STATEMENT ON ***THE NATION'S REPORT CARD:***
2013 Mathematics and Reading, Grade 12

DALE NOWLIN
12th-Grade Mathematics Teacher, Bartholomew Consolidated School Corporation, Columbus, Ind.; Member, National Assessment Governing Board

What does the new NAEP report tell us about math performance among our high school seniors? The big-picture response is that the average mathematics score for 12th graders was higher in 2013 than in 2005, but was unchanged from 2009. That leads to the question, "Does that mean we have stagnated in terms of gains in mathematics, and if so, why?"

When you examine results by race/ethnicity, black and Hispanic students each showed numerical gains in the percentage of students scoring at or above *Proficient* between 2009 and 2013. This was also true for the percentage of black and Hispanic students scoring at or above *Basic*. The only one of those gains that was statistically significant was the increase in Hispanic students scoring at or above *Basic*.

Average scores do not indicate any success in closing the achievement gaps between racial/ethnic groups or between male and female students. The score gap between white and black students is 30 points in 2013, which was unchanged compared to 2009 or 2005. The gap between white and Hispanic students remains at 21 points, which was not significantly different from the gap in 2009 or 2005. The gap between male and female students was at 3 points in 2005, 2009, and 2013—a relatively small gap, but it perpetuates a stereotype, or contributes to the perception that boys are better than girls at math.

I have been thinking about that perception on the local level lately. In late April, my high school in Columbus, Indiana, sent a team of four students to New York City to compete as one of the finalists in Moody's M3 Challenge, a mathematical modeling contest. Our team of four was all guys. When I watched the webcast of the contest from Indiana, I counted 23 male students and 5 female students in the 6 finalist teams. One of the pieces of data we monitor at the school level is the ratio of boys to girls in our different math courses. Just over 50 percent of the students enrolled in our AB and BC calculus courses are girls, but we also have students take multivariable calculus before graduating from high school. Next year, of the 16 students enrolled in multivariable calculus, only 2 are girls. We see a similar disproportionality in our introduction to engineering classes. At the school level, we need to continue to encourage girls to take mathematics and other STEM classes—at least at the same rate boys are taking those classes.

The 12th graders who participate in NAEP are also asked questions that are not directly related to the content—we refer to them as contextual variables, and some of these are found on The Nation's Report

Card website in a section called “Focus: Lower and Higher Performing Groups.” It shows the percentage of 12th graders scoring below the 25th percentile and the percentage scoring above the 75th percentile. One of the contextual variables is parents’ level of education. It is not surprising that parents’ level of education is correlated with performance, as higher scorers tend to have parents with more education. If education truly is the great equalizer, we need to find better ways to make up for the differences in background and preparation that students bring to school. In my school, we have students who come from homes that provide rich learning environments outside of school, spend weekends going to museums or zoos, and have parents who help with homework or at least make sure it gets done, and put a high priority on getting a strong education. But we also have students whose parents did not have a positive school experience themselves, don’t put a high priority on education, or are too busy working multiple minimum-wage jobs to help with homework. The great challenge for education and for educators is to design a support system that will help to make these students successful.

Also not surprising is that “highest math course taken” is a strong indicator of success on NAEP. This is worth considering from a systemic perspective and from an educator’s perspective. Someone might look at those data and say we need to put every 12th grader into calculus because the data show that if students are in calculus they do well on the test. As a calculus teacher, I can tell you the flaw in that thinking. Putting students in calculus before they are prepared for the course is a really bad idea. But there is a challenge for schools that I think makes sense.

About 15 years ago, we had a futurist speak to our teachers corporationwide. As he outlined the future, he said we should have 30 percent of our students taking Advanced Placement calculus. At the time, we had fewer than 10 percent of our students taking calculus. After discussions in the lunchroom about how naive and unrealistic the speaker was, we took a serious look at ways to increase student flow through the pipeline to calculus. We increased the opportunities for students to take algebra in eighth grade and instituted a seventh-grade algebra program. We introduced block class options so students could take geometry and algebra 2 in the same year. Next year, we will have 155 students enrolled in AB or BC calculus. While they are not all seniors, that represents 31 percent of our graduating class. We also have 16 students (about 3 percent) taking multivariable calculus before they graduate, and 84 students (about 17 percent) taking AP statistics. And in all of those courses, the passing rates on the AP tests are quite impressive. The point is that having 30 percent of our students taking calculus in high school sounded like a ridiculous goal all those years ago. Today it feels normal, and those students benefit in their academic achievement and their expectations of themselves. We need to continue to encourage students to take higher level mathematics classes, and provide access to those classes.

Another challenge for teachers made apparent through the contextual questions is the data on engagement. It is not surprising that 36 percent of the students below the 25th percentile did not find their math class engaging. The only way to make gains with those students, however, is to find some way to make the mathematics engaging or to get them engaged in doing mathematics. Finally, there are some interesting data about how challenging the students find the work. In one sense, if a student is scoring below the 25th percentile, you would expect almost all of the mathematics they do in class to be challenging. But the data show that 7 percent of those students found math class to be never or hardly ever challenging. Another 34 percent found it to be challenging only sometimes.

I am reminded of the recent NAEP Mathematics Curriculum Study that found that course titles often did not match the course content. If we lower standards or water down curriculum to make it easier for struggling students, we run the risk of having them disengage because the work is not challenging. As teachers, we must design lessons that are engaging, challenging, and accessible to all students. As difficult as that sounds, it is even more difficult to implement.

I live in a community that is heavily invested in manufacturing. What I see in many local factories is that the level of mathematics needed for students going directly from high school to the workforce is not that different from the level of mathematics needed to enter college in the past. We must make sure that the 2013 NAEP mathematics results for 12th graders do not indicate an end to the progress we have been making in raising student achievement levels in mathematics. Our challenge as educators, policymakers, and community leaders is to set high expectations and to put supports in place to enable students to meet those expectations. As a public school teacher, I am optimistic in what I see happening on a daily basis. I see a lot of very talented, high-achieving students. I also see a lot of very talented teachers working to provide the needed support to help all students achieve. We clearly have our work cut out for us.