

READING 4.2

The Case of the Rafter School District

Four years ago, in an effort to expand educational opportunities for all students, the Rafter School District mandated that all students, in all levels, take algebra by the eighth grade. This decision was hailed by parents, who had complained bitterly about the disparities in educational opportunities for different groups of students. Some teachers agreed, and others did not. Pointing out how difficult the courses in Algebra 1 and Algebra 2 were, many felt that the change was just setting up these students for failure. But the new policy stood.

Now, four years after the mandate, it was clearly time to reconsider. Large numbers of students were, indeed, failing the eighth grade Algebra 1 class, and so had to retake it in ninth grade. Scores on the state test had not improved. Morale was low among teachers; nobody wanted to teach the lowest level class. Once again, parents were clamoring for a change.

This time the district set up an Algebra Task Force to study the situation. The committee was made up of the assistant superintendent, the middle and high school principals, a guidance counselor, the special education director, two teachers from each school, and an influential representative from the Parent Advisory Council. Over the course of several meetings they worked on several problem-based tasks from early algebra, and they discussed articles about mathematics, algebra, and equity.

In particular, they were struck by the story of Crystal, a student who might have been barred from the study of algebra because of her struggles with arithmetic. Caiby Seeley (a former mathematics teacher who later became president of the National Council of Teachers of Mathematics), tells her story in the following way:

It would certainly be ideal to have all students be proficient in arithmetic before progressing to algebra. However, a few years ago I had an experience teaching a ninth-grade algebra class that caused me to re-examine my beliefs about necessary prerequisites for learning algebra. One particular student, whom I call Crystal, could not do fraction operations and asked if she could use a fraction calculator in the algebra . . . class. I quickly discovered that, in spite of her arithmetic deficiency, Crystal was an outstanding algebraic thinker, as long as she had her fraction calculator to help her get answers to fraction problems. To make a long story a little

Author's Note: The contents for the Rafter case are drawn from experiences in a range of schools including urban, rural, and suburban settings. (Interested participants may be interested in reading about the experience of one of these, the Rainside School: Ecker, J., & Staples, M. (in press). Creating mathematical justice through an equitable teaching approach: The case of Rainside School. Retrieved March 30, 2009, from <http://www.uswest.ac.uk/education/profile205572.html>)

Richard DuFour asserts that a simple shift—from a focus on teaching to a focus on learning—has profound implications for schools. He also argues that it is the work of staff to design systematic and schoolwide strategies to ensure that all students who experience difficulty receive additional time and support. (If you are interested in learning more about the Stevenson High School, you may want to track down a copy of the following article: DuFour, R. (2004). Schools as learning communities. *Educational Leadership*, 62(8), 6–11.)

shorter, eventually Crystal was motivated by her success in algebra to go back and learn fractions. She continued through precalculus in high school and went on to graduate from college and graduate school.

We need to be careful not to let our own beliefs about how mathematics must be organized get in the way of allowing all students the opportunity to show us what they can do. Even though computational proficiency helps in higher-level mathematics, there is no evidence that students who are weak in some areas of computation cannot succeed in algebra or higher-level mathematics.

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Algebra Task Force members wondered how many Crystals in their school might be barred from the opportunity to move forward with their own mathematics learning if they removed the algebra requirement, because of beliefs about the way mathematics is organized and about who is ready for higher level mathematics.

The Algebra Task Force emerged from these meetings with a series of questions around which they decided to study their school in order to better understand their situation:

1. How does the content of the Algebra 1 classes offered to different levels of students compare?
2. What approaches to teaching algebra are taken in each level, and what is the cognitive demand of tasks used?
3. What opportunities for professional development are offered to support teachers in learning about how to make algebraic concepts and skills accessible to a wide range of students?
4. What teachers are assigned to the different levels of Algebra 1 classes and what criteria are used in making decisions for teachers' assignments to mathematics classes?
5. What choices about enrolling in further mathematics classes are students making, beyond what is required, and what are their reasons?
6. What is the process currently in place for advising students about placement in mathematics courses?
7. What opportunities for additional support are offered to students who are struggling in mathematics, what is the nature of these supports, and how timely is it?

The Algebra Task Force formed teams to investigate each question and agreed to share their findings at the next scheduled meeting. The team investigating Questions 1 and 2 agreed to use the *Secondary Lenses on Learning Observation and Reflection Guide* to frame their observations.

When they reconvened several weeks later and reported on their findings about the various questions, the news was indeed sobering:

- Students in lower levels of Algebra 1 worked with significantly different content than their peers in higher levels. Though there was some variation in teaching approaches from one classroom to another, for the most part instructional practice

- in the lower-level mathematics classes was remarkably consistent in the paucity of opportunities provided for students to
- work with problem-based tasks of high cognitive demand;
 - learn through substantive discourse or “math talk;”
 - make connections between mathematical concepts, representations, solution strategies, and procedures;
 - make and test out mathematical conjectures.
- Teacher professional development for mathematics was limited and there was little time for teachers to meet together.
 - Because the upper level mathematics classes were popular among experienced teachers, the new hires were often assigned to teach the Algebra 1 classes.
 - Student enrollment data showed that many students had stopped taking mathematics beyond the required Algebra 1 course, and among those that stopped a disproportionate number were low income and minority. Students to whom task force members had spoken related a general sense of disaffection, and feeling that teachers didn't care.
 - There was great variation in the amount of guidance offered to students with respect to selection and placement in mathematics classes, and in who was involved in these consultations with students.
 - While the after school program did offer some support in mathematics, there were virtually no opportunities for the after-school instructors to meet with students' regular mathematics teachers to discuss individual students' needs. Similarly, the Special Education program operated quite separately from the regular mathematics program.

After some discussion of their findings, the Algebra Task Force came to the conclusion that the problem was too complex to be addressed merely by changing enrollment patterns as they had tried when they mandated that all students take algebra by grade 8. It was not helpful to have greater access to algebra if it only meant that significant numbers of students were likely to fail. They needed to think about adequate preparation and support for students if they were going to be successful with raising expectations for course enrollment and achievement for all students.

The Task Force established a short-term strategy and several longer-term strategies for addressing the need for better preparation and support for students.

Short-Term Strategy

Addressing the Need to Provide Additional Time and Support for Struggling Students

The Algebra Task Force decided to focus its immediate attention on coordinated responses for supporting struggling students. Its members began to consider the possibility of increasing time spent on mathematics for students who need it, through a combination of in-school and out-of-school initiatives. They wanted to ensure that the additional support offered was closely coordinated with content and approaches taken in the classroom. They decided to base their work on the framework described in Dufour's *Schools as Learning Communities*:

- *Timely.* The school quickly identifies students who need additional time and support.
- *Based on Intervention Rather Than Remediation.* The plan provides students with help as soon as they experience difficulty rather than relying on summer school, retention, and remedial courses.

- *Directive.* Instead of *inviting* students to seek additional help, the systematic plan *requires* students to devote extra time and receive additional assistance until they have mastered the necessary concepts. (Dufour, Richard (2004). *Schools as Learning Communities*. Educational Leadership, May 2004, Volume 61, #8, pages 6–11))

They set up a system for collecting data about the impact on the achievement in mathematics of individual students who participated in the program of support. They also planned to follow up when students identified for support did not attend programs offered after school, in order to determine whether issues such as transportation, home responsibilities, etc., prevented them from participating.

In addition, the task force decided to learn about initiatives to address issues of time and support taking place at other schools. Some schools they read about offered extended class periods to teach mathematics so as to allow time for all components of a lesson, augmented by individualized support for students. One particularly promising model involved pre-teaching a lesson to students who would benefit from the opportunity to preview the ideas and investigations as a foundation for fuller participation in the lesson with the entire class. Another school's block scheduling, in which courses were taken over half a school year, allowed students who failed a course at any point and were knocked out of a sequence of mathematics courses, to catch up by taking two mathematics classes in a single year. This allowed many more students to take higher-level mathematics courses over the four years of high school, even if they had difficulty with some. However, they also noted a concern about overall time lost for any given mathematics class in many models of block scheduling and so decided to learn more about other options.

Long-Term Strategy 1

The Algebra Task Force identified the need to review the mathematics curricula used in the middle school to see whether an alternative to what they were currently using might better provide all students with access to key ideas in algebra while allowing them to continue their study of important topics in other strands of mathematics. They also identified the need to engage in a thoughtful adoption and implementation process for a new high school mathematics curriculum (either integrated across mathematical strands or following the traditional course sequence) that would build on new directions planned for the middle school.

Long-Term Strategy 2

The Algebra Task Force also identified the need to significantly strengthen their professional development program so that it provided teachers with

1. a strong foundation in mathematics;
2. opportunities to rethink their pedagogy;
3. the tools to differentiate instruction in mathematics while maintaining cognitive demand; and
4. skills in conducting regular formative assessment) to inform their instruction.

Long-Term Strategy 3

The Algebra Task Force identified the need to reconsider practices around tracking/achievement grouping in their school. As a first step they made a commitment to

ensuring that test scores alone would not be used as a basis for decisions that would affect students' life chances or educational opportunities. They decided to convene a meeting of teachers, guidance counselors, and the principal before the start of each year's course selection and placement process. In these meetings they would make determinations about placement that included not only results from large-scale tests, but also data from formative assessments offered in class and student portfolios that provided a view into the mathematics history of students. They also decided to reassess the ways in which they assigned teachers to classes, with an effort to place their strongest teachers (in content knowledge, in pedagogy, and in potential for connecting with students) in the math courses that were required of all students.

In addition, the Algebra Task Force decided to visit a high school that was having success with placing all incoming students into heterogeneous mathematics classes, and to visit its sending middle schools as well. They wanted to see for themselves a middle and high school curriculum that would be challenging for the full range of students. They also wanted to understand how a middle school mathematics curriculum could provide a strong foundation of proportional reasoning as a basis for students' study of Algebra 1 or the first year of an integrated high school mathematics program, while also allowing students to continue to develop their algebraic thinking and connect to important ideas in algebra, geometry, data, and elementary statistics.

Rafter School District Case Study Focus Questions

What strikes you as particularly valuable about the processes and priorities for strengthening the mathematics program at the Rafter School District?

What issues might the Algebra Task Force members encounter as they set about enacting their plans? What might they be missing?

What is the state of school-wide systems and equity in your own setting?