



IT WORKED!

The Downs and Ups of Vertical Alignment Conversations

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I work as a mathematics specialist for a region of schools. I am often asked to facilitate vertical alignment meetings. Many times vertical alignment meetings can turn into blame meetings: “They did not teach ___ in elementary...”

I was asked to come work with 4th grade – Algebra 2 teachers at a school and wanted to ensure the conversation was productive. We started with a high school standard: A-APR.6: students will “divide polynomials such as $\frac{x+4}{x+3}$ by inspection. I chose this standard because I wanted a high school standard that would connect easily to mathematics at lower grades and also because this standard represented an “aha” moment for me – I would have done this by polynomial long division, but it can easily be done by decomposing the $x+4$ into $x+3+1$ and then you simplify it to $1 + \frac{1}{x+3}$.

$$\frac{x+4}{x+3} = \frac{x+3+1}{x+3} = \frac{x+3}{x+3} + \frac{1}{x+3} = 1 + \frac{1}{x+3}$$

The questions I asked participants to consider were:

- What is taught at your grade level that most directly connects to this standard?
- What questions/tasks, at the grade level you teach, can you pose to students that will better prepare them to learn the topic at the higher-grade level?

Teachers were asked to reflect on these questions and to read a learning progression (4-5 Number and Operations: Fractions; 6-8 Expressions and equations; HS: Algebra) for their grade level as they were considering the questions.

The discussion for that morning focused on the work we were asking students to do. All the teachers were able to discuss something that connected to that standard. For example, 8th grade teachers mentioned that discussing different ways to solve a linear equation might connect to different ways to solve the high school division problems. Questions asking students to think about how to solve equations in more than one way might be helpful. 5th grade teachers saw that using decomposition of numbers to rewrite improper fractions as mixed numbers (Ex: $14/8 = 8/8 + 5/8 = 1$ and $5/8$) is similar to the high school work. This is one reason for students to learn more than just the procedure (divide the numerator by the denominator...).

After working our way down grade levels, upper level teachers were asked to consider:

- What did you hear about teaching in lower grades that you might be able to refer back to as you are teaching grade level content?

During this discussion, Algebra 2 teachers noted they could connect rewriting improper fractions as mixed numbers to the high school standard. One planned to use the improper fraction problem as a bell-ringer on the day this standard will be addressed.

One major point that was brought out during the discussion is the importance of composition and decomposition in all of mathematics (this even connects Geometry to the high school standard). This also led to a conversation about how the standards for mathematics practice connect the ways students need to think about all levels of mathematics.

There are other conversations that need to happen around vertical alignment. Many of the future conversations are the harder conversations. I have found that starting with a conversation going from upper level to lower level content and then back up helps create a culture of cooperation that is needed to be productive during the times of tougher conversations. Teachers involved in these discussions have also commented on seeing more relationships between mathematical ideas as a result of these discussions.

Brought to you by the NCSM Coaching Committee (May 2017)

Special thanks to the Arkansas Association of Mathematics Leaders (AAML)

