DOINGWHATWORKS

Audio

FULL DETAILS AND TRANSCRIPT

District Perspective on Algebra

Douglas County School District, Colorado • November 2008

Topic: National Math Panel: Major Topics of School Algebra

Practice: Topics of Algebra

Highlights

- Establish district wide essential learnings for Algebra I
- Implement and discuss interim assessments for Algebra I competencies
- Provide opportunities for teachers to experience Algebra I from multiple perspectives
- Model algebraic concepts to connect manipulatives to symbolic representation
- Mastering algebra essential learnings to continue mathematics course sequence

About the Sites

Douglas County School District

Castle View High School

Castle Rock, CO

Demographics

85% White

9% Hispanic

2% Black
2% Asian
1% Native American
7% Free or Reduced-Price Lunch
2% English Language Learners
9% Special Education

Castle View High School operates on a rigorous academy model designed to provide smaller learning communities within the high school. The Math, Science, and Engineering Academy offers innovative courses in science, technology, engineering, and mathematics with a supportive staff helping all students achieve their potential while acknowledging each individual's learning style. Features of mathematics instruction at Castle View are:

- Integration of mathematics content within mathematics and across other subjects;
- Implementation of technology into instruction;
- Incorporation of problem solving into each level of mathematics; and
- Accessibility of algebra to every student.

Legend High School
Parker, CO

Demographics
2008-09 data, for 9th grade only:
90% White
5% Hispanic
3% Asian
2% Black
3% Free or Reduced-Price Lunch

Legend High School is in its first year of operation in Douglas County School District (Colorado). The mathematics staff has developed mathematics curriculum, instruction, and assessments that emphasize 21st Century skills and learning. Mathematics content is made interesting, motivating, and meaningful through relevance. Features of mathematics instruction at Legend High School are:

- Academic rigor and relationships are emphasized;
- Technology accelerates deeper understanding of algebra topics; and
- Integrated curriculum applies mathematics knowledge to other courses and out-of-classroom experiences.

Full Transcript

Hi, I am Dr. Larry Linnen, K-12 Mathematics Coordinator for Douglas County Schools. Douglas County is located southeast of Denver, Colorado, and our central office is in Castle Rock, Colorado. A couple years ago, we have assembled a group of high school teaches and middle school teachers to discuss what's really important in algebra, particularly Algebra I. We crafted some essential learnings for Algebra I. The big idea was that we wanted a few essential learnings so that teachers could ensure that all kids could access these and master these ideas by the end of their freshman school year, or whenever they are taking Algebra I. Our essential learnings focus on linear functions, quadratic functions, and algebraic expressions. We have some indicators underneath each one of those topics.

Following that year of essential learning development, we kept our study team together, and we began to take a look at our end-of-course algebra exam. So, we spent last year crafting three interim assessments focused on our three essential learnings for algebra. This year, we are implementing those assessments, and all schools that teach algebra are invited to participate and expected to participate in the implementation of these interim assessments. The exams are one part of our plan to implement an awareness and expectations for algebra competency.

We have plans to gather all feeder schools, and by "feeder" it would mean a high school and a middle school in a particular area in Douglas County, together beginning in January to discuss the results of the first interim assessment. Following that, we will administer the other interim assessments, and still the expectation is that high schools and middle schools in a feeder area get together and discuss the results. We take a look at the results—what kids knew, what they didn't know—and adjust instruction based on those results. In Douglas County, we have provided multiple opportunities for algebra teachers to take a look at algebra from multiple perspectives.

Research is pretty clear that when kids can connect mathematical ideas to something other than a symbolic representation, they are more likely to not only remember that, but more fully understand the notion, for example, of a quadratic. So, we provide opportunities for teachers to see how that works. We go into classrooms and model how that works. We go into classrooms and coach teachers as to how that works. And we work with teachers in classrooms with students to get them more comfortable and more confident in working with the kids on modeling mathematical, in particular, algebraic ideas.

In a classroom last week, I was working with students, and I asked them to get out one n-squared piece, five n strips, and six units and see if they could form of rectangle with it. Kids muddled around with it, but eventually some kids figured out that physically those pieces actually make a rectangle. Then, I asked them well, what dimensions are these. And what they found was well, the dimensions are n+3 by n+2. And then we talked about well, that's factoring this quadratic, how would mathematicians write that. Well, they'd write it as n^2+5n+6. When you factor, it's n+2 times 2+3. What I heard from the kids were comments like, "I have never seen that before. It makes a rectangle. Do others make a rectangle?" And so, we had a discussion that came out of this revelation for these kids of another way to represent an algebraic concept and a way

to model that concept. When kids can connect the physical model to the symbolic representation to some sort of real-world example, they are more likely to understand what was going on.

In Douglas County, it's important that teachers of mathematics understand that the curriculum is not the textbook; it is the standards and the essential learnings that we've crafted for each grade level or each course at the high school level. So, our curriculum for algebra really is all about linear functions, quadratic functions, and algebraic expressions, the three essential learnings for algebra. We want to know how are kids doing with that? Are they understanding those concepts? Because we want them to master those concepts so that when they move into the next course, be it Geometry or Algebra II, they are ready to get into that course.