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Using Data to Differentiate Instruction

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In an age of standards, using assessment data to differentiate instruction is essential.



At Redlands Elementary School, Ms. Martez's 5th graders are studying the math concept of greatest common factor.¹ Following an interactive lesson, students participate in a self-assessment procedure that Ms. Martez has created. Using a car windshield metaphor, she asks,

How many [of you] are clear as glass about how greatest common factor works? How many have bugs on your windshield? How many have windshields covered with mud?
(Brimijoin, 2002)

On the basis of their spontaneous self-assessment of "glass, bugs, and mud" and their earlier work on greatest common factor, Ms. Martez assigns students to three follow-up activities. With only a few exceptions, the students' self-assessment matches what Ms. Martez had determined from her pre-assessment.

Because the group of students who are as "clear as glass" understands and can apply greatest common factor at both the conceptual and skill levels, she has these students use a Euclidean algorithm to find the greatest common factor in a series of exercises. A group of "buggy" students—who understand the basic concept of greatest common factor, but still need to build their confidence through application—play a greatest common factor game that Ms. Martez has created. And she sends the "muddy" group to sort factors in a giant Venn diagram constructed of two hula-hoops. This oversized graphic organizer provides a kinesthetic and interpersonal learning experience for those who need additional practice to master the basic concept and skills.

During this time, Ms. Martez offers support and answers questions using a red-yellow-green cup system to prioritize student requests for assistance. A student sets a red cup on his or her desk to say "I can't go on without help." A yellow cup means that the student has questions but isn't completely blocked, and a green cup means that the student understands what he or she is doing. Two students tell Ms. Martez they are "really buggy *and* muddy," and she immediately announces the opening of a "math clinic" where she works on intensive, explicit instruction.

Because Ms. Martez had devoted time at the beginning of the year to talk with her students about the importance of gathering assessment data directly from them, students engage in their tasks smoothly and do not question groupings or complain about assignments. She had modeled the windshield strategy and together she and her class had created a generic rubric for each degree of understanding. Teaching students this self-assessment technique helped accustom them to instruction differentiated by readiness and structures that support student-centered learning (Tomlinson, 1999).

Three-Dimensional Data Collection

For Ms. Martez, informal and formal data about student learning not only shape instruction but also determine its effectiveness. She uses multiple methods of data collection and views the process as dynamic and continuous. She sees her role as data collector in three dimensions: to determine students' prior understanding and achievement, to track their responses to moderate challenges, and to measure their outcomes against expected performance goals (Brimijoin, 2002; Bruner, 1963; Tomlinson, 1995).

Pre-Assessment

Ms. Martez uses a wide array of pre-assessments when teaching new content. During a math lesson introducing basic algebra concepts, for instance, she asks students,

What do you suppose it means to think algebraically? Take out your math logs and write, even if you write that you don't know.

Oral questioning, written journal prompts, objective tests, webbing, K-W-L (What do you *know*? What do you still *want* to know? What did you *learn*?) charts, group discussions, and brainstorming sessions provide rich data about students' existing schema, including critical misconceptions (Bransford, Brown, & Cocking, 2000).

Moderate Challenges

Ms. Martez believes that because students differ in their grasp of key concepts, she must modify her instruction to help them build knowledge, refine skills, and apply understandings on increasingly sophisticated tasks (Wiggins & McTighe, 1998). Assessment helps her modify instruction so that each student is appropriately challenged. She uses paper-and-pencil or — performance-based formative assessments, including objective tests or quizzes, quick-writes, essays, and open-ended problems, varying the type according to the content being studied. She also develops a clear sense of what the culminating assessment will be when she first lays out the lesson or unit.

Ms. Martez gives her students "task cards," which specify the steps in a learning process or experience. These cards include a set of directions for a task in order to facilitate independent learning and nurture autonomy. For example, each of Ms. Martez's learning groups had task cards with step-by-step directions to guide them through their assignments on greatest common factor. The task cards also frequently include rubrics that spell out performance expectations on assignments.

At the end of a lesson, students write in their journal a one-line description or an answer to a question about what they have learned in the lesson. Their responses are "exit tickets" for formative or ongoing assessment to help the teacher evaluate the effectiveness of a lesson design and keep instruction focused on key learning goals and individual needs.

Standards Testing

Teaching in a grade that requires state standardized assessments forces Ms. Martez to reconcile her "gotta get it covered and memorized by testing time" mentality and her belief in concept-centered differentiated instruction. She confesses to feeling conflicted about working wholeheartedly in two seemingly contradictory worlds of teaching and learning.

Three weeks before state standards testing, Ms. Martez asks students to go through their math books and select topics that they have mastered and those that need more work. She reflects on the results and decides to set up centers on such topics as fractions, place value, geometry, and statistics, cycling students through centers related to their areas of need, and assigning "experts" to assist their peers.

Using Assessment to Target Learner Needs

Ms. Martez uses questioning and observing to differentiate instruction and ensure that her instruction is a good match for the varied needs of her students (Brimijoin, 2002). She adjusts questions or performance tasks to be more structured for those who are struggling with a concept and more abstract for those who have mastered the concept. Rather than seeing assessment as an end-of-lesson or end-of-unit phenomenon, Ms. Martez incorporates it at the beginning, at the end, and everywhere in between.

Ms. Martez invests much time and energy in mapping the “start and finish” by first constructing a big picture of assessment results that students bring with them. By the 5th grade at Redlands Elementary, students have one set of state standards test scores from 3rd grade and one set of nationally standardized scores from 4th grade. Ms. Martez enters all these scores on a spreadsheet. During individual conferences, Ms. Martez guides students in setting target goals for their progress and areas of emphasis for her instruction. At the end of the year, she enters all 5th grade scores from state standardized tests and calculates the percentage gains for each student and for the class overall.

At the end of this past year, 74 percent of her students passed the reading assessment, an overall gain of 27 percentage points over their 3rd grade test results; 58 percent passed math, a gain of 5 percentage points; 58 percent passed social studies, a gain of 24 percentage points; and 74 percent passed the science assessment, a gain of 32 percentage points (Brimijoin, 2002). Ms. Martez attributes the improvement in test score results chiefly to her use of pre-assessment, self-assessment, and ongoing assessment to differentiate instruction for individual learning needs:

The facts stuck because they were scaffolded into existing information, taught at the students' readiness levels, hooked in with interests, and nailed down with instruction targeted to the students' strongest learning styles. . . . Differentiation works in a standardized testing world. . . . We can't afford not to do it and expect to meet state standards, especially in low socioeconomic areas like Redlands. (Brimijoin, 2002, p. 263)

Ms. Martez uses the results of test score analysis to reflect on her teaching, comparing her curriculum design and instruction from one year to the next, noting strengths as well as weaknesses, and identifying questions that still need answering in order to refine her practice (Zeichner & Liston, 1996).

The students are also data collectors. They accept responsibility for monitoring their own progress and see that they have a role in shaping instruction. Ms. Martez weaves information gleaned from journal responses with formative quiz and test results. She sees assessment as a powerful tool to be used through the whole process of teaching and learning; one that demands the same kind of evaluation skills that good teachers use for effective management.

Ms. Martez advises other teachers that carefully articulated, continuous assessment that drives curriculum design “maximizes teaching time, streamlines instruction, and facilitates learning for all students.” She insists that assessment is not “just another plate added to the 12-piece service,” but a means of enhancing student and teacher performance.

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Endnote

¹ This article uses pseudonyms for the teacher and school.

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