Math Counts:
Issues That Matter

A Professional Series, Volume 5

INTERVENTION: BRIDGING THE GAPS IN STUDENT LEARNING

"A brute force way to teach swimming is to throw a student in the deep end of a swimming pool. Those with a natural talent will swim. Others, after one or several tries and immersions, may develop a water phobia and be labeled water inept. A gentler way to teach swimming is to have the would-be swimmer wade in the shallow end to practice well-defined strokes and then to discover their effect on buoyancy." (Selby)

It is rare to find an elementary classroom where all of the students are on the same level in mathematics. Often when standards change or students are not at the same level in mathematics, teachers feel the need to push through the mathematics curriculum, even if students are lacking prerequisite skills necessary to succeed. Teaching new mathematics standards to elementary students is analogous to teaching students to swim: expecting students to instantly rise to the rigor of new standards, without bridging the gaps between the old and new standards, sets students up for failure. Previous mathematics programs have provided "inadequate textbooks and inadequate instruction" (Wu). To avoid such mistakes again, programs must have provide a systematic way for teachers to bridge the mathematical gaps of students who are accustomed to less rigorous standards. For these reasons, all mathematics programs need to supply teachers with an effective tool they can use for assessment and instruction of prerequisite skills.

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Entry-level Tests: Identifying the Gaps

To accurately inform teaching decisions in the classroom, an entry-level test should be available to give students before each chapter. Entry-level tests do not test new content; they only test for skills required to proceed successfully into the new content. Such a test helps teachers determine what prerequisite skills students do understand and what skills need to be strengthened before proceeding into the new content. After completion of an entry-level test, an effective mathematics program provides skill building lessons to bridge the gaps in prerequisite knowledge so students can then be successful in upcoming instruction. At the same time, students who do have the required prerequisite skills need to be appropriately challenged so they are continually improving their mathematical understanding and do not become bored.

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Upcoming Lessons	Prerequisite Skills for Entry-level Test
Grade 1	
Counting to 15	Count objects and write the numeral for quantities 1 to 5.
Order Numbers 1-20	Identify objects in a linear sequence using before, after, and between.
Grade 4	
Dividing by 1-digit numbers	Multiplying whole numbers. Subtracting whole numbers Comparing whole numbers

Skill Builders: Bridging the Gaps

Entry-level tests should not merely be given and then set aside; the results of the entry-level tests should be used to guide instruction. In this view of assessment, "the main purpose of assessment—perhaps the only reason—is to improve learning" (Van De Walle). After administrating an entry-level test, teachers determine whether the class is prepared to move on or if prerequisite skill building is necessary for some or all of the students.

Simple, relevant skill builders should be prescribed based on the test items the student answered incorrectly. For this reason, skill builders need to directly reflect the gaps detected on the entry-level test skill by skill. The skill building lessons should be easy to use for teachers, students, and parents. Ideally, skill building lessons will not merely be blackline masters distributed to students for independent, repetitive practice. And, they should not be merely row after row of exercises. They should be designed to reteach conepts and skills, thus improving every student's mathematical understanding and procedures. Skill building lessons that are visual and require minimal amounts of reading enable students to work on their own. Stepped out models and guided practice of strategies to help students bridge their skill gaps should be provided, before students practice independently. By following such a structure, students can learn the concepts, skills, and procedures they were lacking.

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A skill builder teacher's guide should provide a complete lesson plan, including goals, questions, and activities that compliment the skill building page the students are using. Further, and most importantly, the teacher's guide needs to provide follow up diagnosis and further intervention for students who, having completed the skill builder, still lack the mathematical skills they need to progress. For example:

What if the student can't:

identify a solid shape.

• Show a group of solid and plane shapes and have the student separate them and then explain the difference between the two.

use the < and > symbols.

• Provide pairs of students with a set of 0-9 digit cards and two cards showing the < and > symbols. Students take turns making true number sentences with the cards.

Having specific activities such as these allows teachers to help students to solidify their understanding of mathematics and saves endless preparation time on the part of teachers.

Parents and other learning partners, such as siblings, can be very instrumental in helping to bridge prerequisite skill gaps. Simple activities and games that reinforce the skill builder can provided so students can work together with others to improve their mathematical skills outside of the classroom. These activities need not require a lot of extra materials or time, and should be uncomplicated activities and games that students can learn from and enjoy.

Learn with Parents and Partners

Expressions with Parentheses:

The Four Threes

• Use four 3s to make problems like this:

(3 x 3) – (3 + 3) (33 ÷ 3) +3

• Use parentheses for every problem.

• Make at least ten different problems.

Find the answer to each problem

Challenge Activities for On Level and Advanced Learners

Skill building activities that accompany entry-level tests enable students to bridge the gaps in their prerequisite skills and get them ready to proceed successfully into new mathematical topics.

For students who do have the necessary prerequisite skills to continue onto new math concepts, skill building activities are not the answer. These on level and advanced students will benefit most from challenge activities providing a variety of math experiences they can work on independently. Such activities serve a two-fold purpose: students enjoy working on challenge activities such as puzzles, codes, and other critical reasoning formats while at the same time teachers are able to focus their attention on students who need additional instruction. An effective math program will provide such challenge activities for advanced learners saving teacher time and making classroom management easier.

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Summary

"Unique to mathematics instruction is that new skills are almost entirely built upon previously learned skills" (California Framework). Because of this sequential nature of mathematics, when students have deficiencies in their understanding of previous areas of emphasis, it becomes extremely difficult for them to understand new topics that are based on those understandings. Teachers can use entry-level tests, especially when the standards expected of the students have become more rigorous, and then use the results to inform instruction. "It is important that teachers go beyond simply calculating a score to examine each child's response to each item" (Cathcart). Students and teachers need to work together to build skills that are lacking by reteaching necessary prerequisite skills. A solid mathematics program will provide entry-level tests and skill building activities based on the test items to enable students to bridge the gaps so they can move forward successfully.

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Macmillan McGraw-Hill

MM01 W 3145
04/01

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