Classroom Response Systems and Critical Thinking

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Which is not true of formative assessment?

A. It can be a multiple choice test
B. It can be an open-ended question
C. It can occur at the beginning of a unit
D. It can occur at the end of a unit
E. It can occur anywhere in a unit
What is a Classroom Response System?

- Promotes active learning
- Instructor can instantly assess student understanding
- Instructor can collect instant feedback from every student
- Supports active participation by students
- Poll students for opinions

Types of questions

- Formative assessment/check for understanding
- Elicit prior knowledge/reveal misconceptions
- Summative assessment
- Discussion starter
- Opinion poll
- Attendance
Critical thinking questions

- Applying concepts and principles to a new situation
- Decision making
- Articulating ideas and beliefs
- Justifying reasoning
- Pick a Student feature

If you are a global learner, which would be an effective learning activity?

A. Systematic process of mathematical proofs
B. Analysis of the poem, “Stopping by woods on a snowy evening“
C. Designing a roller coaster
D. How a bill becomes law
Which essential features of inquiry were least learner self-directed in the pendulum activity?

A. Learner engages in scientific questions  
B. Learner gives priority to evidence  
C. Learner formulates explanations  
D. Learner connects explanations to scientific knowledge  
E. Learner communicates explanations

Should all science learning occur through inquiry experiences?

A. Of course. Why else would we be in this class?  
B. No. There is a place for memorization  
C. No. There is not enough time.  
D. No. Some topics are inappropriate for inquiry and discovery
Can inquiry learning occur without hands-on experiences?

A. Certainly
B. Of course not!

Which metaphor best describes your experience with k-12 school?

A. Factory
B. Prison
C. Home
D. Church
E. Playground
Opinions, anyone?

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<th>Name-calling and stereotyping jokes are harmless and fun</th>
<th>I don’t have an opinion on this issue</th>
<th>Name-calling and stereotyping jokes represent a threat to the identity of the targeted groups</th>
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The question cycle

- Problem presented without introduction
- Student group discussion
- Poll for responses
- View responses
- Discussion—students explain reasoning
- Instructor comments, brief lecture, demonstration
- Follow-up problem
How the Question Cycle reaches learning objectives

- Focusing student attention by posing the question
- Stimulating thinking processes as students ponder the question
- Providing feedback to students and instructor by viewing of responses
- Articulating ideas about the question during discussion
  - Beatty, Gerace, Leonard, & Dufresne, Designing Effective Questions for Classroom Response System Teaching

Students are better teachers?

“Students who understand the concept have only recently mastered the idea and are still aware of the difficulties involved in grasping that concept. Consequently, they know precisely what to emphasize in their explanation. As a lecturer is continuously exposed to the material, the conceptual difficulties seem to disappear and therefore become harder to address.”

Eric Mazur, Peer Instruction
“Contingent teaching”

- Fluid course of instruction
- Teaching depends on actions of students
- Respond to feedback spontaneously
- Flexible plan
- Need for effective diagnostic questions
  - Draper & Brown, *Increasing Interactivity in Lectures Using an Electronic Voting System*

References