

Additional Thoughts on Questioning in Math Class

Ideas taken from NCTM Professional Standards for Teaching Mathematics (1991)

Asking questions that motivate student reflective thinking is an art. If our lessons are to be effective, we need to develop this art. It takes practice. As with most arts, there is not a set of hard and fast rules that work in all situations all of the time, but here are some general effective ideas to keep in mind for most times.

1. A “Try-to” List:

- Try to use effective pauses and wait time.
- Try to avoid frequent questions which require only a yes/no answer or simple recall.
- Try to avoid answering your own questions.
- Try to follow up student responses with questions and phrases such as, “why?” or “tell me how you know” or “think about how you can put Jim’s response into your own words.”
- Try to avoid directing a question to a student mainly for disciplinary reasons.
- Try to follow up a student’s response by fielding it to the class or to another student for a reaction.
- Try to avoid giveaway facial expressions to student responses.
- Try to make it easy for students to ask a question at any time.
- Try to ask the question before calling on a student to respond.
- Try not to call on a particular student immediately after asking a question.
- Try to ask questions that are open-ended.
- Try not to label the degree of difficulty of a question.
- Try to leave an occasional question unanswered at the end of the period.
- Try to replace or enhance “lectures” with a set of appropriate questions.
- Try to keep the students actively involved in the learning process.

2. **Questions to seldom ask:** [The point here is that even though you *do* want to know the answers to these questions, the way these questions are phrased probably won't get you very far in learning what you want to know.]

- "How many of you understood that?"
- "Everybody see that?"
- "You want me to go over that again?"
- "This is a right triangle, isn't it?"
- "Do you have any questions?"

3. **Phrases That Encourage Participation:** It's useful to have a handful of effective ways to start your questions that will motivate all students to participate. Here are some to try. What others can you think of?

- "Don't raise your hand--yet; just think about a possible answer. I will give you a minute . . ."
- "Everyone—picture this figure in your mind. Is it possible to sketch a possible counterexample to this statement? . . . I will walk around to look at your work and select 3 students to share their results with the class."
- "Find an example for this statement and write it down. In just a minute I will tell you possible ways to check your example to see if it indeed makes the statement true."
- "Put the next step on your paper and write a reason to justify this step. Raise your hand when you are ready and I will be around to check in on you."

4. **Phrases That May Fail to Motivate:** There are some questions that you might want to avoid. Why? Because often you end up answering your own questions . . . and “permitting” students NOT to participate—that is, students are not required to take responsibility to develop a response depending how the question is phrased.

- “Does someone know if . . . “
- “Can anyone here give me an example of . . . “
- “Who knows the difference between . . . “
- “Someone tell me the definition of . . . “
- “OK, who wants to tell me about . . . “

5. **Questions That Need Enhancing:** Some common types of questions need some special care if they are to be useful in the math classroom. Otherwise, these questions do not provide much information to check students’ reasoning.

- **Yes-No questions**
- **True-false questions**
- **One-word-answer questions**
- **Questions that fail to motivate**

Seeking, Explaining, Relating, Predicting, and Describing

The NDT Resource Center recommends that you use the top categories of questions from [their list](#) more frequently than those at the bottom. Ask students to:

- Seek out evidence. ("What made you say that?")
- Explain. ("What caused Nixon's impeachment?")
- Relate concepts, ideas, and opinions. ("Compare germ-eliminating antibiotics to natural alternatives.")
- Predict. ("What will happen to Ahab if he continues to obsess about killing the Moby-Dick?")
- Describe. ("What happens when Max is sent to bed without supper?")

Edutopia – Johnson

According to Robert Marzano's book, *Classroom Instruction that Works*, 80 percent of what is considered instruction involves asking questions. It makes sense then, that if we want to improve our effectiveness at teaching, of course we would start by improving our questions. I have thought a lot about this topic and I would like to share three specific actions that we can take to improve our questions. To begin with, we need to get students talking rather than the teacher talking. Second, prepare the questions when you plan the lesson. And third, scaffold the questions.

Common Core State Standards

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.