

Questions to Increase Number Sense

Promising Practices 31

Suggestions for Program Improvement for Ohio Aspire Practitioners

Curriculum and Instruction

Program Puzzler

In your Aspire classes, you find that it is often difficult to have students participate in math discussions. Questions are posed, and some students respond quickly while others seem to be confused and disconnected. Positive reinforcement of correct answers doesn't seem to improve the situation. What can you do to make these discussions more beneficial for everyone?



Peer Perspective

- **Introduce a topic with questioning.** *What do you know about...? What do you want to know about...?* These two introductory questions can help a teacher pinpoint areas of misunderstanding as well as provide a starting point for discussion. These **open-ended** questions allow all students to participate and explore mathematical ideas.
- **Allow time after posing a question.** Whether questioning an individual, small group, or whole class, it is important to pause to allow all students the time to think through their answers. Questions should lead to discussion, not end it.
- **Do not confirm or deny a response initially.** This allows all students time to continue the mathematical sense making. It is often very hard for a teacher to acknowledge whether the answer is right or wrong, since teachers have been conditioned to immediately give positive feedback. Unfortunately, immediate positive feedback has the undesired result of shutting down any other thought on the topic. (Students will also want an immediate verification; comments such as “but I gave that answer” will have to be addressed.) *Does anyone agree or disagree with this answer? Does anyone have any other ideas? What do the rest of you think?* These questions allow all students to think and explore the question asked.
- **Develop higher-level thinking skills with good questioning.** *What if...? How many ways...? Can anyone find another way...? Why isn't...? When would we use...?* These questions help students explore different possibilities and methods in mathematics.
- **Use questioning to assess what has been understood and where misunderstandings are.** *What is...? Why can't we...? How do you know...? What's wrong with...? What if we...?* Students must **communicate** their thoughts and reasoning, often clarifying and making sense of the mathematics while doing so. The teacher's role is to help the student make the mathematical connections, to help them see inconsistencies, and to make sense of the concepts. Questioning techniques help do this.

Timely Tips

A smile from the instructor goes a long way in making students feel comfortable during mathematical discussions. Admitting that you do not get the answers immediately helps put the students at ease.

Using materials such as sale information from local ads can jumpstart a mathematical discussion on percents.

Misinformation in newspapers and ads are often easily found and foster mathematical sense making.

Encourage students to bring authentic materials to class for discussion.

Added Insights

Good questions techniques are an integral part of any successful mathematics experience. Good questioning makes students think mathematically and help them make sense of the mathematics in an activity and/or discussion. Questioning is an important tool in the introduction of a topic, in any mathematical discussion, and in informal assessment

Good questioning relies on knowledge of both content and development. For the process to work well, the teacher must engage in active listening and appropriate responses.

Allowing the students time to connect concept and procedures improves mathematical competence for students. Good questioning fosters this competence.

Supports

The Ohio Aspire system has varied supports to help program and instructors with mathematical competency. These include yearly face-to-face professional development at regional resource centers and at local programs, online materials, such as Eureka, on-line courses, and the Ohio ABE/ASE Content Standards. Also, answers to specific questions can be directed to the Ohio Literacy Resource Center. Regional resource centers have many materials that can be borrowed for classroom use.

Other online resources such as Hippocampus.org and KhanAcademy.org offer free instructional support for students. Teachers should insure that students are aware of such resources and that they know how they can be used to enhance mathematical understanding.

Developed by the Ohio Aspire Math Task Force and the OSU Aspire Evaluation and Design Project, 2011.

Funds for producing and distributing this publication were provided by the Ohio Board of Regents under authority of Section 223 of the Workforce Investment Act, 1998. Opinions expressed do not necessarily reflect those of the Ohio Board of Regents or the U.S. Department of Education, and no endorsement should be inferred.

