

Math for Love 2016 Seattle Summer Staircase Curriculum Evaluation: Key Findings for Mathematical Learning

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Summary

Seattle-based math education consultancy Math for Love (mathforlove.com) conducted a multi-faceted evaluation of the play-based math curriculum they developed for the Seattle Public School District's 2016 Summer Staircase program. The goal of the evaluation was to better understand the effectiveness of the curriculum for supporting children's mathematical learning.

This report presents key findings for students' mathematical learning over the course of the program. Learning was described broadly to account for cognitive and dispositional growth. Three learning constructs were investigated:

- Mathematical conceptual understanding
- Mathematical fluency
- Mathematical habits of mind, including engagement and enthusiasm

Learning constructs mapped onto Common Core Mathematical Standards and Common Core Standards of Mathematical Practice.

Classroom observations were conducted from various vantage points in order to understand how and to what extent the Math for Love curriculum and teachers' instructional practices engaged students in mathematical thinking and doing. Finally, teacher feedback was examined to understand teacher perspectives on student growth, the strengths of the curriculum, and areas of improvement.

About Math for Love's Summer Staircase Math Curriculum

Summer Staircase is a summer literacy and math intervention program for Seattle Public School students following their Kindergarten through fourth grade year. Although open to all students, the program is targeted at learners below grade level in an effort to bolster foundational skills while staving off the erosion of progress in math and literacy known as the "summer slide".

Nearly 2,000 elementary school students at 19 school sites participated in 2016 Seattle Summer Staircase. 2016 marked Math for Love's third year collaborating with Seattle Public Schools on Summer Staircase. Math for Love provided math curriculum in three grade bands: Kindergarten; Grades 1-2; and Grades 3-4. Additionally, Math for Love conducted trainings for teacher and

instructional aids in the curriculum and corresponding instructional practices before Summer Staircase began, and offered ongoing teacher support throughout the program.

The curriculum crafted by Math for Love for Summer Staircase was at once rigorous and play-based. It was designed to provide abundant opportunities for all students (from struggling students to those making excellent progress) to develop critical thinking skills, build their mathematical content knowledge and skills, and to hone their mathematical habits of mind, including perseverance. Importantly, Math for Love sought to provide in Summer Staircase an unequivocally positive mathematical experience, and games and manipulative were an essential part of the curriculum.

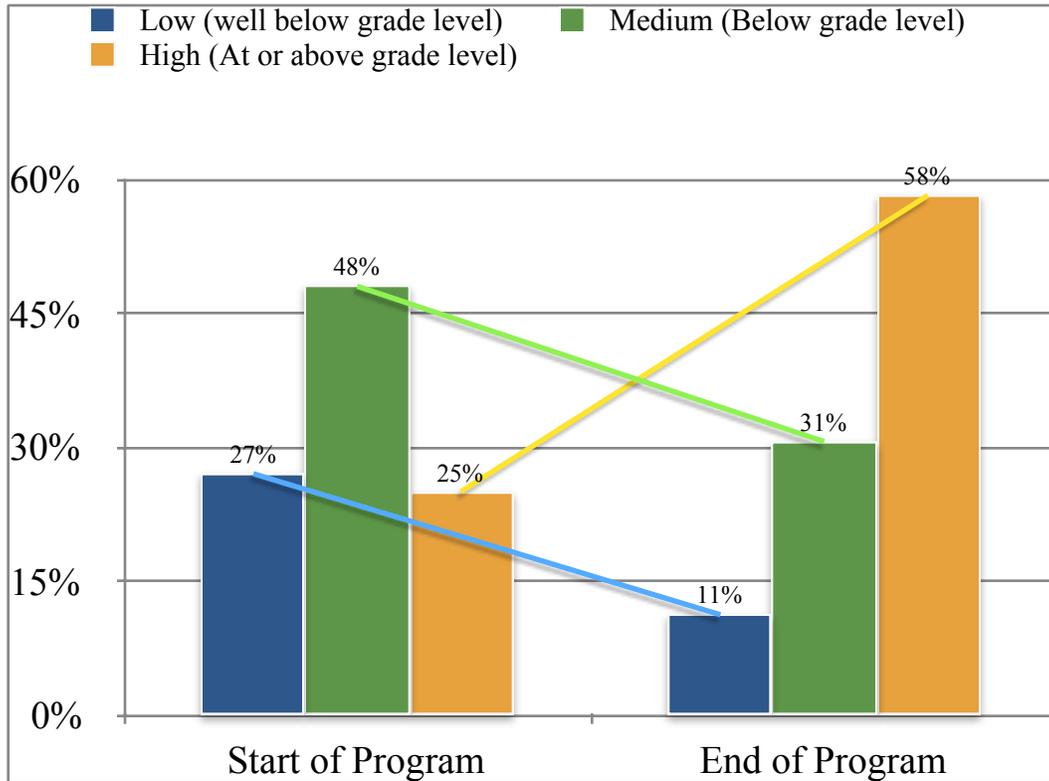
Findings for Mathematical Learning

The data show many successes for Summer Staircase students across program sites and demographics. Main findings include growth for the majority of students in their mathematical conceptual understanding, fluency, and habits of mind. Growth occurred for struggling students and students at or above grade level alike. Data from the program suggests that third and fourth grade students experienced the largest mean growth in habits of mind and conceptual understanding (See Table A).

Table A. Student Growth in Conceptual Knowledge and Habits of Mind

Grade Band	Mean Conceptual Understanding Score Gain	Mean Habits of Mind Score Gain
Kindergarten	16.5 percentile points	18.25 percentile points
1st/2nd Grade	13.7 percentile points	15.5 percentile points
3rd/4th Grade	22.0 percentile points	27.25 percentile points

Student “Math Profile” Change from Start to End of Program, by percentage



Classroom observations demonstrated that the majority of program teachers successfully fostered classroom environments that rigorously engaged students’ in mathematical doing and thinking. Students’ critical thinking was supported by, among other instructional practices, teachers asking open-ended questions that prompted children to explain their thinking and make connections between ideas. Engagement in math activity was facilitated by the curriculum’s games and playful activities as well as teachers’ organizational choices in the stations, and comfort with and enthusiasm for the curriculum.

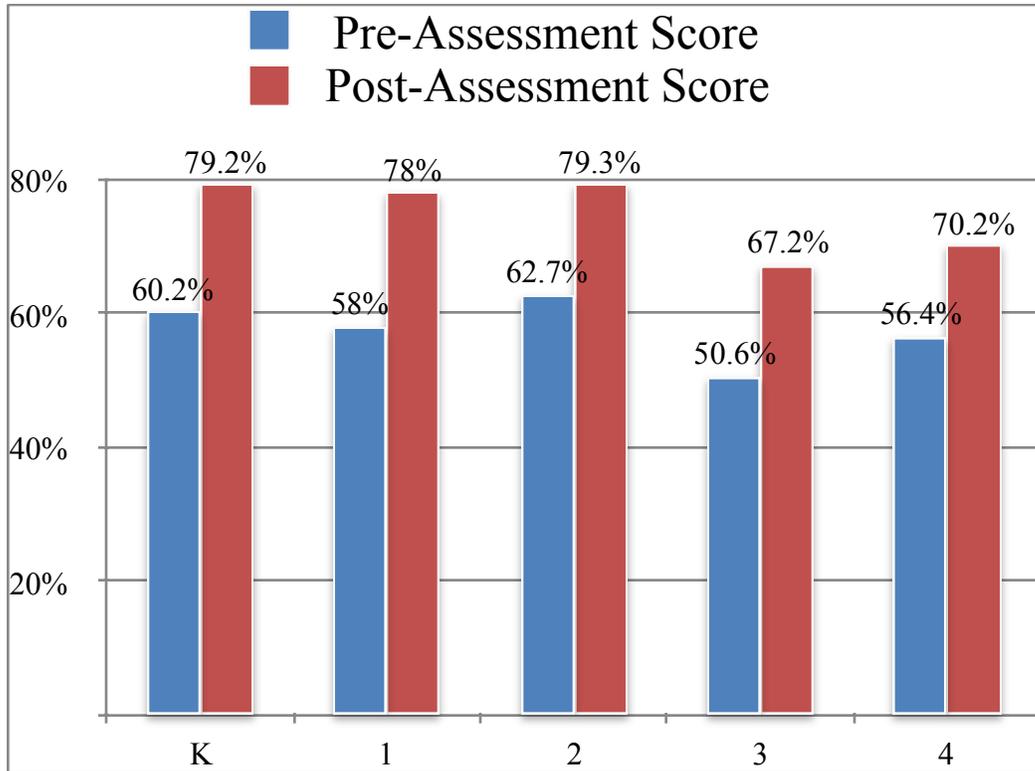
Teacher survey results show that over the course of the six-week program, teachers saw many of their students gain not only in fluency and conceptual understanding, but also in confidence, persistence in the face of challenge, and critically, in their enjoyment of math. Of those surveyed, 94% of teachers said the curriculum supported student engagement, and 85% said it supported student critical thinking. It is Math for Love’s hope that these positive approaches to math work will support students in their school year math classrooms.

In mathematical fluency, as measured by a pre/post assessment, 76% of students who scored below 90% on the pre-assessment, showed improved results on their post-assessment. The results in this cohort were consistent across grade levels (See Table B).

Table B. Fluency Improvements for Students Scoring Below 90% on the Pre-assessment

Mean Pre Assessment Score (out of 10)	Mean Post Assessment Score (out of 10)	Improvement	Percentage Point Increase	Percentage Increase
5.76	7.50	1.74	17%	30%

Mean Pre- and Post-Assessment Fluency Scores by Grade for Students Scoring Below 90% on the Pre-assessment



Overall, the Summer Staircase curriculum has the potential to be a model for summer intervention program in math, and a powerful tool to help build mathematical success for elementary students at all levels.