



Ensuring That No Child Is Left Behind in Mathematics



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NO CHILD LEFT BEHIND: REACHING ALL LEARNERS ALL THE TIME

Implications of No Child Left Behind have made it imperative that school districts put in place effective systems for assessing and supporting the learning of every student in every classroom. The emphasis on more rigorous state and district standards combined with requirements for annual yearly progress have raised the stakes for annual testing that measures student progress—and school districts’ effectiveness. The challenge comes sharply into view when you consider that a typical fifth-grade classroom, for example, all too often might consist of students whose mathematics abilities span from a third-grade to a sixth-grade level; and consists of students who both speak English and some who do not. With such disparity, what does an elementary school teacher need to do to ensure that not only no child is left behind in mathematics, but that every child makes annual yearly progress?

CURRICULUM COHERENCE AND ADEQUATE YEARLY PROGRESS

New state standards are clearly academically more rigorous than in the past, increasing teachers’ and administrators’ fear of the consequences of No Child Left Behind. Because standards are more rigorous than ever before, this places a premium on developing mathematical concepts carefully from grade to grade and on stepping instruction out and up in a developmentally appropriate manner. As the authors of NCTM’s Standards argue, an effective mathematics curriculum “must be coherent, focused on important mathematics, and well articulated across the grades” (NCTM, 2000). Challenging learning objectives become reasonable for a fifth grader when appropriate concepts have been developed consistently from kindergarten. Only when the curriculum is coherent and developmentally appropriate is annual yearly progress a reasonable expectation.



For mathematics teachers to reach all learners effectively, an effective mathematics program needs to provide teachers with the tools necessary to

- Transition Students to New Standards
- Link Assessments to Intervention Mechanisms
- Prepare Students for Standardized Tests
- Customize the Curriculum and Instruction.

TRANSITIONING STUDENTS TO NEW STANDARDS

The implementation of a new mathematics program is always a challenge. Implementing a new fourth-grade program, for example, with significantly higher expectations for students, is particularly challenging when students have not had the opportunity to experience the developmentally appropriate progression of concepts and skills in the previous grades.

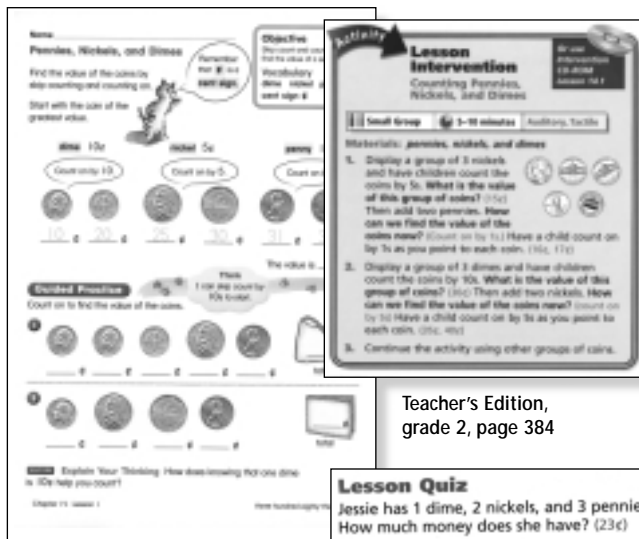
The challenge of transitioning students to higher expectations can be lessened when each unit of instruction and lesson begins with a quick prerequisite assessment and review activity that encourages learners to access prior knowledge. This provides teachers with an opportunity to assess prerequisite skills and identify skill gaps students may have simply because they weren't in the new program last year.

LINK ASSESSMENTS TO INTERVENTION MECHANISMS

Assessment, if it is effective, must be more than a test at the beginning and end of a unit of instruction; rather it must become “a routine part of the ongoing classroom activity” (NCTM, 2000). To ensure that every student in every classroom receives quality mathematics instruction, classroom-based assessment—that is aligned with curriculum and linked to intervention mechanisms that allow teachers to customize instruction for individual students—must be embedded in the curriculum and ongoing. Research shows that frequent classroom-level assessment can improve the quality of learning tremendously, particularly when teachers are given

specific guidance concerning what they should do for students who are experiencing difficulty learning (Guskey, 2003; Stiggins, 2002; Whitehurst, 2003). In the past, such interventions, if they have taken place at all, have occurred at the end of semesters, chapters, and occasionally periodically during a chapter or unit of instruction. Today's accountability climate requires that in order to ensure that standards are being met, that teachers assess student competency during and after every lesson so they can intervene immediately and appropriately when they determine learning objectives are not being met.

But simply adding more assessments will not improve student learning. A comprehensive and effective system of mathematics instruction links all assessments to high-quality materials, both in print and via technology, that teachers can use to support each student's mastery of lesson objectives. The era of one-lesson fits all is gone—the focus is no longer on the group, but on meeting the needs of each and every individual student. Teachers, therefore, need a system of mathematics instruction that is robust enough to allow customization of lessons and interventions as necessary to meet specific student needs. Research indicates that high-performing schools tend to “implement comprehensive systems



Student Book, grade 2, page 383

Teacher's Edition, grade 2, page 384

Teacher's Edition, grade 2, page 383A



Unit Resources, grade 4

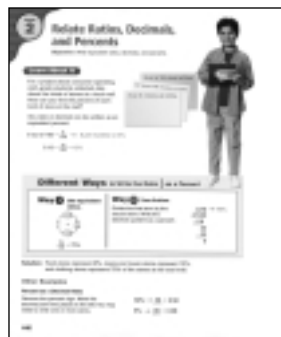
program should enable instructors to easily target instructional pieces to cover the intervention needs of individuals within the classroom ensuring that all students meet grade-level expectations and annual progress targets.

PREPARING STUDENTS FOR STANDARDIZED TESTS

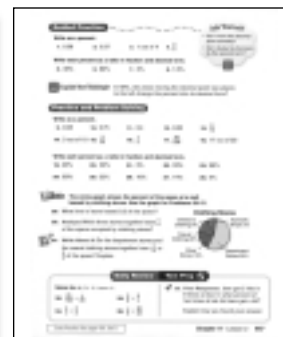
Because the success of No Child Left Behind is measured largely by annual standardized tests, an effective mathematics curriculum must prepare students for demonstrating their progress and learning on these state and national exams. The high-stakes nature of these exams, for schools and districts, raises some concern that teachers will compromise the quality and scope of the curriculum by “teaching to the test.” But “curriculum teaching” (Popham, 2001), in which a teacher aligns instruction with the concepts and skills that will be tested, is not only appropriate and ethical, but an important characteristic of effective curricula (Charles A. Dana Center, 1999). When curriculum, instruction, and assessment are aligned, test preparation becomes seamlessly integrated into each lesson.

Part of aligning curriculum, assessment, and instruction, is ensuring that the curriculum includes the types of representations, language, and vocabulary students will encounter on assessments. Often students experience difficulty with state or standardized tests because the mathematics is represented in ways on the assessment that differ from how it was presented in class or the text. Therefore, it is important that the

to monitor individual student progress and provide extra support to students as soon as it is needed” (Education Trust, 1999). An effective mathematics



Student Book, grade 6, page 346

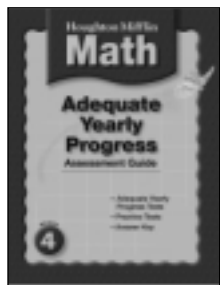


Student Book, grade 6, page 347

mathematical models used in the classroom include alternative approaches and representations students might encounter on tests. Similarly, students who perform poorly on tests often do so because they have difficulty reading and understanding the problems presented. An important component of test preparation is direct instruction in the mathematics vocabulary and comprehension skills students need to read and interpret mathematical problems successfully. Such instruction has been shown to improve students’ achievement on mathematics assessments (Helwig et al, 1999). Students who are exposed to embedded test preparation features are not only more likely to master the content assessed, but become familiar with various testing formats and develop confidence in their ability to solve problems under various conditions.

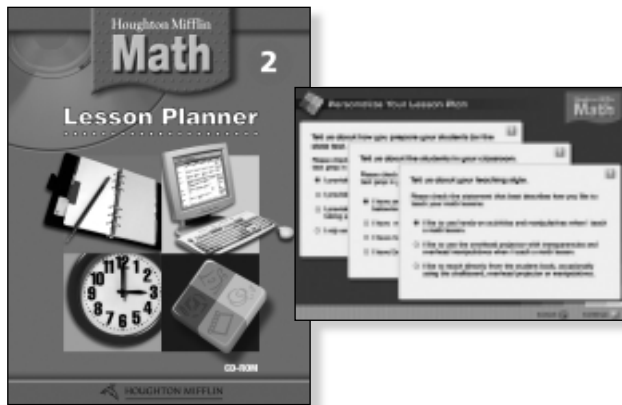
CUSTOMIZING THE CURRICULUM

One of the challenges teachers face is teaching the content students will be assessed on prior to the administration of the test. All too often mathematics programs are inflexible. The curriculum frequently does not permit teachers to change the order of important topics. The ability to reorder major concepts is often necessary in order for teachers to provide students an opportunity to learn important content prior to testing. In addition, the curriculum is often not robust enough to meet the needs of included students, English learners, and talented students who may all be present in the same classroom—and all groups who must make annual progress.



Adequate Yearly Progress Assessment Guide, grade 4

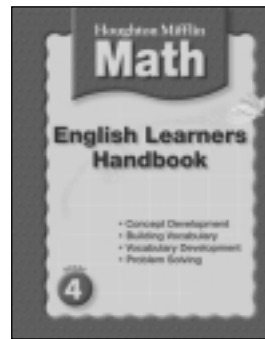
An effective system of mathematics instruction gives teachers the tools they need to both teach the content they need to prior to testing and the means to customize instruction to meet the wide range of individual student needs present in one class. Technology can assist teachers in meeting these



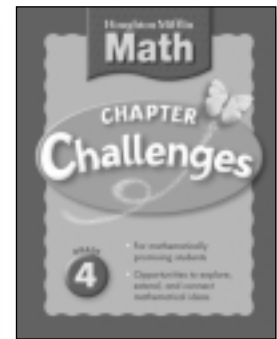
Lesson Planner, grade 2

challenges. A comprehensive mathematics program includes a lesson planning tool which allows teachers to reorder units of instruction as necessary to cover what needs to be taught by test time; which allows them to customize individual lessons to meet the needs of all students in their classroom; and which ideally even lets them customize lessons to fit their own personal teaching style in addition to the needs of particular students.

NCTM's Equity Principle states that "excellence in mathematics education requires equity—high expectations and strong support for all students" (NCTM, 2000). These higher expectations combined with the added measures of accountability embodied in No Child Left Behind have raised the stakes for students, teachers, and school districts. To ensure all students meet annual progress targets, traditional mathematics programs will no longer be sufficient. Effective and comprehensive systems of mathematics instruction now must include the tools teachers need to assist students in making the transition to higher expectations; must include diagnostic and ongoing assessments that are linked to intervention



English Learners Handbook, grade 4



Chapter Challenges, grade 4

mechanisms; must include ethical test preparation features; and must include tools to support teachers' efforts to customize the curriculum not only for the demands of their district, but for the needs of their students as well. Equity in mathematics education requires nothing less.

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