

Making the Most of

MULTIPLE

CHOICES

How to use multiple-choice questions to uncover students' thinking skills.

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Multiple-choice questions draw criticism because many people perceive that they test only recall or atomistic, surface-level objectives and do not require students to think. Although this can be the case, it doesn't have to be that way.

Open-ended questions are an important part of both instruction and assessment, and students should be challenged to both ask and answer them. However, multiple-choice questions have advantages that make them a useful part of any teacher's questioning repertoire.

First, they do not require extensive written or spoken answers, just a choice. Students without well-developed oral or written language skills can still show their thinking skills. Some students particularly like multiple-choice items for this reason.

Second, you can ask and answer a lot more

multiple-choice questions than open-ended questions in a given period of time. This means you can cover the content more extensively, asking questions about more aspects of the content students are studying.

So how can teachers write and use multiple-choice questions to assess higher-order thinking?

Writing Effective Questions

Well-written multiple-choice items conform to a set of guidelines. They ask or imply a direct question. They use clear, non-textbook language that is as simple as possible. The answer choices are all plausible answers to the question, arranged as logically as possible. Ideally, the choices should reflect common errors in student thinking so that even wrong answers give students and teachers information about what students know and can do.

Three particularly useful strategies for designing multiple-choice questions involve a “context-dependent item,” that is, a question that is accompanied by a visual or written “context” that gives students something to think *about*. Because students have the material in front of them, their mental energy can be devoted to thinking about that material, not striving to retrieve it from memory.

Interpreting a Visual

When we give students a map, chart, photo, or other visual and ask a question that requires them to interpret it, we enable students to demonstrate that they can apply content knowledge and interpretive skills. Most students are familiar with this type of question, which has been in use for a long time.

It is sometimes possible to extend the level of thinking and design an item that requires analysis or evaluation. For example, this series of questions requires students to interpret a bar graph showing growth trends for fertilized and unfertilized plants (fig. 1, p. 38) at different cognitive levels:

1. What is the independent variable in this experiment?
 - A. Height of plants in cm
 - B. Time of measurement in weeks
 - C. Use of fertilizer [correct answer]
 - D. Amount of grass seed

2. The results in the graph support all of the following conclusions EXCEPT
 - A. Rye grass grows taller with fertilizer than without fertilizer.
 - B. Rye grass has to have fertilizer to grow. [correct answer]
 - C. Rye grass grows at a steady rate whether it is fertilized or not.
 - D. Rye grass grows faster with fertilizer than without.

3. What would be the most appropriate experiment for Maria and Jorge to do next to find out more about the effects of fertilizer on rye grass?
 - A. Vary the amounts of fertilizer (high, medium, low) to see whether there is an optimal amount. [correct answer]
 - B. Vary the amount of water to see if water makes fertilizer work better.
 - C. Vary the amount of sunlight to see whether sunlight makes fertilizer work better.
 - D. Vary the kind of plant to see whether other plants besides rye grass do better with fertilizer.

Question 1 is about interpreting the graphs: Do students understand what the graph is saying? Question 2 is about drawing a conclusion from the data in the graph: Can students practice inductive scientific reasoning? Question 3 is about using the results of one experiment to plan a follow-up experiment.

Whether these questions are the right questions to ask depends on what you want your students to know and what you want to assess. The effectiveness of multiple-choice questions—or any kind of questions—depends on their relationship to what students are trying to learn.

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Interpreting a Text, Story, or Scenario

Reading tests have used passage-dependent multiple-choice questions for a long time. You can use the same format to assess application, analysis, or evaluation skills in any content area by creating a story or scenario related to the content, akin to “word problems” in mathematics. You can use an actual text or write a scenario of your own.

For example, if your class is studying the Bill of Rights, you might write a little story illustrating the use of free speech and then ask a question that requires an inference. The following question asks students to make an inference about a speaker’s rhetorical intent:

Jefferson Davis made a speech to the Confederate Congress in April 29, 1861. This excerpt comes after Davis has reviewed several different ways in which the North had promoted its own economic, social, and political interests at the expense of the South and has reviewed the principle of state sovereignty regarding anything not explicitly mentioned in the U.S. Constitution:

“The people of the Confederate States, in their conventions, determined that the wrongs which they had suffered and the evils with which they were menaced required that they should revoke the delegation of powers to the Federal Government which they had ratified in their several conventions. They consequently passed ordinances resuming all their rights as sovereign and Independent States and dissolved their connection with the other States of the Union.”

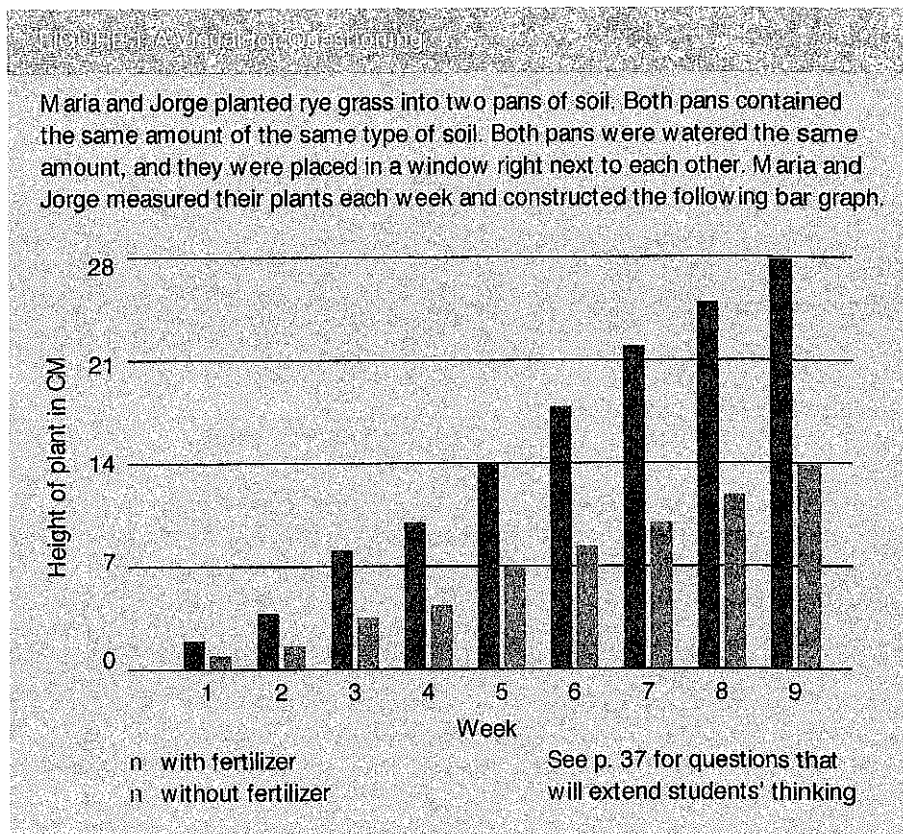
Which of the following is the best summary of the idea Jefferson Davis is trying to communicate in this excerpt?

- A. The problems of the South are all the North’s fault.
- B. The North has been bullying the South, and the South’s response has been justifiable and civilized. [correct answer]
- C. The Confederate Congress will be much better able to govern the South than the Union Congress has been able to.

This question could help introduce a class debate or discussion about the feelings and intentions of the U.S. South toward the North or the kind of leadership that Jefferson Davis provided for the Confederacy. You could also ask comprehension questions about this excerpt (What are the wrongs and evils to which Davis refers? What event in U.S. history is described in this quotation?). However, the better way to test whether students understand the historical facts leading up to the U.S. Civil War would be to ask simple, direct questions. Interacting with primary sources should help students go deeper than just identifying facts.

Critiquing the Work of a Fictional Student

A special version of the story or scenario strategy is to pose a problem and then describe how one or more fictional students addressed the problem. You can then ask your students



whether they agree with the fictional student and why or ask them to decide which of two or more students is correct and why.

The advantage of this strategy is that you can use the thinking you have observed in your own students or illustrate instances of common errors. Sometimes you can even use the fictional students’ thinking to set up a problem that requires your real students to do more thinking! Another plus of this strategy is that the scenario will be about a “student like me.”

This question asks students to determine which, if any, student is correct:

Alicia and her friend Bethany were learning about the difference between physical and chemical changes. Alicia said that making a cake from a recipe was a physical change because all of the ingredients—flour, sugar, and so on—were still in the final cake when

it was baked and you ate it and could taste them. Bethany said that making a cake was a chemical change because the ingredients came together to make something different and you couldn’t see the individual ingredients anymore. Which student do you agree with?

- A. Alicia is correct.
- B. Bethany is correct. [correct answer]
- C. Neither Alicia nor Bethany is correct.

It would be good to follow up a question like this with a discussion in which students had to defend their answer or try to persuade classmates to accept their point of view. Students might be interested in doing some research to find out what specific chemical changes happen when a cake is baked.

Using Questions Effectively

The obvious way to use multiple-choice questions is to put them on a

test. But there are less obvious formative ways to use multiple-choice questions. If multiple-choice questions are to serve a formative purpose, you and your students should both be able to use the experience of answering these multiple-choice items, and participating in follow-up activities, to bring about more learning.

Student-Response Systems

When using student-response systems, teachers generally ask questions orally, one question at a time, often followed by activities that probe student thinking. Students make a choice and often defend it to clarify, and perhaps revise or extend, their thinking.

Student-response systems can be electronic (using “clickers” or free or low-cost Internet-based response systems) or not (holding up ABCD cards or using hand signals). The system is not nearly as important as the quality of the questions and how you use student answers.

You might pose a multiple-choice question that requires higher-order thinking, like the example questions already discussed. If most of the class selects the right answer, you might use follow-up questions: Why is the right answer correct, and why are the other answers wrong? If the class is divided, you might form groups according to students’ chosen answers and have each group prepare a statement to try to convince the rest of the class of their point of view. Usually, this method will result in students being persuaded by the rationale for the correct answer, with most of them able to explain it in their own words.

Another option is to use a series of questions that begin with a few comprehension questions and then move to questions that require students to solve a problem or make an inference. Finally, you would move

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toward more open-ended problem solving, writing, or discussion.

Open-Ended Explanations or Extensions

In contrast to student-response systems, which usually involve group activities, multiple-choice questions with open-ended explanations or extensions are usually answered individually, on paper or electronically. These hybrid questions are in the same family as all “solve the problem and explain your thinking” questions. The following questions, for example, assess students’ understanding of the Declaration of Independence and their ability to apply that understanding:

Here is an excerpt from the Declaration of Independence:

“We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.—That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed□□□”

1. Which is the best summary of the main idea about government in this excerpt?

A. Government should make people happy.

B. The government should let people do whatever they want to do.

C. The main purpose of government is to protect the rights of people. [correct answer]

D. The government should not kill people or put them in prison.

2. Explain your thinking. How did you decide which statement was the best summary of the main idea?

Asking students to explain their thinking in this way gives them the opportunity to analyze content information and practice metacognitive skills.

Learning, Game-Show Style

A basic point underlying all these methods is that selecting means making a decision, and making a decision means thinking. Writing and speaking are the conventional ways we assess student thinking, and should remain so, but we shouldn’t be too quick to dismiss multiple-choice questions.

What we must do is get better at writing multiple-choice questions that require students to think deeply. This is difficult, I admit, but once you learn to write multiple-choice questions that tap higher-order thinking, you can use them in all kinds of fun ways that seem more like a game show than a test. And students will enjoy it. ■

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