

## How I Unlocked the Potential of My Sixth Graders Through Math Fact Fluency

By Denika Gum

Every year, one of the greatest barriers that many of my incoming sixth graders face is a lack of **math fact fluency**. Without a strong foundation in basic addition, subtraction, multiplication, and division, they have a hard time working through the more complex mathematics in the sixth grade curriculum. Topics involving computing with rational numbers and integers, for example, build on whole number arithmetic, and tend to be very difficult for students who are not able to recall their mathematics facts quickly and easily.

A lack of math fact fluency also hampers students in developing a robust sense of number. I co-teach a Math Inquiry class for pre-service teachers and one of the things we emphasize is encouraging students to play with numbers, to manipulate and decompose them. If students do not know their mathematics facts, unfortunately, developing this kind of facility with numbers is extremely challenging. Last year I finally found a way to get all my kids fluent with their facts and it made a huge difference. Student test scores soared and so did their confidence.

### About My Students

In 2012–13, I taught three mathematics classes, one advanced, and two at the standard level. One of the standard level classes included several special education students and

others who needed accommodations. A large number of my standard students had failed their fifth grade state test and many had come to hate mathematics. The three classes, taken as a group, were well below the averages for my school division.

Armed with a new secret weapon for developing math fact fluency and a focused implementation plan, we were able to close the gap and actually exceed the district's overall state test performance, as well as show big gains on the NWEA MAP® test, a nationally normed assessment of student growth. Even better, I had students who had never ever passed a state mathematics test come up to me and say, "Math is my favorite subject now!"

### My New Secret Weapon

Although I have known for a long time that math fact fluency was a problem for my students, I just had not found an effective solution. Like many other teachers, I had tried different approaches and met with limited success. When I heard about a new game-based math fact fluency system called *Reflex*, I knew I wanted to try it. After a year of using it, I can say that the program is truly amazing. There are so many things about *Reflex* that I like. It's game-based and the kids really enjoy playing it. The program is online so they can use it anywhere they have an Internet connection. It's got a great reporting system that lets you easily monitor and support the usage and growth of individuals and whole classes

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**" She just got her very first 100% on a math test. She was so proud of herself she cried. "**

## With a strong foundation *anything* is possible

Jennifer Peponis, a 6th grade teacher at Gillespie Technology Magnet School in Chicago, noticed that every year her students "who struggle in math do so because of their lack of fluency." After using Reflex, the most effective math fact fluency solution, her students "were able to learn other concepts they had struggled with."

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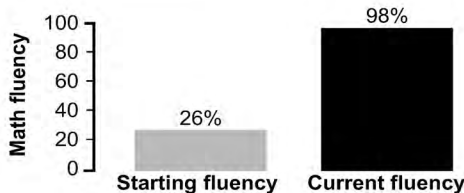
of students, and it's truly adaptive so that kids work on only the facts where they need help.

One of the best things about *Reflex* from a mathematical perspective is that it utilizes fact families. Most approaches to math fact fluency focus on isolated facts in one operation. With *Reflex*, my kids not only learned their facts better and faster than they ever have before, they improved their number sense by solidifying their understanding of the commutative property and the conceptual connections between the operations and among groups of related facts.

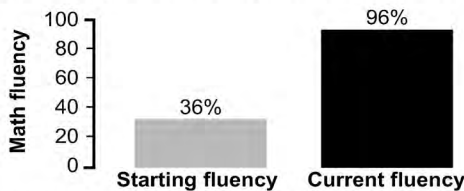
### How I Implemented Reflex

To get the most out of any approach, you need to have a good plan and then to stick with it. Every Wednesday, my classes logged onto *Reflex* from the computer lab. I also required them to use it three additional days per week outside of class time and counted that work toward their participation grade. I developed a fantastic communication system with their parents. They were emailed nightly and one of my goals was to get them onboard with supporting *Reflex*. Students graphed their fluency weekly so they could see how they were progressing. This really helped to give them ownership of their own learning, which was motivating and rewarding. I also created some other ways to increase usage, including a high score bulletin board that encouraged students to play at home and try to beat their friends, and a grab bag of prizes for reaching certain milestones. In the end, between the inherent fun of the program and these additional motivational supports, many of my students used the system more than required, logging on during vacation and even on holidays. And, since most of the usage was outside of class time, all this math fact fluency work did not hinder our ability to address the sixth grade curriculum.

### Results



**Grade 6 Students • Multiplication and Division 0–12**  
*n* = 37 students • report date 7/1/13  
 (Students using Reflex 20+ days • mean usage = 50 days)

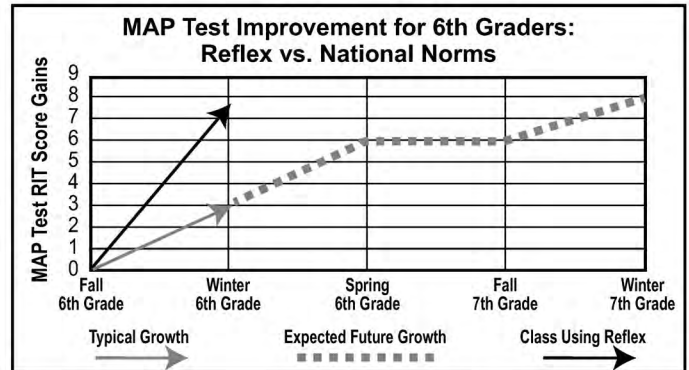


**Grade 6 Students • Addition and Subtraction 0–10**  
*n* = 37 students • report date 7/1/13  
 (Students using Reflex 20+ days • mean usage = 39 days)

My students thrived this year in many ways. First, they developed instant recall with their mathematics facts. One of my sixth grade groups went from 26% to 98% fluency in multiplication and division in 50 days of average usage. The same students also went from 36% to 96% fluency in addition and subtraction in 39 days of average usage.

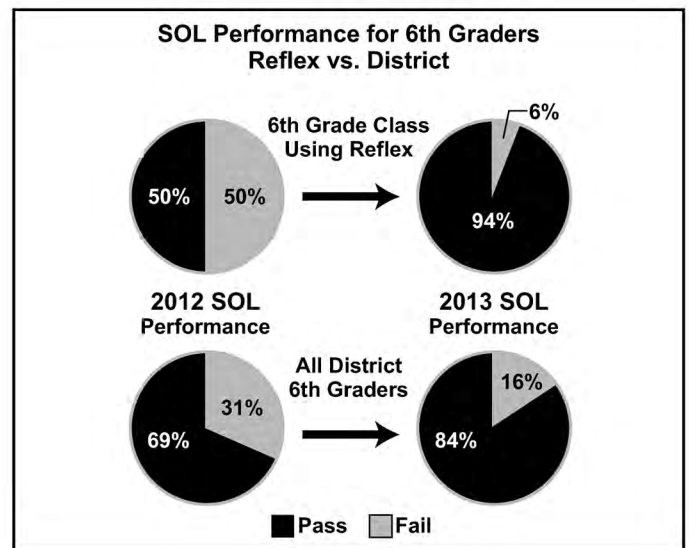
The growth I saw in *Reflex's* reporting system was also evident on other assessments. My students were tested in September

2012 and retested January 2013 using the NWEA MAP® test (Measures of Academic Progress). MAP provides a detailed picture of every student's current level of knowledge, as well as their growth over time, and allows you to compare your students' progress to others across the U.S. I was amazed at the results. The growth for the median student in the national sample was 3 points. My kids gained 7.9 points.



In those four short months, my students had actually achieved about a year and a half's worth of typical growth. As you might expect, a lot of the growth was in the Number/Number Sense strand where my students had average growth of 14 points. I had never seen anything like that before. One of my special education students actually jumped almost 4 grade levels in that category.

The results on our state tests were also very exciting. As I mentioned earlier, the students in my three classes, taken as a group, started out substantially below our district's averages. Only half had passed the fifth grade test and none had passed with an advanced score. This was compared to a 69% pass rate for all fifth graders in the district and 15% passing with an advanced score. By the end of the year, my students had closed the gap and actually outperformed the overall district averages. Our pass rate was 94% compared to 84% for all sixth graders in the division! We even had a slightly higher percentage of advanced pass scores than the district as a whole.



Beyond test scores, student confidence and enjoyment of mathematics has increased. In addition to the changes I saw in my students, their parents noticed, too. One parent

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of a historically struggling mathematics student took the time to write to me that her son's confidence had "increased tremendously, which has helped him to be open to tackling more difficult problems." I could not have said it better myself; I'm so proud of what so many of my students were able to achieve.

### **Conclusion**

All of us who have noted the barrier that a lack of math fact fluency presents for middle school mathematics students have been absolutely right. It's a real problem

that really does harm students. Fortunately, with new tools like *Reflex* and a focused plan of action, it is a problem that can now be solved. It is possible to remove this persistent obstacle and help our students move forward with a much stronger chance to realize their true potential. On a personal level, it just feels wonderful to know that my students from last year are going into 7th grade with the skills and confidence they'll need to succeed.

*Denika Gum is a 6th grade teacher at Sutherland Middle School in Charlottesville, Virginia. She has been teaching middle school mathematics and science for over 20 years. In addition, Ms. Gum co-teaches Math Inquiry at Mary Baldwin College and is a medical instructor for the National Ski Patrol.*

## **NCSM Member Spotlight on Janet Dodd**

**Describe the nature and scope of your job and your professional involvement in the Texas Association of Supervisors of Mathematics (TASM) and NCSM.**

I work for Pasadena ISD (Pasadena, Texas) and serve as our district's Instructional Specialist for Elementary Mathematics (Kindergarten–Grade 4) which includes creating and managing our district's scope and sequences and all related documents, assessments, and professional development. Much of this work is facilitated with a team of campus-based mathematics coaches that I also support, working to increase their capacity as leaders and innovators.

I have been a member of TASM since 2005 and recently served as the organization's President-Elect (2012–2013) before transitioning into the role of President (2013–2015). Through my membership in NCSM, I have had opportunities to present at the annual conference to share what I have learned and experienced with the 5E instructional model and literacy. The annual conferences are powerful learning opportunities open for all members of NCSM.

**What aspect of your job gives you the most satisfaction?**

What motivated me as a teacher was not only working towards the academic success of the students in my classroom, but working to help my students grow in their confidence as learners and in their abilities/individual talents. What motivates me as a supervisor of mathematics is not only working towards the academic success of the students in our district, but working to help the teachers and campus-based mathematics coaches grow in their confidence as teachers/coaches and in their abilities/individual talents.

**What motivates you to be a leader in mathematics education?**

I believe that every classroom should be a community of learners where students are exposed to an engaging, standards-based mathematics classroom that develops mathematical thinking and proficiency. I believe that mathematics is accessible to each and every one of our students, though the instruction to make mathematics accessible can look different from student to student or teacher to teacher. I believe that every student has a right to quality, rigorous mathematics education that develops depth of understanding and prepares students for post-secondary success. These core beliefs motivated me as a



Janet Dodd

classroom teacher and motivate me now as a leader in mathematics education.

**What are the greatest challenges facing the mathematics education leadership in Texas today? How is TASM planning to address these challenges?**

One of the most immediate challenges facing mathematics education leaders in Texas is our transition to new state standards in 2014-2015 for Kindergarten-Grade 8 mathematics and

2015-2016 for high school mathematics. We must ensure that teachers have a working knowledge of the depth and complexity of the standards as well as the mathematical content behind the standards. One of our upcoming professional development meetings is focused on the depth and complexity of the new standards as well as the mathematical content of the new standards. Our business meeting will allow members to network with other mathematics leaders from around the state regarding plans for implementing the standards and the support being provided to teachers during this transitional time.

**What has been your greatest professional challenge and how did you address it?**

One of the challenges that I have encountered as a classroom teacher, as an education specialist at a regional education service center, and as a district instructional specialist and one that I think will always remain is the challenge of making our best better. The successes of individual students must be celebrated each year and then challenged with higher standards for the next year. The academic goals that we meet each year must be celebrated and then refined with higher standards for the next year. We must continually celebrate our areas of growth, but never lose sight of the vision that ensures that each student has the opportunity to be successful in mathematics. How do I address this challenge? We discuss data. We celebrate growth. We discuss trends. We identify areas of needed growth. We set goals. We learn. We try. We try again. We keep the vision before us that mathematics can and should be accessible for each and every one of our students. We must continually seek ways to make our best better ... for the sake of our students' mathematics education.

**How do you renew and energize yourself professionally?**

My sister, who is also a leader in mathematics education, was a middle school mathematics teacher for several years before I started teaching. She encouraged me to join NCTM (way back in 1995!) and to attend NCTM's

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