concept without becoming distracted by details (Beatty, 2004; Beatty et al., 2006). Some useful goals for question design can be culled from the literature:

1. Good clicker questions should address a specific learning goal, content goal, skill, or reinforce a specific belief about learning (Beatty et al., 2006).

2. Questions can (Beatty, 2004):
   - assess students' background, knowledge, or beliefs
   - make students aware of others' views or of their own
   - locate misconceptions and confusion
   - distinguish between related ideas
   - show parallels or connections between ideas
   - explore or apply ideas in a new context.

Some examples of questions recommended by the literature include (Dufresne et al., 2000; Wit, 2003):

- given a term or concept, identify the correct definition from a list, and vice versa
- given a graph, match it with the best description or interpretation, and vice versa
- match a method of analysis with an appropriate data set, and vice versa
- questions that link the general to the specific
- questions that share a familiar situation or example with several other questions
- questions that students cannot answer, to motivate discussion and curiosity before introducing a new topic
- questions that require ideas or steps to be sorted into order
- questions that list steps and ask "which one is wrong?"
- questions that apply a familiar idea to a new context.

Several researchers assert that it is useful, and even important, to design questions that produce a wide set of responses or on which some portion of the class makes mistakes (Dufresne et al., 2000; Hake, 2002; Wit, 2003; Beatty, 2004; Brewer, 2004; Johnson and
McLeod, 2004; Wilson et al., 2006). Others seem to agree, asserting that exploring those misconceptions can be an important part of steering students toward deeper understanding, not just factual knowledge (Tanner and Allen, 2005). To construct such questions, it is helpful to:

- identify student misconceptions and include them as answers, plausibly phrased
- "shut up and listen" to students to find out how they think, and pay particular attention to wrong answers
- include answers that contain common errors.

A variety of questions is usually deemed useful. While instructors are learning to write questions, often most of their questions consist of factual recall (Brewer, 2004). One set of researchers reports that asking instructors to identify the type of question they are writing can help increase the diversity of questions (Brewer, 2004).

Practical suggestions include (Wit, 2003; Beekes, 2006):

- limit the number of answers to five or less, so that question is easy to read and consider
- assess knowledge of jargon separately from concepts to ensure that each is addressed clearly and effectively
- create wrong answers (distractors) that seem logical or plausible to prevent "strategizing" students from easily eliminating wrong answers
- include "I don't know" as an answer choice to prevent guessing
- plan to ask some questions twice to allow peer learning and build emotional investment. (Allow students to answer individually, but do not display the correct answer; then direct students to discuss the question with their peers and answer again.) This approach is advocated by many instructors who have used clickers, including Wilson et al. (2006) and Knight and Wood (2005).

References:


