ESSA RESEARCH REPORT

Data in Support of *BlueStreak Math's* Impact on Growth of RIT Scores for Lower-performing Students in Grades 3-5

Title I Elementary School A and Title I Elementary School B

CHICAGO PUBLIC SCHOOLS, ILLINOIS

Jerry A. Pedinotti, Jr

Center Data Specialist, CTE Technical Assistance Center of NY
Lead Data Analyst for Dr. Willard Daggett, Founder, International Center for Leadership in Education

Independent Research and Data Analyst: Conducting Research in the Areas of Measurement, Evaluation and Statistical Analysis

February 2019 (revised September 2020)

Table of Contents

ESSA Evidence for *BlueStreak Math*

This analysis of *BlueStreak Math's* impact on mathematics achievement of elementary school students meets the Elementary and Secondary Education Act (ESSA) Tier II standard for being an evidence-based intervention. In accordance with this standard, this study used a pretest-posttest quasi-experimental design that had no selection bias on the part of *Blue Streak Math* or as part of this evaluation. Our treatment control groups were well-matched for analysis following ESSA and What Works Clearinghouse (WWC) guidelines.

As required by ESSA Tier II standards, this study measured outcomes using a reliable benchmark assessment (NWEA MAP). The demographics of students sampled for this study was highly homogenous (99 percent ethnic minority and more than 90 percent economically disadvantaged).

This study found that the use of *BlueStreak Math* had a positive and statistically significant effect on student academic achievement in mathematics.

Methodology

BlueStreak Math is an online, standards-based solution for students in pre-K through grade 8 that assists students utilizing the key aspect of math fact fluency in addition, subtraction, multiplication, division and application facts.

At the start of the 2017-18 school year, all students in grades 3-5 at Title I Elementary Schools A and B were eligible to receive supplemental instruction using *BlueStreak Math*. Teachers in the district had the option of using *BlueStreak Math* as an additional method of instruction based on student need and accessibility, which may have included the availability of technology in the home. These students were included in the treatment group of students that did not receive a Post ADD 1 score. There were also students that started using *BlueStreak Math* at the start of the school year but either opted out or did not take the Post ADD 1 test. These students too were included in the treatment group of students that did not receive a Post ADD 1 score.

In spring 2017 and spring 2018, 233 students from Title I Elementary Schools A and B in Chicago, Illinois, took the Northwest Evaluation Association™ (NWEA™) Measures of Academic Progress® (MAP®) year-end assessment in mathematics. Of those 233 students, 172 received pre- and post-test scores in at least the Addition 1 (ADD 1) level of *BlueStreak Math*. The other 61 students either did not use *BlueStreak Math* or only took the ADD 1 pre-test.

To ensure that this study would be well-designed and well-implemented, only those students that took the NWEA MAP in both spring 2018 and spring 2019 were compared.

About Title I Elementary School A

Title I Elementary School A is a Pre-K through grade 8 school in the Chicago Public Schools system. The school reports an enrollment of 268 students, 100 percent of whom are ethnic minorities (98 percent are Black). Almost 97 percent of students enrolled are eligible for free or reduced-price meals. The school has a mobility rate of 19 percent and a chronic truancy rate of nearly 50 percent.

About Title I Elementary School B

Title I Elementary School B is a Pre-K through grade 5 school in the Chicago Public Schools system. The school reports an enrollment of 332 students, more than 99 percent of whom are ethnic minorities (96 percent are Black, and 3 percent are Hispanic). 88 percent of students enrolled are eligible for free or reduced-price meals. The school has a mobility rate of 21 percent and a chronic truancy rate of nearly 40 percent.

NWEA MAP (Normative Data)

MAP interim assessments use carefully constructed measurement scales that span grades and offer educators an accurate, apples-to-apples approach to view and report estimates of student achievement status within a subject. RIT Scale Norms allow educators to compare achievement status—and changes in achievement status (growth) between test occasions—to students' performance in the same grade at a comparable stage of the school year.

For this study, observed growth of student RIT scores from the end-year (spring 2017) to end-year (spring 2018) NWEA MAP tests are used.

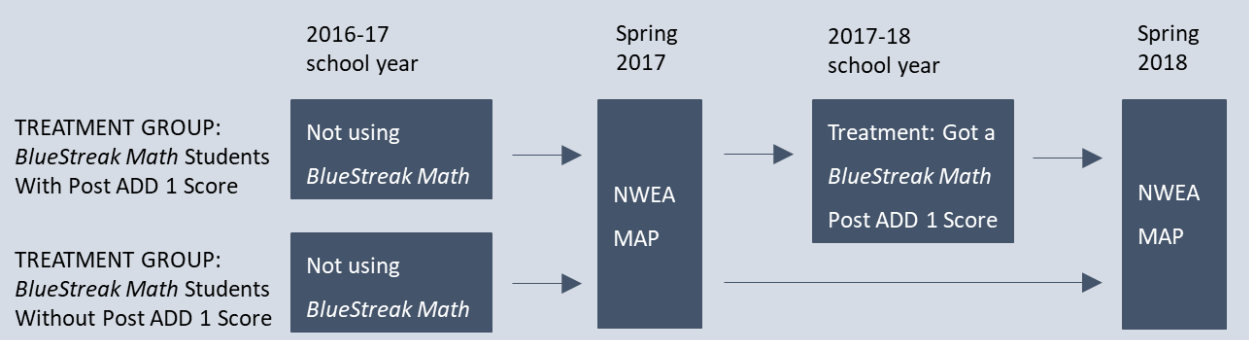
Hypothesis

In spring 2017 and spring 2018, 233 students from Title I Elementary Schools A and B in Chicago, Illinois, took the Northwest Evaluation Association™ (NWEA™) Measures of Academic Progress® (MAP®) year-end assessment in mathematics. Of those 233 students, 172 received pre- and post-test scores in at least the Addition 1 (ADD 1) level of *BlueStreak Math*. The other 61 students either did not use *BlueStreak Math* or only took the ADD 1 pre-test.

Students who took the pre- and post-test in any level of *BlueStreak Math* would have been exposed to *BlueStreak Math* long enough to have been impacted by it. By spring 2018, students that used *BlueStreak Math* would have had essentially a full school years' time to become familiarized.

If students who scored in the lower percentiles range (1st to 10th) on the spring 2017 NWEA MAP assessment obtained a post ADD 1 score in *BlueStreak Math* during the 2017-18 school

year had higher observed growth in RIT scores than students who scored in the lower percentiles ranges but did not obtain a post ADD 1 score, then it would be plausible to surmise that *BlueStreak Math* had an impact on performance for lower performing students.



Study design

Analysis

Mean growth in NWEA MAP RIT scores in mathematics were compared between students in grades 3, 4, and 5 that completed at least the *BlueStreak Math* ADD 1 post-test in 2017-18 and those students that did not. The comparison period was spring 2017 to spring 2018.

To determine whether *BlueStreak Math* may have had an impact on lower-performing students, the 1st to 10th percentile range on the spring 2017 NWEA MAP test was used.

Results

Figure 1 below shows the total mean Observed Growth in RIT scores for students in **grade 3** in the 1st to 10th percentile range on the spring 2017 NWEA MAP test during the comparison period. Students that completed a post-test in at least ADD 1 during the 2017-18 school year had a mean RIT score growth of 14.3 points, which was 8.5 points greater than students in grade 3 that did not take a post-test in *BlueStreak Math* ADD 1.

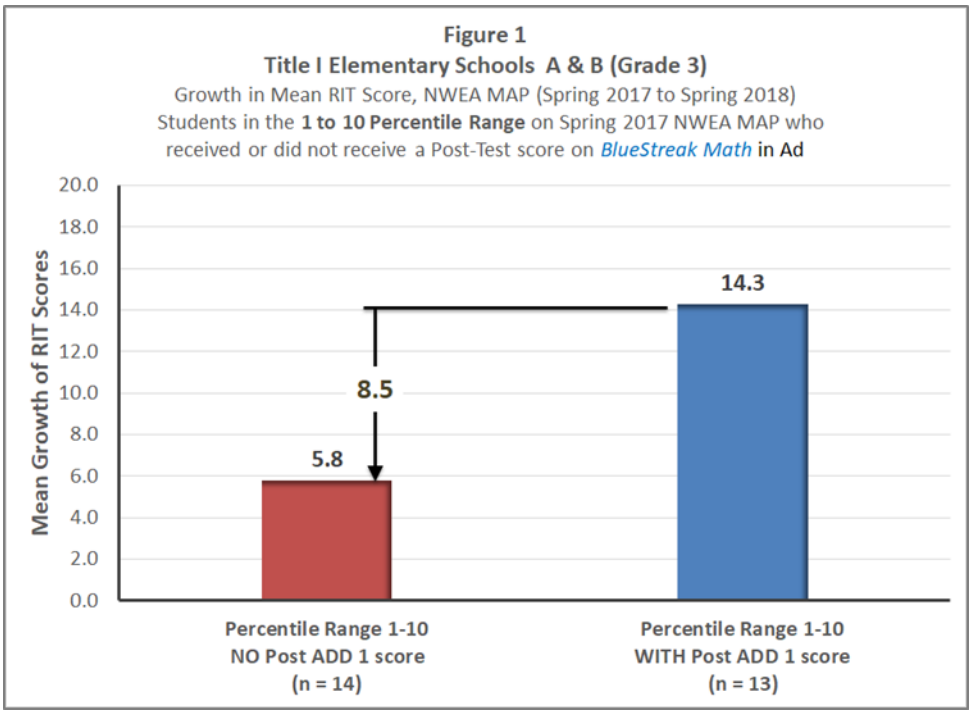


Figure 2 below shows the total mean Observed Growth in RIT scores for students in **grades 3–5 combined** in the 1st to 10th percentile range on the spring 2017 NWEA MAP test during the comparison period. Students that completed a post-test in at least ADD 1 during the 2017-18 school year had a mean RIT score growth of 11.9 points, which was 9.2 points greater than students in grades 3–5 combined that did not take a post-test in *BlueStreak Math* ADD 1.

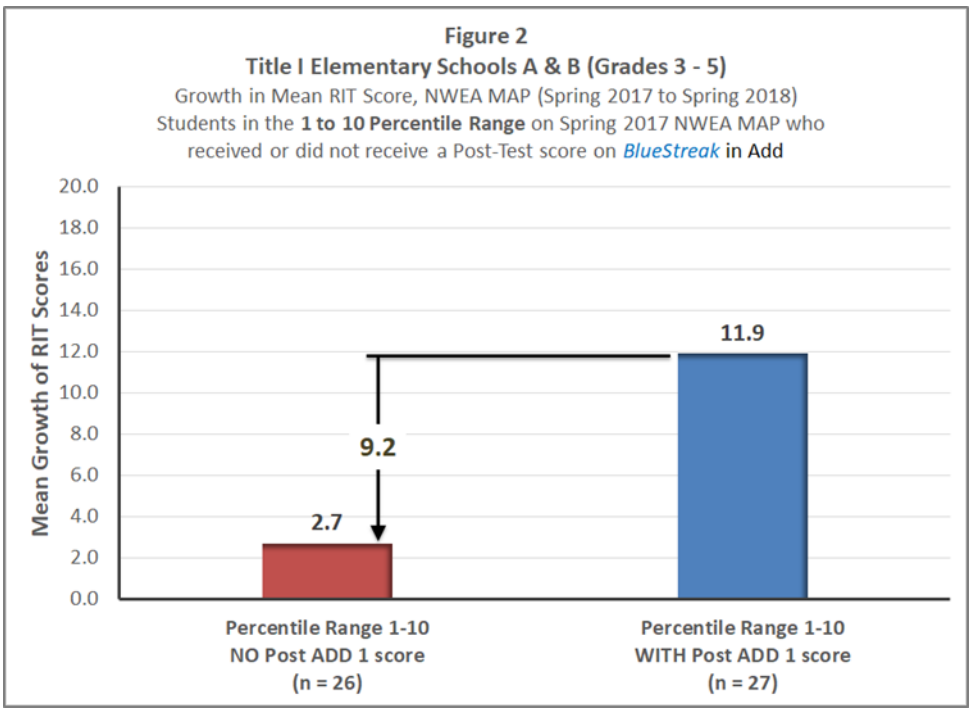


Table 1 shows the average growth of mean RIT scores for students in grade 3 and grades 3–5 combined in the 1st to 10th percentile range. For both groups of students, those in the lower percentile ranges that received an ADD 1 post-test score have observed growth that exceeded students that did not obtain an ADD 1 post-test score (8.5 points greater in grade 3 and 9.2 points greater in grades 3–5 combined).

Table 1. Percentile 1-10	**Average Growth of Mean RIT Score**		**Average Growth of Mean RIT Score**
Grade 3		**Grade 3-5**	
Percentile Range 1-10 NO Post ADD 1 score (n = 14)	**5.8**	Percentile Range 1-10 NO Post ADD 1 score (n = 26)	**2.7**
Percentile Range 1-10 WITH Post ADD 1 score (n = 13)	**14.3**	Percentile Range 1-10 WITH Post ADD 1 score (n = 27)	**11.9**

Conclusion

For most hypothesis-driven experiments, a significance level of 0.05 is acceptable and is the level used for this study. The significance level is the threshold set to determine significance. If the p-value (level of statistical significance) is less than or equal to the set significance level, the data is considered statistically significant. A higher confidence level (and, thus, a lower p-value) means the results are more significant (See Appendix).

Students in early grades (Grades 3–5) from Title I Elementary Schools A and B who performed in the lowest percentile ranges in spring 2017 and took an ADD 1 post-test in *BlueStreak Math* during the 2017-18 school year experienced more observed growth in their RIT scores from spring 2017 to spring 2018 on the MAP tests in mathematics than those that did not take an ADD 1 post-test. It is, therefore, reasonable to state with at least 98% confidence (See Appendix) that *BlueStreak Math* had an impact on student performance.

Appendix

Since the p-values (level of statistical significance) for both data sets are less than or equal to the set significance level (0.05), the data is considered statistically significant.

	Figure/Table:	**Figure 1 / Table 1**	**Figure 2 / Table 1**
Count (n):	n with Post ADD 1 Score:	13	27
	n with no Post ADD 1 Score:	14	26
	Total Population:	27	53
Mean (μ) Growth:	μ with Post ADD 1 Score:	14.3	11.9
	μ with no Post ADD 1 Score:	5.8	2.7
Standard Deviation (s):	s with Post ADD 1 Score:	8.2	8.6
	s with no Post ADD 1 Score:	9.7	11.6
	Variance(S_d):	3.4	2.8
	t-score:	2.5	3.3
	Degrees of Freedom(df):	25	51
	Significance (p-value) for a two-tailed test:	**0.01 to 0.02**	**0.001 to 0.002**
	Confidence Level (CL):	**98 to 99%**	**99.8 to 99.9%**
	Meets 95% CL:	**YES**	**YES**