Veteran MTSS/RtI School District Sees Significant Gains in Math Proficiency With SpringMath

This southwestern U.S. district, serving about 12,000 students in PK-12, began using SpringMath in the fall of the 2017-2018 school year. The district implemented data-based decision making and classwide math intervention with their MTSS/RtI model across the district in 2002.In other words, all schools conducted universal screening in mathematics using measures verysimilar to SpringMath measures. All schools provided classwide math intervention following aprotocol that was similar to the protocol used in SpringMath. RtI support structures were in place, including an on-site instructional coach in every school who was facile with the basic features of RtI implementation, data-based decision making, and resource allocation decisionsbased upon student need. Thus, this site was considered a veteran MTSS/RtI implementer andprovided an excellent test of the value-added effect of SpringMath. SpringMath value-add comes in the form of all needed materials, data interpretation, and prescriptive interventions provided in printable packets, along with an implementation/coach dashboard that tracks intervention effects, and directed coach support where implementation was not optimal.

The district chose two pilot sites, one elementary school and one middle school. SpringMath was implemented in grades K-8 across these two schools.

In the elementary school (Grades K-5), all students participated in SpringMath (n = 638). In the middle school (Grades 6-8), only the most mathematically at-risk students were selected for SpringMath based upon the preceding year-end test scores, current-year screening results, andteacher input (n = 150).

All classes received classwide intervention. Within weeks, growth was apparent at all grade levels. Below is an example of the progress graph from one 7th grade teacher for the skill *adding& subtracting with integers*. The class median is shown across weeks of intervention. Her class median gained 5.0 answers correct per week during intervention (ROI computed using ordinary least squares regression).

The graph below is the same class, but now showing all students' scores and growth acrossweeks. This graph shows that 100% of students scored above the risk range at the final classwide intervention session.

We can look at the number of skills mastered during classwide math intervention across gradesto gain a sense of skill coverage or dosage of the intervention. In the first column, we provide the average number of weeks to reach the mastery criterion during classwide intervention. In the second column, we provide the number of skills mastered during the intervention which can be thought of as intervention dosage.

	Mean Weeks to Skill Mastery	**Number of Skills Mastered**
Grade 3		
Teacher 1	1.1	14/17
Teacher 2	2	8/17
Teacher 3	1.1	14/17
Teacher 4	1.3	12/17
Mean	**M = 1.38**	**M = 12 of 17 skills mastered**

Grade 4		
Teacher 1	2.3	7/16
Teacher 2	2	8/16
Teacher 3	1.2	13/16
Teacher 4	4	4/16
Mean	**M = 2.38**	**M = 8 of 16 skills mastered**
Grade 5		
Teacher 1	2	8/15
Teacher 2	2.3	7/15
Teacher 3	1.5	11/15
Teacher 4	1.5	11/15
Mean	**M = 1.83**	**M = 9.25 of 15 skills mastered**
Grade 6		
Teacher 1	8	2/14
Teacher 2	5.3	3/14
Teacher 3	8	2/14
Mean	**M = 7.1**	**M = 2.33 of 14 skills mastered**
Grade 7		
Teacher 1	0.3	13/13
Teacher 2	0.5	13/13
Teacher 3	0.5	13/13
Mean	**M = 0.43**	**M = 13 of 13 skills mastered**
Grade 8		
Teacher 1	0.7	12/12
Teacher 2	0.7	12/12
Teacher 3	1.0	12/12
Mean	**M = 0.8**	**M = 12 of 12 skills mastered**

There was intervention dosage variation within and across grades, with especially strong dosesat grades 7 and 8 (all classes attained mastery on all intervention skills), and especially weak doses at grade 6 (classes only attained mastery on the first 2-3 skills in the sequence which is only 14% of the intervention and reflects below-grade-level skills).

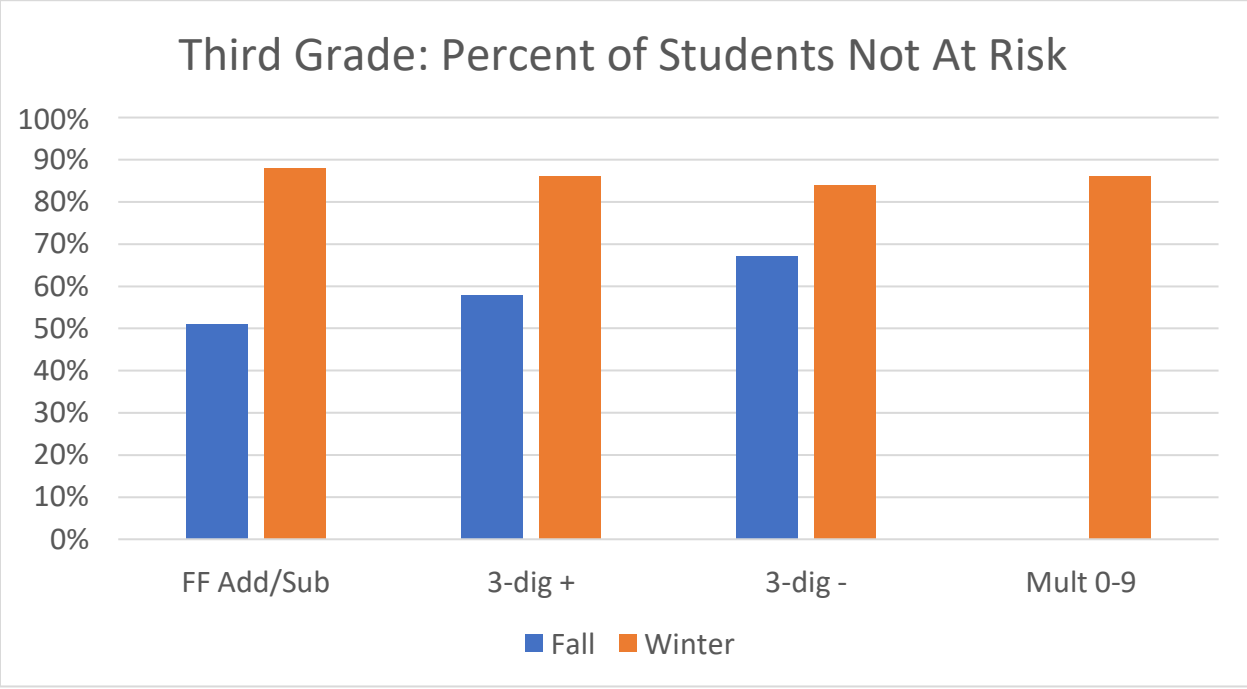
Within grades, we also see some variation between teachers. The greatest within-grade variation in dosage occurred at Grades 4 and 5. Below is the percentage of students scoring in the proficient range on the year-end test in higher-dose versus lower-dose SpringMath classrooms. In Grades 4 and 5, the higher-dose SpringMath classes had higher proficiency ratesthan the lower-dose SpringMath classes.

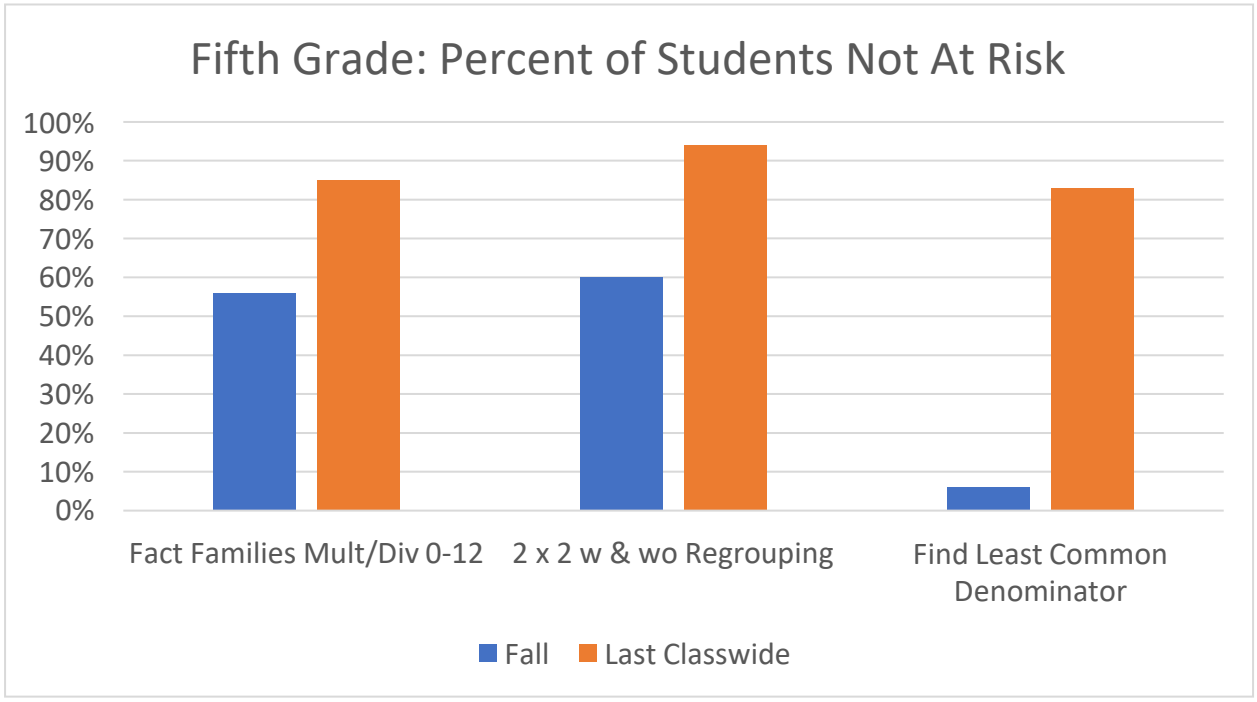
	Higher Dose SpringMath	**Lower Dose SpringMath**
Grade 4	Teacher 3: **81%**	Teacher 4: 73%
Grade 5	Teacher 3: **76%** Teacher 4: **85%**	Teacher 1: 69% Teacher 2: 68%

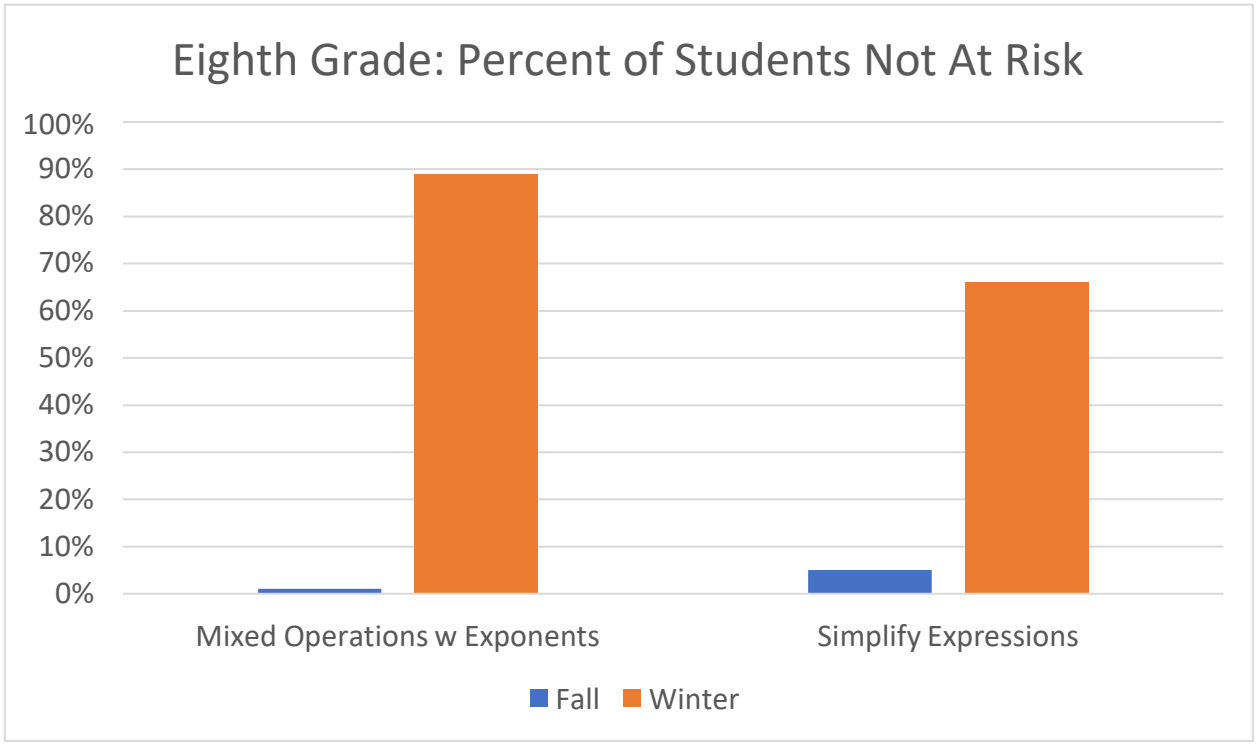
The only way to conclude that higher-dosage use caused greater student proficiency would have been to begin with equivalent groups of students and randomly assign groups to higher- dose and lower-dose conditions, which obviously we did not do. But we can look descriptively at the preceding year's proficiency rates for these teachers to consider whether the higher- dose and lower-dose teachers were similar in starting proficiency. At Grade 4, the lower-dose class went from 46% proficient in the preceding year to 73% proficient in the current year, which is a gain of 27%. The higher-dose teacher and went from 52% in the preceding year to 81% which is a gain of 29%. Both teachers grew and the higher-dose SpringMath class out-grewthe lower-dose class. This finding mitigates somewhat the likelihood that the lower-dose teacher simply provided weaker instruction in general which is what accounted for the proficiency differences and her lower-does use of SpringMath was simply coincidental.

The same pattern occurred at Grade 5. The lower-dose class lost 10% points going from 78%proficient in the preceding year to 68% proficient, whereas the higher-dose class gained 5% going from 71% proficient in the preceding year to 76% proficient with SpringMath.

By mid-year, effects were detected with reduced risk at winter screening, especially in gradesexperiencing higher doses of the intervention.




Fifth Grade: Percent of Students Not At Risk
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Fact Families Mult/Div 0-12
2 x 2 w & wo Regrouping
Find Least Common Denominator
Fall
Last Classwide


Eighth Grade: Percent of Students Not At Risk
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Mixed Operations w Exponents
Simplify Expressions
Fall
Winter

Based on these gains, we anticipated gains on the year-end state test. In all grades, gains inSpringMath schools exceeded the district average gains in percent of students proficient.

	Change in Percent Proficient from 16-17 to 17-18	
	District Average (all schools)	SpringMath School
3rd Grade	2	**10***
4th Grade	1	**18**
5th Grade	No change	**3**
6th Grade	2	**3**
7th Grade	5	**10**
8th Grade	-1	**5**

*Gains that are superior to the District average are in bold print.

Next, we can consider the gains in SpringMath schools compared to schools that had similar demographics and similar rates of proficiency before SpringMath, which is a slightly more rigorous comparison. Here we see that SpringMath schools experienced greater gains than thecomparison schools in four of the six grades.

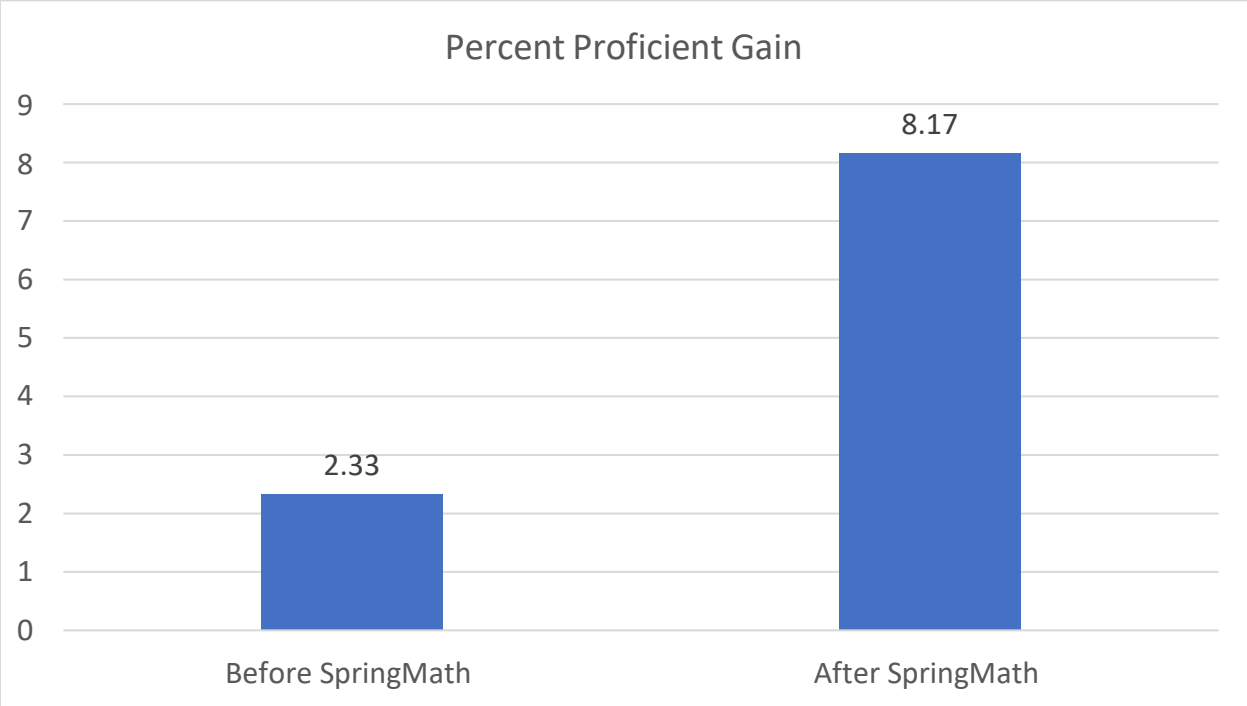
	Change in Percent Proficient from 16-17 to 17-18	
	Comparison School	SpringMath School
3rd Grade	-7	**10***
4th Grade	No change	**18**
5th Grade	10	3
6th Grade	5	3
7th Grade	1	**10**
8th Grade	-5	**5**

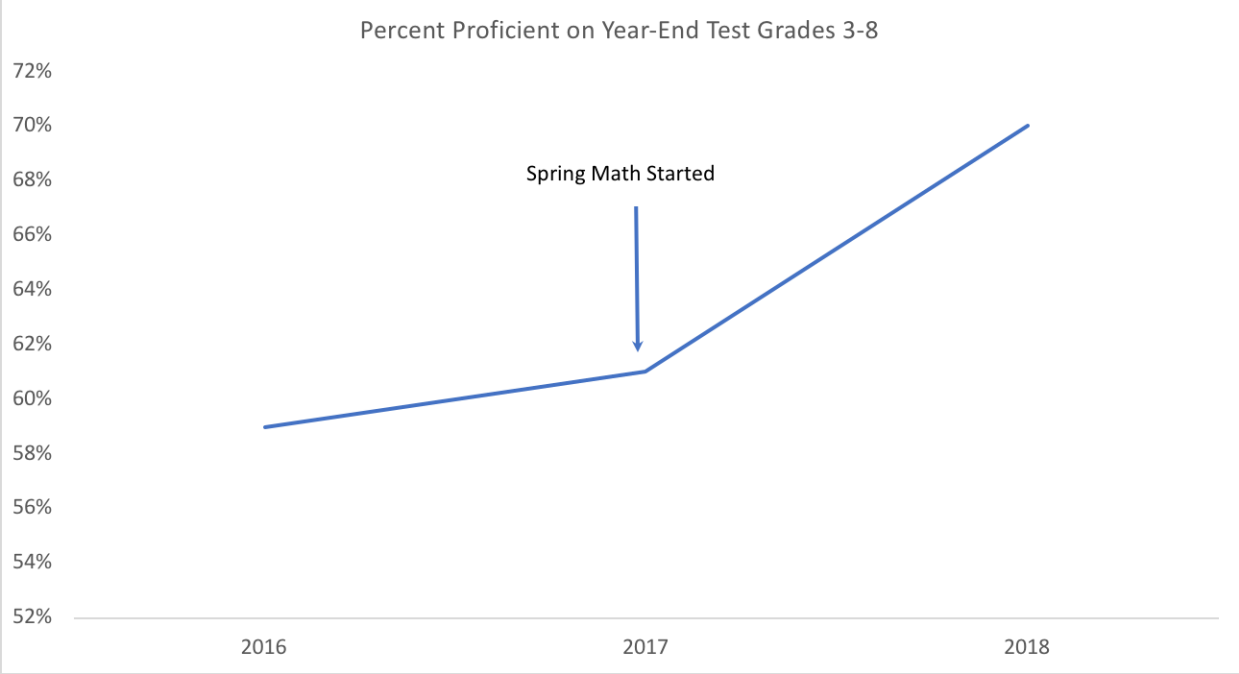
*Gains that are superior to the comparison school gains are in bold print.

Finally, we can examine proficiency gains in the SpringMath schools at each grade level beforeand after the use of SpringMath within the SpringMath schools, which is the most rigorous way to examine effects given the available data. Here we see that growth in percentage of students proficient on the year-end test was greater following use of SpringMath in four of sixgrades.

	2016 % Proficient	**2017 % Proficient**	**2018 % Proficient**	**Gains Before SpringMath**	**Gains After SpringMath**
3rd Grade	59	67	77	8	**10***
4th Grade	71	56	74	-15	**18**
5th Grade	75	71	74	-4	**3**
6th Grade	61	68	71	7	3
7th Grade	52	58	68	6	**10**
8th Grade	36	48	53	12	5

Below is a graph showing gains before and after SpringMath. On average across all grades, anincrease of 2.33% of students met the year-end proficiency criterion before SpringMath was used. With SpringMath, 8.17% increase in students meeting the year-end criterion was attained.





Reduction in risk was observed across screening occasions and gains were observed in grades using SpringMath that were superior to the district average, superior in most cases to the comparison school, and superior in most cases to growth in the same school before the use of SpringMath. It is especially notable that a value-added effect was observed with the use of SpringMath, given the comparison conditions also included strong use of RtI for mathematics - including classwide math intervention. Although these data were not experimentally controlled,they support the continued use of SpringMath, support for high-dosage implementation, and ongoing evaluation of program effects to ensure that desired results are sustained over time especially as SpringMath is scaled to other schools in the district.