Letter from Dr. Overbay to Spokane school district 81 and the colloquium group.

Hello everyone,

I think it would be good to have both sides in on this. I am sending this e-mail to some folks from the district, too to see if they would like to participate. I think it would be good for K-12 educators to get together with college Mathematicians and open up a discussion. However, I don't want this to become a shouting match. The meeting needs to be carefully structured. I would hope that we could get some real dialogue going on this matter, raise awareness of the controversial nature of these programs, look at research (both pro and con), and try to discuss viable solutions/compromises that will best serve the needs of all students (K-12).

There are many valid concerns on both sides of this issue. I fully understand the need of the district to get students to perform well on the WASL---it is a state requirement and the district must comply with state requirements. At the same time, putting a program in place for all students K-10 that is geared for the WASL and not for college preparation is not a solution that is going to meet the needs of all students in the district---especially many of the 77% that continue on to 2-year college, 4-year colleges, and technical schools. To gain proficiency in the language of Mathematics, it is not enough to offer pre-calc and calc in 11th and 12th grade for the college-bound students. The entire curriculum K-12 is what prepares students for life after high school, and that includes post-secondary education for a majority of students. In addition to developing conceptual understanding and meaning, this education needs to include basic skills and standard algorithms (division, addition, subtraction, multiplication, equation solving, symbolic manipulation, etc.), starting in grade school and continuing through junior high and high school. These are standard skills learned throughout the world and are essential in the bigger picture of mathematics and related areas.

These basic skills are the foundation upon which advanced work in logic and philosophy, science, law, mathematics, engineering, business, and many other areas is based. A student cannot easily understand the meaning of an equation in economics or physics if they don't understand how to read and manipulate the symbols within that equation. I have received many e-mails from professors in philosophy, chemistry, law, biology, economics, business, and engineering who have become increasingly concerned with the lack of student proficiency in algebra and their inability to construct a logical proof or derive a basic mathematical formula. These needs cannot be dismissed.

It seems like much of the debate is about the teaching approaches---direct instruction versus constructivist approaches. But, I think that this detracts from the real issue---the content, skills, and understanding of students coming out of these programs. I think teachers should be free to use a variety of teaching strategies---especially since different students learn in different ways.
I don't teach my class by saying "here is a formula, I won't tell you how it works. Now work 100 problems." Although this is what several will suggest that traditional math is.

I spend time developing formulas---with student input. Sometimes they are developed from observations obtained from working through an example or application, sometimes they are obtained by using formulas that have already been developed. We use pictures, graphs, examples and intuition (developed over time through previous sections, practice, and previous courses) to build upon the students' knowledge base and obtain something new. Part of the process of developing understanding involves practicing the new concept to help solidify the idea before going on to the next idea.

To me traditional mathematics is the development of integers, real numbers, complex numbers, properties of equality, graphs, algebra, geometry, trigonometry, functions, etc. in a logical fashion in which ideas are built upon and practiced. Throughout this development, applications and constructive methods can be used to enhance knowledge and give additional meaning and reinforcement of the skills and techniques that are used. For example, the long division typically learned in early grades is useful on its own in dividing whole numbers and converting from a rational number to a decimal. But the algorithm and the idea of long division are used in later courses in the division of polynomials and the study of more advanced functions.

If there are items not in these traditional courses, such as probability and statistics (although these were covered in my traditional math courses) that might be useful for WASL preparation or to provide practical applications (e.g. reading the newspaper or watching the news), these ideas can be easily placed into a course without compromising the mathematical content. For example, when working with fractions, students could explore the likelihood of getting heads twice when tossing two coins. This would be a good place to show that the probability of 1/4 is the same as .25 or a 25% chance of getting two heads. This would be an opportunity to practice long division, decimals, and percents, while putting it into the context of probability. I think these are valuable lessons and applications. Unfortunately, Connected Math and Core-Plus take the probability ideas to the extreme at the expense of the skills. Students spend days tossing coins in groups, then use the calculator for creating graphs, boxplots, charts, and tables of their results, then spend time writing about their observations, answering questions about what would happen if the coin was unfair, etc. What is lost? The students don't practice the basics of converting fractions to percents and decimals, so the skill component is lost. Also, the large amount of time spent on basic ideas loses the interest of the kids that catch on quickly (I have heard this from many students coming from these programs, including my own son who had connected math for a short time) and takes away from time that could be used learning another topic. Perhaps the extra time spent on these topics helps some students, so I don't mean to suggest that this process is not helpful for some students, but the students who need the skills and are ready to move at a much quicker pace are hurt. It seems like a more traditional or "enhanced" traditional track would better serve the needs of these students. I understand the difficulty in trying to serve the needs of a diverse student population while trying to satisfy state requirements.

I would love to talk about this through a colloquium/discussion---if we can do this is a non-combative way. It would be nice if we could develop a good working relationship between the district and regional Mathematicians.

Do any of you have any suggestions for how to make this a constructive process?

Thank you,

Shannon Overbay