Title I Students Succeed Using Symphony Math

Abstract

The Barnstable Community Horace Mann Charter Public School was introduced to the Symphony Math® program in October 2016. Throughout the course of the school year, approximately 210 students in grades 1-3 used Symphony Math in classrooms, intervention blocks, and at home. Their use of Symphony Math was supported fully by a full-time Math Specialist, who oversaw program use and coordinated targeted interventions with struggling students. The results of year-long testing with a third party assessment, and end of year state testing, show that students who used Symphony Math made significant gains in math achievement and, on average, outperformed their peers in both their district and the state.

Introduction

A number of research studies have demonstrated that struggling math students often have an underdeveloped understanding of foundational numeracy. Barnstable Community Horace Mann Charter Public School (BCHMCPS) is located in Hyannis, Massachusetts. The school is designated as a Title I school, with approximately 40% of students designated as Economically Disadvantaged. Additionally, 17.6% of students were classified as English Language Learners during the 2016-17 school year. The principal and Math Specialist identified numeracy as a primary goal for their students (K through 3). After being introduced to Symphony Math through a colleague, they decided to use the program as their primary technology intervention. This report summarizes the implementation of the program and subsequent results.

Participants

BCHMCPS is a public charter school serving students in grades K through 3. All students in grades 1 through 3 were chosen to participate in the use of Symphony Math. A control group was not selected, as administrators designated the use of the program to be carried out school-wide.

Implementation

The Math Specialist at BCHMCPS received initial training and support from a qualified Symphony Math regional representative, including several on-site visits, telephone, and email support. A goal of 45 minutes of use per week for students was set. However, technology at the school was mixed, with a variety of devices available to students, including Apple iPads, ASUS Chromebooks, and older desktop computers. Access to technology required careful scheduling, and had an impact on use throughout the year. Regardless of challenges, the support of the administration and Math Specialist resulted in a consistent effort by both students and teachers. Specifically, the Math Specialist viewed student reports on a weekly basis, and used data and recommended resources to intervene with struggling students.

Intervention

Symphony Math is an intervention program designed to help students develop a profound understanding of the most important mathematical concepts. Many students struggle to become proficient in math because they do not have the opportunity to master foundational concepts with sufficient depth. In an age when

most curricula value covering a large number of topics, some students are falling through the cracks. They need more time and more practice working with the big ideas of mathematics in order to develop the proper foundation.

Symphony Math provides students with the experience of learning and thinking about the most important mathematical concepts. This experience provides the necessary foundation for a successful future of math learning. Symphony Math helps students achieve this solid mathematical foundation by implementing several key research-based pedagogic strategies.

The conceptual sequence of Symphony Math consists of a tightly connected progression of the most important mathematical ideas. These underlying "big ideas" are important because they provide the foundation for later mathematical learning. A student does not move on to the next concept in the Symphony Math sequence until she has mastered the current concept. One concept follows logically from the previous concept. While a student is working on a new concept she sees review concepts that help support her learning of the new concept. This process helps the student connect new knowledge to previous knowledge.

The pedagogic style of Symphony Math emphasizes thinking, figuring out, and making connections. The program is designed to be used as a complement to the classroom learning experience. Students receive direct instruction and group learning in a classroom setting. The program provides the opportunity for individual practice at the developmental level of each student. The style of this practice encourages independent thinking and problem solving, and this is accomplished through the use of three important pedagogic strategies.

Symphony Math works with each student at his or her developmental level. The "dynamic branching" of the program and detailed progression of the scope and sequence allows students to work within their developmental zones. The amount of time and practice that students need to

understand mathematical concepts is not uniform. Symphony Math allows students to spend the time they need mastering foundational concepts. In addition, the program quickly moves students through the conceptual progression of the program to identify their area of need. Once the area of need has been identified, the program slows the progress until the necessary understanding has been achieved.

In addition to adjusting the pace of progress, Symphony Math also alerts educators of the need for intervention when students show signs of struggle. For every skill covered in the program, offline Guided Practice materials are available. Educators can use these materials to structure small group or 1:1 work sessions with students. The offline materials offer a chance for educators and students to express their understanding of difficult topics, and and they are an important key to successful implementations.

Assessments

Two 3rd party measurements were used by this study to evaluate student math ability. Students in all grades were given the STAR 360® Math assessment (STAR), by Renaissance Learning, in the Fall and Spring of the 2016-17 school year. The assessment provides percentile ranks for students based on norm referenced scores. The multiple administrations of testing allow for comparisons in growth during the school year.

In addition, 3rd grade students participated in Massachusetts state testing in Mathematics in Spring 2017. State testing begins in 3rd grade, and so comparisons in this case study were made to the other four elementary schools within the district.

Analysis

This case study focused on results comparing two 3rd party assessment measurements. Scores and distribution of students on the STAR assessment in grades 1 through 3 were used to measure

growth within the school population. In addition, performance of the grade 3 students on the Massachusetts state test (MCAS) was compared to the four other elementary schools in the district. Those schools include one Title I school and three non-Title I schools.

Participation

During the 2016-17 school year, 210 students in grades 1 through 3 used the Symphony Math program. On average, each student used the instructional program for 9 hours and 57 minutes during this time frame. Use increased by grade level, with 3rd grade students averaging more than 13 hours of use. In addition, the Math Specialist at HMPCS worked with students using the Symphony Math Guided Practice offline materials in targeted interventions.

Results

Comparison of results from the STAR assessment from fall to spring showed a dramatic shift in the distribution of students in the 'At or Above' (80th percentile or higher) designation. This population grew 23% from fall to spring, ending with almost 3 in 5 students in the category. In contrast, the three lower categories all showed decreasing percentages. In particular, the 'Urgent Intervention' group (0-19th percentile) decreased to less than 1%. In other words, the risk profile of the group was almost completely eliminated during the course of one school year.

STAR 360 Math: Grades 1-3 Percentile Groupings (n=210)
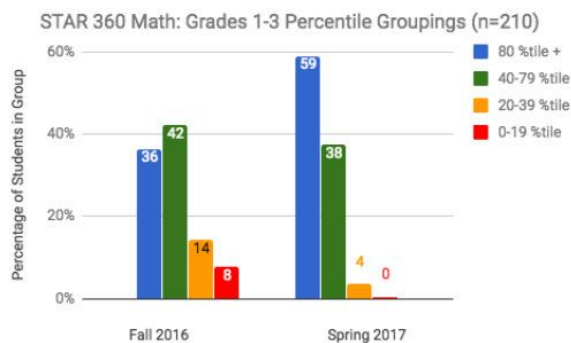
MCAS Math Performance

The results of the STAR assessment were corroborated by MCAS Math (state testing) results for the 3rd grade population. In Massachusetts, state testing begins in 3rd grade, and so this is the only grade with data available in comparison to the district and state.

Similar to the STAR assessment, MCAS groups students into one of four categories: Exceeding Expectations, Meeting Expectations, Partially Meeting Expectations, and Not Meeting Expectations. BCHMCPS had 68% of 3rd grade students appear in the top two groups. This distribution was 16 percentage points higher than the other 4 schools in the district, and 19 percentage points higher than the state average.

MCAS 2017: Students Meeting/Exceeding Expectations
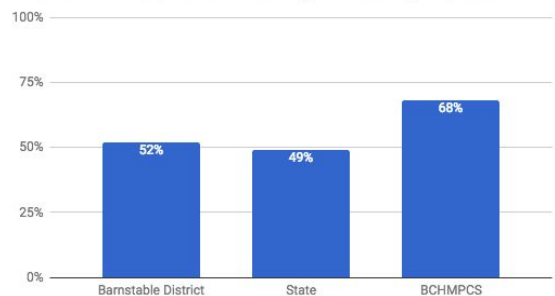
The percentage of students in the lowest category of MCAS, Not Meeting Expectations, showed a similar difference. The district and state averages of students in this group were both 13%, while only 5% of students in BCHMCPS were included.

MCAS 2017: Students NOT Meeting/Exceeding Expectations
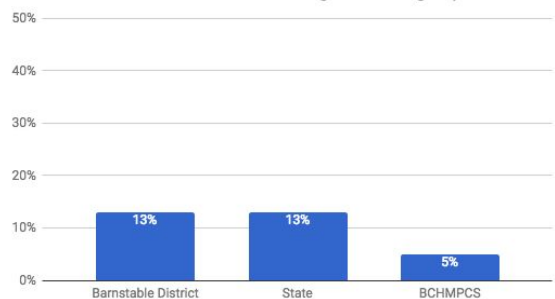
Conclusion

The administration and staff of Barnstable Community Horace Mann Public Charter School identified foundational number sense as a critical need of all students. During the 2016-17 school year, they used Symphony Math as their only technology component of a school-wide effort to support students in the goal of mastering key components of numeracy that enable math success. The school implemented the program as a regular part of students' week, and also supported teachers by including data review and focused Math Specialist interventions for struggling students.

When observing growth as measured by an independent assessment instrument, and comparing students to their peers in the district and throughout the state, students at this school made significant growth during the course of the school year, and also outperformed their peers in the state math assessment. This provides evidence that the Symphony Math program was effective in supporting the math curriculum and all learners at this school.

Appendix A: Data

STAR Math Assessment

First Grade (n=74)

STAR Categories/Levels	Fall 2016	Spring 2017	Percent Change
At or Above (80th percentile or Above)	16%	40%	+150%
On Watch (40th-79th percentile)	52%	58%	+12%
Intervention (20th-39th percentile)	18%	3%	-83%
Urgent Intervention (0-19th percentile)	14%	0%	-100%

Second Grade (n=74)

STAR Categories/Levels	Fall 2016	Spring 2017	Percent Change
At or Above (80th percentile or Above)	31%	66 %	+113%
On Watch (40th-79th percentile)	45%	30%	-33%
Intervention (20th-39th percentile)	18%	3 %	-83%
Urgent Intervention (0-19th percentile)	6%	1%	-83%

Third Grade (n=62)

STAR Categories/Levels	Fall 2016	Spring 2017	Percent Change
At or Above (80th percentile or Above)	67%	73 %	+9%
On Watch (40th-79th percentile)	27%	22%	-18.5%
Intervention (20th-39th percentile)	5%	5%	0%
Urgent Intervention (0-19th percentile)	2%	0%	-100%

MCAS 2017 Math: 3rd Grade

District Comparison

MCAS Category	Hyannis West Elementary	Centerville Elementary	West Barnstable Elementary	West Villages Elementary	HMPCS
Exceeding Expectations	11%	9 %	0%	10%	8%
Meeting Expectations	40%	42%	39%	52%	60%
Partially Meeting Expectations	40%	35%	43%	26%	27%
Not Meeting Expectations	10%	14%	18%	11%	5%

State Comparison

MCAS Category	State Average	HMPCS
Exceeding Expectations	7%	8%
Meeting Expectations	42%	60%
Partially Meeting Expectations	38%	27%
Not Meeting Expectations	13%	5%

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