

iClicker

Clickers in the Classroom:
Pedagogical Best Practices
&
Quiz writing Recommendations

i>clicker in the classroom



- ❖ What Are Classroom Response Systems?
- ❖ How are they used?
- ❖ How can you format content for use in a response system?
- ❖ What makes a good clicker question?
- ❖ Examples
- ❖ Clicker question formatting
- ❖ Questions?

What are classroom response systems?

❖ Electronic polling systems enable you to:

- *Encourage classroom discussion*
- *Quiz/query students informally*
- *Encourage conceptual understanding*
- *Take attendance*
- *Encourage student preparation*



How do they work?

- ❖ Each student has a “clicker”
- ❖ Each instructor has a receiver that collects votes
- ❖ Students respond by “clicking” the appropriate button
- ❖ Wireless signal sent from each clicker to the base
- ❖ Computer (through the software) logs the data
- ❖ Results can be displayed to the class



How are they used?

- ❖ To reset students clocks
- ❖ To offer immediate feedback to students
- ❖ To offer immediate feedback to instructor
- ❖ To encourage greater student preparation
- ❖ To promote higher class attendance
- ❖ To administer paperless testing (not recommended)

Good clicker questions...

- ❖ Are generally not calculations or numerically-based
- ❖ Have good distractors (more than one viable option)
- ❖ Target common misconceptions and preconceptions
- ❖ Ask students to apply rather than recite
- ❖ Result in 50% or less correct for initial vote
- ❖ Should generally not be drawn from publisher's test bank
(unless they are written specifically for response systems)

Main types of clicker questions:

- ❖ Peer Instruction, Formative Assessment Questions
- ❖ Misconception Questions
- ❖ Estimate Problems
- ❖ Outcome Prediction Questions
- ❖ Staggered Questions

Peer Instruction Example

An empty office chair is at rest on the floor. Consider the following forces:

1. A downward force of gravity
2. An upward force of gravity
3. A net downward force exerted by the air



Which of the following forces are acting on the chair?

- A. 1 only
- B. 1 and 2
- C. 2 and 3
- D. 1, 2, and 3

Formative Assessment Example

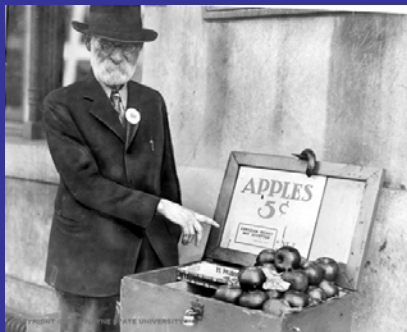
A nurse interviews a new patient from the Dominican Republic client with limited English skills. The nurse observes the client is reluctant to reveal personal information about his ailments. The nurse should:

- A. Acknowledge the client's cultural differences
- B. Request a family member interpret for the client
- C. Request help from a colleague fluent in Spanish to help interpret for the client
- D. Use a chart to identify certain body parts to identify problem

Formative Assessment Example (Slide 1)

Prices and Output During the Great Depression

Aggregate output and the aggregate price level fell together from 1929 to 1933 and rose together during 1933 to 1937. This is what we would expect, but even in 1942 the aggregate price level was still lower than it was in 1929; yet real GDP was much higher. What happened?



Formative Assessment Example (Slide 2)

Prices and Output During the Great Depression

1. The rightward shift in the short-run aggregate supply curve in the early 1940s was the result of:
 - A) high unemployment.
 - B) a left-ward shift in the underlying long-run aggregate supply curve.
 - C) increased productivity.
 - D) increased nominal wages.

Good Peer Instruction and Formative Assessment Questions...

- ❖ Include at least two distractors that could be reasonable choices
- ❖ Encourage discussion about reasoning
- ❖ Natural next step after asking the question:
 - Don't provide the correct answer
 - Ask for reasoning behind choices
 - Survey class again



Misconception Example

At 3 years, Robert can wear the same shorts he wore at 15 months, but he can no longer wear the same pants as he wore then. Why?

- A. He may be malnourished.
- B. He may be a victim of abuse.
- C. His physical development is normal for his age.
- D. His physical development is unusual for his age.

Misconception Example

If weight were 50 percent *heritable*, it would be most accurate to say that:

- A. your weight is equally influenced by nature and by nurture.
- B. your mother's genes are responsible for half of your weight, and your father's genes explain the other half.
- C. nature explains about half of the differences we observe among people.
- D. there is very little you can do to override the power of your genes in influencing your weight.

Questions that Target Misconceptions...

- ❖ Require Practice, Feedback, and Experience
- ❖ Include real world examples and applications
- ❖ Are difficult to explain
 - *Students often cannot explain rationale for their choice (or explain it well)*
- ❖ Are largely answered incorrectly (40-50%)

Estimation Example #1

How many quarts of milk are consumed in the United States each morning at breakfast? In which range?



- A. Less than 300,000 quarts?
- B. Between 300,000 and 1 million quarts
- C. Between 1 million and 30 million quarts
- D. Between 30 million and 100 million quarts
- E. More than 100 million quarts

Estimation Example #2

How many Fortune 500 Chief Executive Officers are taller than the average American male (5'9)?

- A. Between 10 and 20 percent
- B. Between 20 and 30 percent
- C. Between 30 and 40 percent
- D. Between 40 and 50 percent
- E. More than 50 percent

Good Estimation Problems...

- ❖ Involve real world examples and data
- ❖ Are not terribly precise
- ❖ Challenge students to think creatively and make reasonable assumptions
- ❖ Don't always have to be related heavily to course content
- ❖ Are good beginning questions

Predicting an Outcome #1

Three-year-old Jorge sees his sister Isabel put on their father's big boots and walk around outside in the fresh snow. Isabel asks Jorge, "When mommy comes home and sees the footprints, who will she think was walking around in the snow outside?" Jorge will reply,

- A. "Daddy!"
- B. "Mommy!"
- C. "Me!"
- D. "You!"

Predicting an Outcome #2

A warship fires two shells simultaneously at enemy ships X and Y. If the shells follow the parabolic trajectories shown, which ship is hit first?

- A. Ship X.
- B. Ship Y.
- C. Both ships are hit at the same time.
- D. More information is needed.

Good Prediction Problems...

- ❖ Involve real world examples and data
- ❖ Ask students to analyze data to predict a result
- ❖ Are effective when used as a follow up question to a more fundamental question

Reading Quizzes

As Allison reaches for a box in her garage, out jumps a big spider. Her heart immediately begins to race as she withdraws her hand, but soon she realizes that the spider is harmless, and she begins to calm down. Which part of her nervous system is responsible for bringing her back to a normal state of arousal?

- A. sympathetic nervous system
- B. somatic nervous system
- C. parasympathetic nervous system
- D. skeletal nervous system

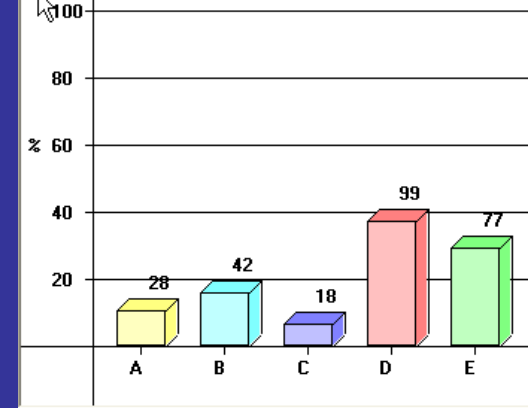
Staggered questions...

- ❖ Build upon each other
- ❖ Are useful indicators of whether or not students truly grasp a concept or set of concepts
- ❖ Can often be easily adapted from exam banks
- ❖ Fall into three main categories:
 - *Different problems using same concept*
 - *Related problems linking different concepts*
 - *Diagnostic questions*

Good Clicker Questions

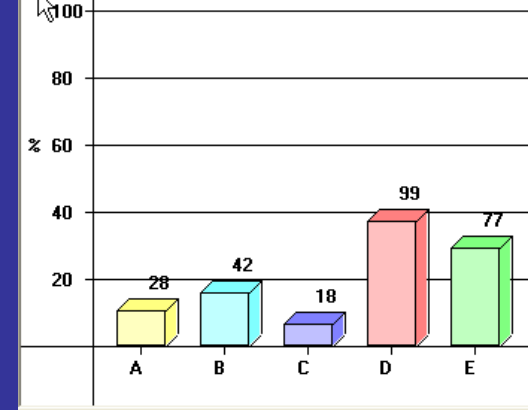
- ❖ Are likely not drawn from a test bank (unless there are clicker-specific questions that critical thinking/conceptual questions)
- ❖ Are not heavily numerical or calculations based
- ❖ Answers are generally 50% or less correct

Question Format Options for i>clicker



- ❖ *True/False (A/B)*
- ❖ *Yes/No (A/B)*
- ❖ *Multiple choice up to five options*
- ❖ *Does not allow for numeric entry*
- ❖ *No special formatting required*
 - *Floats above your slides/presentation*
 - *Screen shot captured in i>grader each time you poll*

Format and Grading Suggestions



- ❖ *Initially answers without talking to neighbors*
- ❖ *Don't show class distribution of answers*
- ❖ *Talk more about question and then ask them to discuss with their neighbors*
- ❖ *3 points for correct answer, 2 for incorrect*
- ❖ *Drop 5 lowest averages*
- ❖ *Don't penalize heavily for correct answer; greater points for participation*
- ❖ *Best used for conceptual quizzing, not high stakes/high*

Questions?

