

 **AUDIO**  
4:54 min

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## Supporting Teachers' Conceptual Understanding

Jonathan Wray, M.A.  
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**Topic**    **DEVELOPING EFFECTIVE FRACTIONS INSTRUCTION FOR K-8**

**Practice**    **OPERATIONS WITH FRACTIONS**

- Highlights**
- » Johnathan Wray describes his role on the Fractions Panel as a practitioner and curriculum specialist.
  - » He highlights how, because of the Common Core State Standards, teachers will need a deeper understanding of mathematics, especially related to fractions, compared to what current state standards require.
  - » Mr. Wray describes how his district supports teachers' practices through the use of coaches who provide demonstration lessons, coteach, lead professional development, and assist with assessments and using data to inform practice.
  - » The district is also using small professional learning communities to empower teachers to examine their teaching practices. They look together at student work, assess understanding, and plan interventions.
  - » Teachers' mathematical content knowledge is assessed as they are challenged to solve problems in ways that demonstrate conceptual understanding.

- » The district also uses walk-throughs of math classes to observe the level of student discourse, the types of questions teachers are asking, the amount of communication about math that is taking place, and whether mathematical tasks are worthwhile.

## About the Interviewee

Jonathan Wray, M.A., is the instructional facilitator for secondary mathematics curricular programs in the Howard County (Maryland) Public School System. He recently completed a two-year term as president of the Maryland Council of Teachers of Mathematics (MCTM). Mr. Wray was selected as the MCTM Outstanding Teacher Mentor in 2002 and as his district's Outstanding Technology Leader in Education by the Maryland Society for Educational Technology in 2004. He serves on the editorial panel of *Teaching Children Mathematics*, a peer-reviewed journal produced by the National Council of Teachers of Mathematics. Mr. Wray also has served as a classroom teacher for primary and intermediate grades, a gifted/talented resource teacher, an elementary mathematics resource teacher, a curriculum and assessment developer, and an educational consultant.

## Full Transcript



🔊 00:00 My name is John Wray. I served as one of the panelists, and my role in the panel was to serve as both a practitioner and somebody who works as a curriculum specialist in a school district. The school district that I work in is the Howard County Public School System.

🔊 00:20 There is a lot of talk right now around professional development and working with teachers on building up their understanding and building up through mathematical content knowledge for teaching mathematics as well as pedagogical knowledge for teaching mathematics. And the reason is because we are really in a transition. As we move toward implementing the Common Core State Standards, what we are noticing is that there are significant differences between the current standards and indicators that our teachers are teaching, mostly in grades kindergarten through eighth grade, and also what the expectations for the Common Core State Standards are for fractions.

 **01:04** What we realize is, as the plate shrinks in terms of the number of standards the teachers will be teaching, what we also know is that the depth of understanding that they will need to sort of grasp as they prepare to teach the Common Core, and their students will need to master, is very significant in comparison to what they are currently doing.

 **01:26** There are a number of things we are doing to support teachers' practice in our district. One of them is that we have coaches. They help provide resources and guidance and demonstration lessons and help coteach and lead discussions about student data, but also lead discussions about mathematics and mathematics content.

 **01:48** We have been working with smaller professional learning communities within schools to help empower teachers to examine their practice, to examine their own assumptions about student understanding, to look at samples of student work, to examine what students don't understand and design interventions, to support student mastery, and also look very carefully at the way that we assess students.

 **02:16** We conduct purposeful observations, and in doing that what we try to do is partner with a school-based administrator or someone who serves in a leadership role, such as a mathematics support teacher or math instructional support teacher, and conduct periodic walk-throughs through the building and kind of take stock of what's going on in the classroom in terms of teacher practice and student understanding. So a lot of times we will look for things like the level of student discourse that's taking place and the types of questions teachers are asking. What kind of tasks are being used in the math classroom? Do they fit the definition of a worthwhile mathematical task—in other words, engaging student intellect, developing math understanding and skills, stimulating student interest, and making connections in developing a coherent framework for math ideas—and does it promote communication about mathematics?

 **03:13** In terms of empowering our teachers to do some of this important work on their own to support their own content knowledge

of rational numbers and fractions specifically, one of the models we have developed in our district has involved small professional learning communities of teachers choosing a topic, such as operations with fractions, with connections to the Common Core State Standards. And what we have done is we have designed pre-assessments of teacher content knowledge where they have been challenged to demonstrate their understanding of mathematics content. Oftentimes we ask them to solve problems using whatever strategy they are comfortable with, but then we ask them to solve the same problem without using numbers or symbolic representations of fractions. So we are asking them to do it using a hands-on tool or pictorially. And after we do that what we do is we discuss their methods and strategies and solutions, including addressing any confusions or misunderstandings and questions that they have.

 04:15 The next step we look at is we really need to sort of accelerate and deepen teacher understanding. So we examine, what do the experts say about operations with fractions? And then we discuss, what are teacher assumptions about their own student understandings, both conceptually and procedurally, of that mathematical topic? And in doing that we collect student samples and we actually examine student understanding by collecting and analyzing those student samples. And we do that in the very classrooms that they work in.