

New Standards, New Curriculum

How one Connecticut district upended its math curriculum to ‘shift’ with the times



“What if I asked you to add 997 to 997?”
Would you reach for a pencil?
Would you ‘carry a 1?’

Harold Greist, Coordinator of Math and STEM Education for Stratford Public Schools, uses this problem to spark discussion when talking with parents about the district’s math curriculum.

He shares that he personally chooses to add 3 to get each number to a round 1000, then subtracts the extra 6. Answer: 1,994.

His chosen strategy allows him to solve easily and quickly in his head. He opts against carrying the 1, or regrouping, as it’s now known.

Greist, a trained mechanical engineer and former secondary math teacher, points out that the seeking of varied and increasingly efficient calculation strategies has long been the domain of engineers and mathematicians.

For the rest of us, departing from the impulse to use the procedure we were taught—say, stacking the numbers and adding each place value, careful to carry the 1s—can feel like a neat trick.

“But it’s not a trick,” says Greist. “It shows that you understand how numbers work and how you can break them apart and put them back together to do what you want them to do.”

Greist believes that, for most, such an understanding must be learned: “Most people don’t tend to see alternative methods unless they know to look for them. So if we fail to overtly teach with this in mind, most students won’t get it.”

He continues, “And if they don’t get it, we’re going to raise another generation of Americans who may think they understand mathematics, but really only understand the procedures.”



Location:

Stratford, Connecticut

Metro Location:

Urban

K–8 Students:

4,000

K–8 Schools:

9 Elementary, 2 Middle

Title I:

47%

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Preparing for Change

"Very grim."

That's how Greist describes the situation in mathematics when he began his job in Stratford back in 2013. Of course, he allows, it was a challenging time nationwide owing to upheaval created by the new learning standards.

Greist personally faced the following:

- **A decade-old curriculum** with no alignment to the Common Core
- **Poor state test performance in math**, with the percentage of students meeting the SBAC's standards for proficiency ranging from 18% to 28% in Grades 3–6
- **Achievement in reading far outshining that in math**, as the percentage of students meeting the SBAC's standards for proficiency in reading exceeded those in math by close to 30 percentage points in Grades 4–6 and 10 points in Grade 3

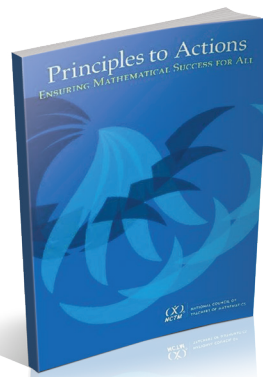
"I recognized very quickly that I had to become a more educated consumer," says the former high school teacher. "So I spent a significant amount of time studying the elementary math standards, which I had never really spent a lot of time looking at."

Greist dove deep into his research, reading widely and watching videos on the three key shifts to Focus, Coherence, and Rigor. In his office, he examined the interconnectedness of the standards by posting a twelve-foot-long printout of lead writer Jason Zimba's extensive "wiring diagram," later renamed the Coherence Map and posted as an interactive resource at AchievetheCore.org.

Once he applied the shifts' implications to the existing curriculum, Greist became a believer: "It was very obvious why our students weren't seeing connections across the curriculum."

As an example, he points to the teaching of two-step equations. They were being taught as discrete units each year in Grades 5–9, with no linking to the progression of understanding across the grades.

On Mr. Greist's Bookshelf



To increase his knowledge of the new math standards, Greist read the book *Principles to Actions: Ensuring Mathematical Success for All* by the National Council of Teachers of Mathematics.



Stratford teacher Brian Testroet guides eighth graders in the study of multistep linear equations.



Key Criteria for the New Curriculum

Greist's number one requirement for the new core resource was tight alignment with the standards.

Inundated with options, he hit upon three touchstones to help him identify viable candidates and eliminate the rest:

- 1. Treatment of third grade:** "A huge transition year," explains Greist, "and one that can mark the start of an unfortunate obsession with speed and memorization." Third graders move from addition and subtraction to multiplication, division, and fractions. Greist wanted to know: How is this transition handled? How are fractions introduced?
- 2. A balance of procedural, conceptual, and application question types:** Greist notes that Stratford teachers were accustomed to seeing around 70% procedural questions, very few conceptual questions, and one or two application questions at the end of the lesson. To answer the call for Rigor, he needed to see equal treatment of each question type in the new curriculum.
- 3. Quality of teacher resources:** After alignment, this was of most importance to Greist. He knew he was signing teachers up for a sea change, so he sought a curriculum able to expertly guide their efforts while also winning hearts and minds. He asked himself, did the resource provide teachers with an explicit explanation of each standard? Did it give a rationale for the rigor and emphasize its purpose of preparing kids for later grades? Did it provide them with questioning strategies for delivering instruction?

Neighboring districts—ranging from the nation's wealthiest to amongst the neediest—were using traditional, mainstream offerings for their math curriculums, and there was some pressure to fall in line.

Greist reviewed the familiar programs adopted by his peers but saw problems. Often, alignment was neither tight nor straightforward. Too much was being asked of teachers in jumping around resources to adhere to scope and sequence.

Greist would go out on a limb, he decided, if he could find a core resource that met his needs.

"I've been teaching nine years, and I'd say the first five or six years, my lessons were very teacher driven, skill based, and repetitious. I was in front lecturing and modeling for a good portion of the class."

Students had some time at the end to work some problems, but they weren't conceptual or application based."

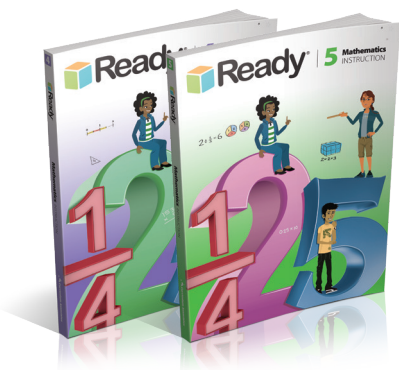
—Brian Testroet, Eighth Grade Teacher



Kindergartners and first graders take part in a math lesson.



Modernizing Teaching Methods in Math



Following a one-year pilot, Greist made a bold commitment for the 2014–2015 school year. He chose to adopt *Ready Mathematics* from Curriculum Associates as the core resource for instruction in Grades K–6. It marked the program’s first adoption in the state of Connecticut.

A major source of Greist’s preference for *Ready* was the very thing that would place the most significant demand on Stratford’s teachers and students: Rigor.

Rigor does not imply, Greist will remind you, more or harder questions, extra-long homework, or a surplus of application problems. To inform the transition, the district committed to a common definition of rigor: “Expecting all students to pursue the three areas of conceptual understanding, procedural fluency, and application with *equal* intensity.”

Now, how to teach with it?

Greist had made sure the *Ready* program came with a robust Teacher Resource Book and a wealth of lesson-by-lesson instructor support material. Even so, he knew that changes of this magnitude would come gradually and require patience:

- 1. Fewer problems, deeper understanding:** Perusing the weeklong lessons in *Ready*, one first grade teacher recalls, “At first I thought things like, ‘Oh well, there’s only one problem to do today’ or ‘Maybe this won’t fill my math time.’ I was wrong!”

There were indeed fewer questions to cover than teachers were used to—signaling the shift to Focus—and that was because *Ready* prized students’ ability to identify and discuss multiple strategies and representations over mere ‘answer-getting.’

- 2. Student-centric instruction and discourse:** In *Ready*, topics are often introduced using a real-world application, or story problem, and the teacher assumes the role of discussion facilitator, leaving much of the explaining, questioning, and debating to the students themselves.

In the hallmark Think–Share–Compare Routine, the pace of the lesson slows to allow for genuine focus, coherence, and rigor to take root. Ample time is taken to do everything from Make Sense of the Problem—which might mean multiple reads while probing, “What do you notice?” and “What do you wonder?”—to solving and sharing with partners to comparing and debating strategies as a class.

One teacher observed that prior to *Ready*, she would sometimes realize mid-discussion that some of her students had misunderstood what the question was actually asking.

Before *Ready*, Stratford teachers might have delivered instruction for an extended period and then assigned independent, skills-based practice. As such, Think–Share–Compare was a dramatic change:

“It takes a lot of practice not to jump in too soon. Our old teaching methods were more rote, and we were quick to give kids answers. I think we needed to let go of a little ‘teacher baggage’ to go from a director to more of an observer, not rushing and giving students more time to explore at their current level.”

—**First Grade Teacher**, Nichols Elementary



A third grader voices her agreement with a classmate using a number line.



First grade partners discuss using a part-part-whole strategy.

3. A new understanding of developmental appropriateness: Early on, there was pushback from all quarters regarding whether the students could indeed perform in the way *Ready* asked. One teacher says, “We have a challenging population, and in the beginning, we were like, ‘They can’t do it. They can’t do it!’”

The unit assessments seemed unrealistic and too hard, and it was tempting to modify them to include more procedural questions. Parents voiced concerns. Greist and fellow leaders prevailed on staff to persevere and to encourage students’ productive struggle, even if it was uncomfortable.

One teacher notes that, at home at night, she noticed herself reflecting on instances during the day’s lesson when she could have let the kids wrestle with problems a bit longer.

The students were struggling by design, but the challenges facing teachers proved less edifying: “Historically, application has been seen as the realm of honor students. To many teachers, it looked like an overwhelming amount of conceptual understanding and application,” says Greist.

“It’s not really teaching to a text. Sometimes when teaching whole group, you think you have to follow the book step by step.

But *Ready* gives you a chance to learn how students find their own ways to solve. It gives them a chance to question, to think independently and as a partnership, and to think more outside the box.”

—Third Grade Teacher, Nichols Elementary



A third grader explains her thinking about equivalent fractions.



A first grader describes his addition strategy.



A fifth grade student guides her teacher in drawing an area model.

Cue the Math Coaches



Math Coach Rose Okai

He took the resistance to heart, arranging for professional development and mounting a campaign to start a math coach program, which Greist says would have been necessary regardless of which new core resource they chose.

By 2017, the coaching team had grown to nine members, and their work had indeed helped bring about the change Stratford needed.

Coaches prepared lesson plans, modeled lessons and vocabulary, encouraged teachers to trust the pacing, and advised on the best use of *Ready*'s support resources, such as the widely used Online Teacher Toolbox.

They also met with each grade level to do a deep dive on the assessments, working alongside teachers to map each question to conceptual, procedural, and applied understanding. Once they'd taken apart the assessments this way, the teachers were on board. Their confidence in the integrity of the assessments grew, as did their belief and confidence in preparing students for them.

In partnership with fellow administrators, Greist avoided tying teacher evaluation or accountability to execution or success of the program. If the students were cultivating a growth mindset, the staff would, too. School leaders made it clear they expected this change to take time, and therefore they would accept variation in teaching practices and pacing across classrooms.

Coaches, as set down in their job description, were empowered to be colleagues, not evaluators. Greist made and learned from mistakes and encouraged teachers to do the same.

"We're all learning together" was the resounding message, and it was roundly praised and continues to be appreciated by staff.

In 2015, Greist added Grades 7 and 8 to Stratford's *Ready Mathematics* implementation. It was time to expand. The new math curriculum was getting results.

From teachers using *Ready* with fidelity, I get rave reviews. They love the resources. They love that it's differentiated. They love the student center activities.

And they basically don't need to use anything else because it has such rich online materials that can be accessed at home, on their phone—from anywhere."

—Rose Okai, Math Coach, Grades 3–5



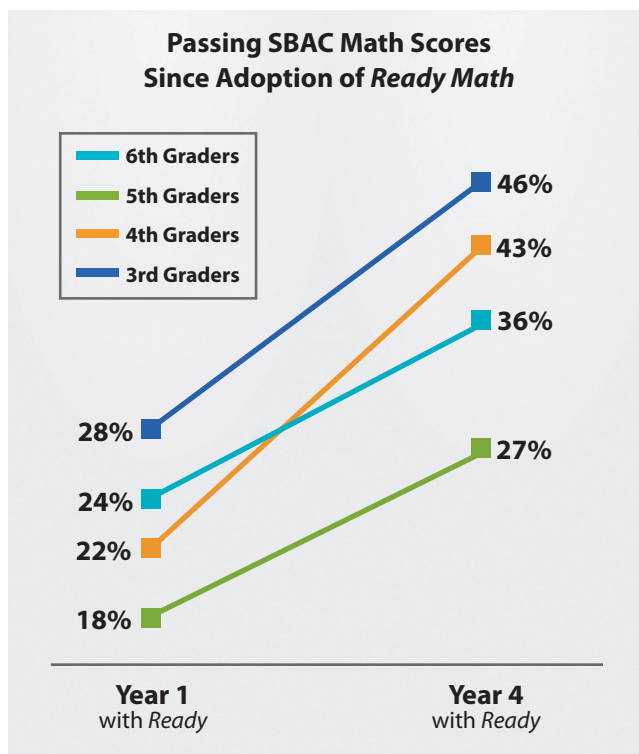
Math Coach Jackie Giordano says, "We talk about perseverance all the time. We model sayings like, 'Mathematicians never give up' and 'Once you're done, you've just begun.'"

Ready for Some Results?

For quantitative impacts of the new math curriculum, Greist points to Stratford students' improved math proficiency as measured by the SBAC state test.

After four years with *Ready Mathematics*...

- **Grades 3–6 had all seen increases in the percentage of students meeting or exceeding standards**, with third graders—the cohort that had used *Ready* for the largest portion of their schooling—rising from 28% to 46%, the highest overall performance.
- **A 10-point performance gap between reading and math finally closed** when, for the first time since the implementation of the SBAC, third grade's math results came in higher than those for reading. In fourth grade, a 30-point gap has narrowed to 8.



Beyond the Numbers

Of course, the data tell only half the story. As a result of the new math curriculum, Stratford students have become well versed in growth mindset, the vocabulary of rich discourse, and the active role they play in learning.

They begin each year with a “boot camp” run by teachers and coaches to make way for discussion, risk taking, and mistake making in math. Students are paired for sharing, and expectations are high. Every detail is agreed on, including when to use *Ready*'s hand signals, how to physically “Turn and Talk” to one's partner, the characteristics of an active listener, and what to say when explaining or challenging a solution strategy.

Visit a Stratford math classroom today, and you will hear a level of discourse and student engagement that seemed unimaginable just a few years ago.

In kindergarten, lessons begin with a spoken “I can” statement (*e.g.*, *I can count to 100 by ones*) and a brainstorm about the task at hand, and teachers are regularly amazed by the way students grow in sophistication week by week.



A third grader asks her partner, “How do you know the fractions are equivalent?”

“Students are being asked to present to each other, and that instills confidence.

They're becoming more of a presenter, even more of a leader, inside the classroom because they're relied on by their partners. They're relied on by me, too, when I pose questions to the class, because there's the expectation that everybody must share out.”

—Eighth Grade Math Teacher, Wooster Middle School

Pondering the question, "Why do we count by tens?" on day one of the unit, one kindergartener mused, "If my mama says to count by tens, I have to count by tens!"

After some instruction, the kids had worked out "It's faster," and later in the week the teacher was astonished to hear kindergarten voices volunteering, "Counting by tens is an *efficient strategy*."

Says one third grade teacher, "The level of discussion has skyrocketed. Students are able to explain their thinking so much better. They can tell me all the 'Why's.' They often joke with me and say, 'Watch, she's going to ask 'Why?' again. That's her favorite word!'"

Ready Is Recognized by EdReports.org



In 2017, *Ready Mathematics* for Grades K–5 received a highly favorable review from EdReports.org, an independent nonprofit that evaluates instructional materials across the gateways of Focus & Coherence, Rigor & Mathematical Practices, and Usability.

When Grades 6–8 were reviewed in 2018, *Ready* took its place amongst the top-rated

K–8 programs in the country. It received "all green" ratings to indicate it fully met expectations across all grades and gateways, while most programs received some yellow or red ratings.

Harold Greist felt some vindication. "When you go out on a limb with a new program, and then two years later you can show that it's highly vetted, highly reviewed, and highly aligned, it is very helpful. It has certainly quieted the critics."

Today, Stratford is one of many disparate Connecticut districts using *Ready* to modernize teaching practices and tighten curriculum alignment to the new standards.

"We're always telling people about *Ready*," says Greist. "We're hearing from upper-grade math teachers that our students are coming in more and more prepared as the years go by. It's been a real success."

“My advice for teachers starting out with *Ready* is to believe in it. Really fall in love with that lesson design and allow yourself to use all the parts slowly.

Trust the weeklong sequence and stick with day one, two, three, four, and five. *Ready* moves students through the concrete to the representational to the abstract. It's so important that all students go through each of those steps.”

—First Grade Teacher, Nichols Elementary

Ready® | Mathematics

When it comes to math, do you let your students do the talking?

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