

BUILD DEEPER MATH FOUNDATIONS

BY T. SPENCER JAMIESON

Elementary students need solid math understanding to succeed in middle school and beyond.

Here's how to foster it.

Common Core math has left many parents and educators across the country asking, “Why is math different from when I was a kid?” Mathematics hasn’t really changed; one plus one still equals two. What has changed is the way we teach math and how we want our students to understand it.

Math is often presented as a series of rules and formulas. The “old” method of teaching math often just forces students to memorize their way through. But now, the time has come for elementary and middle schools to embrace a new understanding of math teaching. It’s up to schools to prepare students for a 21st century future and jobs that will require not only more complex mathematics, but also communication, collaboration, and critical and creative thought.

Elementary and middle school teachers, then, should work to build deep, foundational mathematical understanding for students. Here’s how it can be done.

Why Elementary Math Is Key

The idea that our students need to understand more than basic math skills is evident today. Many states' college- and career-readiness standards emphasize changing and supporting how mathematics is taught. For our children to be college and career ready, we need them to be able to make a deeper connection to math. The math content itself has not necessarily changed, but the opportunity to access the curriculum has.

For instance, consider how many districts and states now have students accessing Algebra 1 in grade 8. This has been met with mixed results. When students access Algebra 1 in grade 8, it often affords them the fortunate opportunity to take calculus or higher math in their senior year of high school. But on the other hand, districts and colleges have reported that more students are missing the content knowledge and mathematical understanding to be successful in these higher-level courses.

What is missing for these students? Often, it's a content gap. By accelerating the content so quickly *before* Algebra 1, students have not had the opportunity to develop a deep understanding of it. This can happen when mathematics is taught as a series of rules and tricks. What elementary students need is the ability to see where, why, and how mathematics concepts fit together.

Elementary teachers who teach mathematics need to have not only a deep understanding of their grade level, but also a vertical, K-8 understanding.



This article is brought to you from the Learning First Alliance, a partnership of education organizations representing more than 10 million members dedicated to improving student learning in America's public schools. learningfirst.org/commoncore

How to Build Deep Understanding

To understand why this foundational math knowledge is critical, think about a task that you learned easily—say you're good at remembering your students' names. If you examine why this task was easy, it probably has to do with your ability to make connections to those students.

It could be that they remind you of someone else, or maybe they said something unique that made them memorable. Now, think about a task you learned that was challenging—learning to ride a bicycle, for instance. Remember how difficult it was to remember to pedal, steer, and keep your balance? You had no or limited connections to or experience with riding a bike before.

This same idea is true for learning mathematics. If math is taught as isolated content, it will be difficult. It is important that students use their previous connections in mathematics to help them understand new and more complex mathematical ideas. It is through these connections that students develop how math ideas are related, and this gives students the ability to problem-solve and reason mathematically.

The problem is that understanding mathematics is difficult for both our students and our teachers. In many of our elementary schools, teachers are generalists who teach multiple content areas. This means they have a wide variety of knowledge around multiple subjects, but seldom a deep understanding in all content areas, especially math.

We need to dispel the notion that elementary math does not require deep understanding. It's complex. Elementary teachers who teach mathematics need to have not only a deep understanding of their grade level, but also a vertical, K-8 understanding.

It is this vertical understanding of the content that allows teachers to help their students develop their own deep understanding. For example, how many of our kindergarten teachers realize that the patterning work they have their students work on has a direct correlation to having students find patterns in our base-10 system? Or how it helps with identifying prime and composite numbers?


Here are some key points for administrators to help teachers develop understanding of elementary math:

- Make mathematics instruction a focus for all teachers.
- Have focused professional development around critical mathematical ideas.
- Find the time for and encourage teachers to observe each other's math lessons.
- Hire a math resource teacher who develops and coaches teachers in both math content and teaching practices.
- Focus your school improvement plan on improving both math content and math understanding.

Forming Math Blueprints for Students

While it is important to support your teachers' math knowledge, it is equally important for your teachers to create a plan of action for their students. Here are ways teachers can improve students' math understanding:

- **Ask purposeful questions.** These questions should be deeper than, "How do you know?" They need to focus on assessing and advancing student understanding and reasoning. For example, "How do you know?" followed by, "Is this always true?" or, "How is your thinking similar to the way Blake thought about it?"
- **Promote productive struggle.** Offer mathematics tasks that support higher levels of thinking. These tasks should be relevant and engaging, but they should not be too easy or too hard.
- **Have meaningful discourse.** Math classroom discourse gives students an opportunity to make their thinking visible. It encourages not only the student's thought process, but also that of the whole class. Discourse needs to take place between teacher and students, but more importantly between student and student. Teach your students how to agree and disagree with each other. Note: This also means less talking from the teacher and more talking from the students.
- **No more lessons that model the "I do, we do, you do" approach.** If you want students to understand the math they are learning, then the teacher needs to be the facilitator of the knowledge and not the giver of knowledge. One way is to have a teacher focus lessons around open-ended mathematical tasks that promote productive struggle, reasoning, and discourse. Students can collaborate in small groups to further their understanding on the math concepts found in the tasks. This small group work will promote reasoning and discourse as students challenge one another's ideas and develop a deeper understanding of the math concepts they are learning.

It is important to focus on expanding both your teachers' and your students' understanding of math. Maintaining this focus and making it a part of your school practice and culture will help build a way of learning math that emphasizes both the mathematics content and the understanding behind it. This, in turn, will prepare our students for their future. 

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