

Teaching Math in a Multi-Level Classroom

Promising Practices 33

Suggestions for Program Improvement for Ohio Aspire Practitioners

Curriculum and Instruction

Program Puzzler

In your Aspire program, you have students at different math levels. Students often work independently but spend a lot of time waiting for help. You feel pulled in all directions, and students are not making the progress needed for success. What can you do to increase student confidence, success, and mathematical competence?



Timely Tips

Peer Perspective

- *Decrease emphasis on computation and increase emphasis on problem solving, decision making, reasoning and number sense for all levels and all learners.* A daily problem when the students walk into class is a fun way to work on problem-solving skills. Remember, not all problems can be solved immediately. Get rid of those “drill and kill” workbooks!
- *Introduce geometry and algebra skills and concepts at early levels.* A daily concept can be introduced to all learners in a group setting, followed by group problem solving to solidify the concept. Some students may be able to extend their learning while others will struggle with basic concepts, but all will benefit from the exposure.
- *Make connections between mathematical concepts by linking new knowledge to previous concepts.* Talk about how the basic concepts are seen repeatedly in mathematics. Teach fractions, decimals, and percents at the same time and show how they can be used in different math levels.
- *Use manipulatives to foster understanding of mathematical concepts.* While perimeter and area may seem clear to you as a teacher, students benefit from using manipulatives to see the relationships and concepts. Cut out a square inch and compare it to a square foot; cut out a square foot and compare it to a square yard. Look at square numbers using square tiles. Tie abstract concepts to concrete things.
- *Use technology for all levels and all learners.* Calculators are an important tool for problem solving and making mathematical sense of concepts and skills. Students can be given the option of using a calculator when needed or wanted. Practice of computation skills can be done effectively on a computer at other times. Two good practice math sites are: <http://aplusmath.com> and <http://aaamath.com>. Use online resources in the classroom, such as Khan Academy and Hippo Campus to provide opportunities to expand students’ understand of math concepts.

Never tell students that this is an easy problem. There is no benefit from solving an easy problem, and if the students don’t solve it, it can be devastating. Try to always say, this is a hard problem.

Take time to extend learning whenever possible. Showing proper notation of powers when talking about repeated multiplication can enrich student competence.

When problem solving, don’t worry about quantity, worry about quality or problems completed. Sending home incomplete work will only encourage students to get the answer rather than understand the concept.

Added Insights

- Students who participated in an activity remembered the concept longer than those who just listened to instruction. Lectures are not always the most beneficial the way to teach math: group discussion and group work are much more beneficial.

Cohen, R.L. (September 1981). On the generality of some memory laws. *Scandinavian Journal of Psychology*, 22, Issue 1, pages 267-281.

- The “study hall” approach, where students spend the entire class working individually out of a workbook or on worksheets, does not assist the students in expanding the mathematical understanding of the concept.
- Use group work to foster understanding through communication. Students can be grouped in a multi-level group in most areas of problem solving and concept development as long as calculators are available as needed. Students learn to think by actively thinking and engaging with the subject in a social setting. Working in pairs and small groups help students communicate ideas to each other and become more mathematically confident.

Brown, J.S., Collin, AL, & Duguid, P. (February 1989). Situated cognition and the culture of learning. *Educational Researcher*, v18 n1, pages 32-42)

- The best ways for student to learn to think are: watching teachers solve problems and explain their thinking process. Teachers should practice thinking out loud as they solve problems.

Bynes, J. (2007). *Cognitive development and learning in instructional context*, Boston, MA: Allyn and Bacon

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.

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