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Guest column: What the Common Core math standards mean for Montana students

By Anne Keith, Guest Columnist

If I asked you to multiply 12 x 50, would you grab a paper and pencil? Not if you were a student at Hyalite Elementary School in Bozeman, where students participate in "Number Talks" relying purely on mental math strategies. During one recent session, a Hyalite fourth-grader used a technique called "doubling and halving" to conclude that since 12 x 50 is the same as 6 x 100, which is the same as 3 x 200, the correct answer is 600. Another classmate related the problem to money, reasoning that 50 cents is half of a dollar, and that 12 half-dollars equals six dollars, or 600 cents. A third student decomposed 12 into 10 and 2 (numbers she said her brain liked) to deduce that 10 x 50 is 500, and 2 x 50 is 100, and adding 500 and 100 together totals 600.

Gone are the days of teaching students to simply memorize math facts. Brain research has shown that it's important that students first develop "number sense," because after gaining a firm grasp of math concepts (like multiplication), young minds are better prepared to put math facts into long term storage. Also gone are the days when teaching meant showing students a single procedure for solving a math problem.

Fortunately, today's teachers have a tool that's well equipped to help them teach to the demands of today's classroom in the form of the Montana Common Core Standards. These standards were written to support math instruction that fosters "number sense," and that encourages critical and independent thinking. How to teach students to meet those standards is a decision left to schools and teachers.

Students learn math concepts best by working first with hands-on materials, then pictures, and then abstract representations, such as equations. A fifth grade teacher at Hyalite teaching her class how to divide large numbers recently began by having the students use base 10 blocks (small colored cubes representing hundreds, tens, and ones) to model a division problem.

It was a noisy, busy process as students gathered materials and discussed in groups how to evenly subdivide a hundreds block into 10 tens. But after repeated practice, students were able to sketch out solutions to similar problems. And only after her students were comfortable with the concept of division did the teacher move her instruction to more efficient methods of division, using paper, pencil and equations.

In order to become successful problem solvers, today's students must learn to relate and apply mathematical concepts to other areas.

To meet this goal, Bozeman teachers are developing integrated units that teach students to understand math skills as deeply interconnected with many other subjects. For instance, after learning about shapes and weather, first graders used recycled materials to construct "houses" designed to weather different environmental effects. The houses were then subjected to "earthquakes" (teachers shook the tables), "rain" (water squirted from bottles), and "wind" (from large fans). If a house did not withstand the elements, the first grade engineers were allowed to redesign and retest them, after discussing the problem -- and potential solutions -- with a teammate. Not every house successfully weathered the storms, but every house was improved during redesigns.

More importantly, students were challenged to find multiple ways to solve one problem, to try different methods, to learn from each other's ideas – and to not give up. Our student mathematicians will learn to translate and apply these approaches to more traditional math problems, and by the time our students begin working on complex math, it will be second nature for them to seek input from their peers, to revise their own thinking before producing a final draft of their solutions, just as they learned to during first grade Number Talks.

Implementing this new set of standards hasn't been easy, and we are far from done. Teachers are working together to understand the grade level expectations under the Common Core and to design meaningful instruction that helps students learn key concepts deeply. Teachers are also analyzing student work to uncover misconceptions and to help each other plan the next steps in advancing student learning. The process has been messy and frustrating at times, but results so far have been amazing!

Montana parents want to know if the changes underway in our classrooms are helping to ensure that their children are gaining the skills they need to succeed. As a longtime advocate for improving math education for every student in our state, I can assure you that these changes will better prepare our students for their years in middle school, high school and beyond.

Anne Keith is in her 21st year of teaching, 20 of those years in Montana. She was selected as the 2010 Montana Teacher of the Year, received National Board certification in early adolescent mathematics in 2007 and was honored with the Presidential Award for Excellence in Math and Science Teaching in 2008. She was recently appointed as a member of the Montana College and Career Standards Commission by Superintendent of Public Instruction Denise Juneau.