USA District Like Mine (High % African American) Math Outcomes Analysis 2018/19

Grade Levels: 3, 4, 5
ST Math Program: Gen-5
Analysis Type: Z-score of math proficiency
Treatment-Years: 2018/19
Baseline-Year: 2012/13, 2013/14, 2014/15, 2015/16, 2016/17, or 2017/18
Subgroup: All

Jessica Guise

Abstract

This analysis evaluates grades using ST Math with a high percentage of African American students in the USA in 2018/19. It identifies those grades with nominal or better implementation of the ST Math program, and matches them to randomly selected, similar math-performance comparison grades. The nominal ST Math users are an aggregation of 125 grades, consisting of grades 3, 4, and 5 at 67 schools, with an average baseline z-score of -0.52. Refer to Figures 2 and 3 for the math performance and demographic distributions. They were matched to 125 similar, randomly selected control grades at 111 schools that never used ST Math. Grade-wise growth in math proficiency was evaluated (i.e. growth in same grade, same school, from Baseline to 2018/19) on the mean z-scores of percent Proficient or Advanced (see Section 3.1). Grades 3, 4, and 5 aggregated showed an ST Math effect of 0.22 z-score points.

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1 Introduction

1.1 Background

This is a quasi-experimental analysis at the grade-mean level. Entire grades represent the units of analysis, and outcome measures are the multi-year changes in grade-mean z-score of Proficient or Advanced. The treatment grades used the ST Math program for 1, 2, 3, 4, 5, or 6 years, beginning in the 2013/14, 2014/15, 2015/16, 2016/17, 2017/18, or 2018/19 school year, respectively. The study hypothesis is treatment grades using ST Math will outperform similar matched control grades, using their "business as usual" conditions of instructional content and professional development. The control grades were selected to have similar demographic and math attributes (See Figures 2 and 3) to the treatment grades during the baseline year (2012/13, 2013/14, 2014/15, 2015/16, 2016/17, or 2017/18), and did not use ST Math in 2018/19. The treatment grades' selection pool was all schools using ST Math with a high percentage of African American students in grades 3, 4, and 5 in the USA. The control grades' pool was all schools not using ST Math in grades 3, 4, and 5 in the USA. This study method measures effectiveness of the ST Math program when nominally implemented.

1.2 Program Description

Spatial-Temporal Math (ST Math) is game-based, instructional software for K–12 students, created by the MIND Research Institute (MIND). The purpose of the program is to boost math comprehension through visual learning. The ST Math software games begin without language or symbol abstractions by posing math problems as purely visual puzzles. In this way, three objectives are accomplished: i) language proficiency prerequisites to engage with the program are minimal, ii) non-mathematical distractions (e.g. back-stories for word problems) are minimized or eliminated – thereby reducing load on working memory, and iii) the actual math in the problem can be represented clearly, simply, and unambiguously. Interactive, animated visual manipulatives provide informative feedback on student solutions. A score of 100 percent on a game level comprised of 4-12 puzzles is required for progression through the levels. Failure requires a re-play of the level, via a new quasi-random set of puzzles. In this way, progression is self-paced.

Besides the self-paced progress made by students in their one-to-one environment, the program is designed to be referenced by teachers during their regular math instruction. It is supplemental to core or basal math instruction and instructional materials. As the great majority of grade-level math standards are covered in the ST Math digital curriculum, completion of 100% of the entire ST Math curriculum (i.e. completing every Game) is required to cover all grade-level math standards. Teachers receive initial training, either face to face or through self-guided online instruction. The training covers account startup, as well as math learning and growth mindset goals, the pedagogical approach to learning in a visual experiential game, monitoring and intervention of the student 1:1 game play, and connecting of ST Math content to classroom content and pacing.

For students to achieve nominal progress through the program, there is a recommended time-on-task requirement of 90 minutes per week over about 30 weeks. Consistent application of 90 minutes per week throughout the school year is normally sufficient to result in a grade's average ST Math content coverage exceeding 50% by year-end. In this study, we include grades that have achieved 40% or more content coverage (Progress) by April 15th.

This is a passive study with no experimental setup or extraordinary communications to any schools. All schools in this study therefore received normal program implementation support through the year from MIND support managers. This support includes bundled startup services of approximately 2-4 hours of training either in-person or online, access to live webinars, regular online and push reports on

usage and progress, email/phone helpdesk, and proactive monitoring for gaps or issues by MIND support representatives.

MIND Research Institute initiated, funded, and exercised editorial control over this study.

2 Data Collection

Since this analysis uses grades as the unit of analysis, and states publish grade-mean state standardized test scores, the data for student math outcomes is collected from each state education agency's research files (retrieved from state websites). The treatment students use ST Math student accounts served by MIND. Student ST Math usage data is aggregated to grade-level means by MIND.

2.1 Treatment Grades Pool and Selection

The Treatment grades pool originated with all schools and grades using ST Math with a high percentage of African American students in the USA. From these schools, every grade that had used the ST Math program only for the year 2018/19 was identified. They comprise the Treatment grades pool for this evaluation of multi-year usage.

2.1.1 Enrollment Filter

Because the analysis uses grade-mean data, such as grade-mean scale scores or grade-mean proficiency level percentages, it is necessary that the program also be a grade-wide treatment, with the great majority of students in each grade receiving treatment. Otherwise, the grade-means reported by the state of 100% of *tested* students would not be valid measures of a smaller fraction of *treatment* students. MIND's site implementation requirement is that an entire grade, including all teachers and all classes within that grade, use the ST Math program. We validate how closely this is the case for each individual treatment grade by comparing the number of ST Math student accounts at a grade level to the reported enrollment at that grade level. We discard from the Treatment pool any grade with a ratio of ST Math student accounts to reported grade enrollment lower than 85%.

2.1.2 Content Coverage Filter

Furthermore, the outcomes measure is a summative year-end test, i.e. the standardized math assessment of that state. The math assessment thus covers all the math standards for that entire grade level. Meanwhile, the ST Math program curriculum (arranged into Learning Objectives) is also aligned to each state's math standards. To infer that the ST Math content is having a valid effect on student outcomes on the summative assessment, we discard any grade with grade-mean of ST Math Progress for its students lower than 40% by April.

Progress is a percentage, and is defined as Levels completed by the student, divided by the total number of Levels in the grade-level curriculum. Note that student achievement of at least 40% progress in ST Math is accomplished primarily by teacher assignment of computer session time to students. With sufficient time on task, students make progress. The program helps them self-pace through providing real-time informative feedback for each puzzle.

2.2 Control Grades Pool and Selection

The control grades are randomly selected from a control pool of schools in the USA. Though they are randomly selected, they are also matched to be similar to the Treatment grades' math attributes and demographics during the baseline Baseline year. The matched attributes include:

- grade-mean z-score of percent Proficient or Advanced
- percentage of students receiving free or reduced lunch at the school-level (using the demographic data from MDR)
- percentage of African American students at the school-level (using the demographic data from MDR).

The method of matching used is propensity score matching, via the "matchit" program in R, with "mahalanobis" as the distance measure.

3 Data Analysis

The set of all schools and grades using ST Math with a high percentage of African American students in the USA is evaluated for Enrollment percentage and Progress percentage parameters. A filtered Treatment set (TRT) of all ST Math grades with $\geq$ 85% Enrollment and $\geq$ 40% Progress is identified. State math assessment data is tabulated. A matching set of Control grades based on baseline year state math assessment is selected.

Changes in math performance, i.e. the difference in math performance of a grade from a baseline year to the final year, are evaluated and tabulated. Statistical tests of the significance of the difference in math performance changes between Treatment grades and Control grades are performed. Finally, a grade-by-grade disaggregation is performed.

3.1 Z-scores

In order to analyze across all states with different math assessments, a new z-score of that test's math proficiency is calculated. For each year being analyzed, by grade, a z-score takes the difference of the grade mean percent proficient and the mean of all percent proficient statewide for that year, and then divides it by the standard deviation of all percent proficient statewide for that year. Here is a fictional example to illustrate the calculation of a z-score for the 2015/16 exam:

School A, Grade 3, Percent Proficient: 70
Average across all schools statewide, Grade 3: 50
Standard deviation across all schools statewide, Grade 3: 20
Z-score=((School A, Grade 3, Percent Proficient)-(Average across all schools, Grade 3))/(Standard deviation across all schools, Grade 3)

$$\text{Z-score}=\frac{70-50}{20}=1$$

The z-score is calculated for every grade across all years being analyzed, using the full state data set of schools for the averages and standard deviations. The use of z-scores is a valid statistical method to normalize any dataset and to enable analysis across otherwise uncomparable exams. In this report, we only analyze z-scores.

3.2 Percentile Ranking

These newly calculated z-scores can then be converted into a percentile ranking. Each percentile ranking shows the grade's performance relative to the others in that year and grade. For example, for a specific grade 3, a percentile ranking of 50 shows that this grade 3 performed at the average of all third grades in the state for that testing year.

3.3 Final Treatment and Control

3.3.1 ST Math Grade-Aggregated Implementation ($\geq$ 85% Enrollment Grades Only)

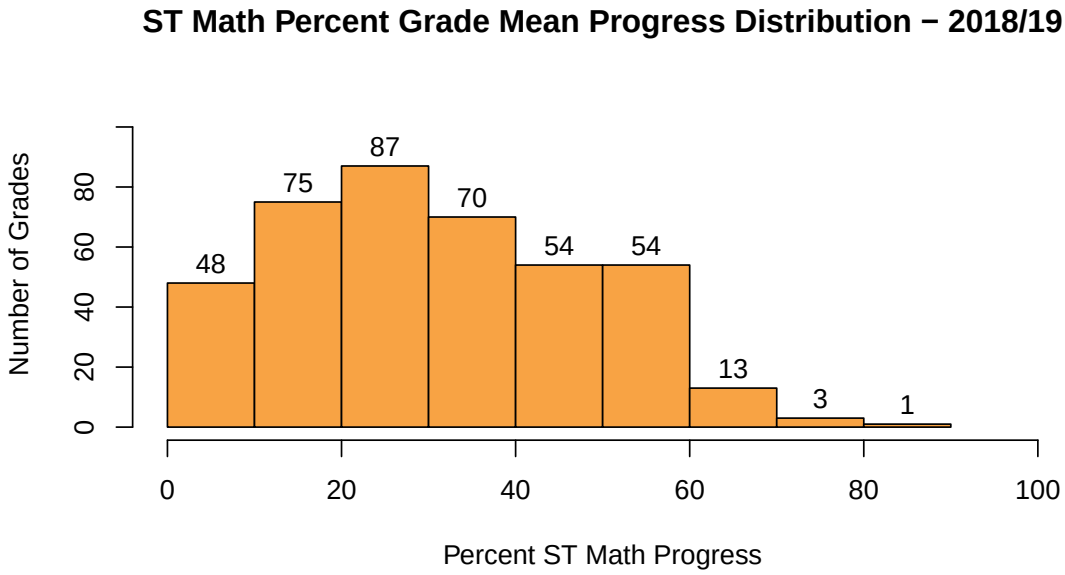

Figure 1: Histogram of ST Math Percent Progress for $\geq$ 85% Enrollment Grades 2018/19

For all ST Math grades with Enrollment $\geq$ 85%, Figure 1 shows the frequency distribution of grade-average Progress percentage through the program. Note that we will only be using grades with $\geq$ 40% Progress as the Treatment Group.

Table 1 provides descriptive statistics of the Progress distribution. Table 2 shows the number of remaining treatment grades after applying enrollment and progress filters.

	Min.	Max.	Average	S.D.
ST Math % Progress	1.0	83.9	31.1	16.9

Table 1: Descriptive Statistics of ST Math Percent Progress for >= 85 percent Enrollment Grades

Grades with >= 85% Enrollment:	405
Grades with in addition >= 40% Progress:	125

Table 2: Number of ST Math Grades with >= 85 percent Enrollment and with >= 40 percent progress

3.3.2 Filtering Treatment and Controls

Table 3 shows the total number of grades in the Treatment pool, the number of grades that exceeded the 85% Enrollment figure, and also the 40% Progress filter. Other rows in the table indicate counts of numbers of students (2018/19 from state testing count) and counts of number of schools represented. The number of matched Control (CTRL) grades, students, and schools is also shown.

	Grade 3	Grade 4	Grade 5	Total
ST Math Using Grades	274	220	209	703
ST Math Using Schools	273	220	209	334
ST Math Students	19073	15822	15864	50759
ST Math Grades (Enroll >= 85%)	145	131	129	405
TRT Grades (Enroll >= 85% & Prog >= 40%)	43	42	40	125
TRT Schools (Enroll >= 85% & Prog >= 40%)	43	42	40	67
TRT Students (Enroll >= 85% & Prog >= 40%)	3792	3868	3558	11218
CTRL Grades	43	42	40	125
CTRL Schools	42	42	40	111
CTRL Students	3005	2935	3754	9694

Table 3: Treatment Pool Filtering and Controls: Counts of Grades, Schools, and Students

3.3.3 Match of Controls to Treatment

Figure 2 shows the density plots of the baseline z-score of percent students at state assessment Proficient or Advanced (left plot) and the percentage of students needing free or reduced lunch (right plot) for treatment grades overlayed on control grades, showing the closeness of the match obtained between Treatment and Control sets of grades in the baseline year.

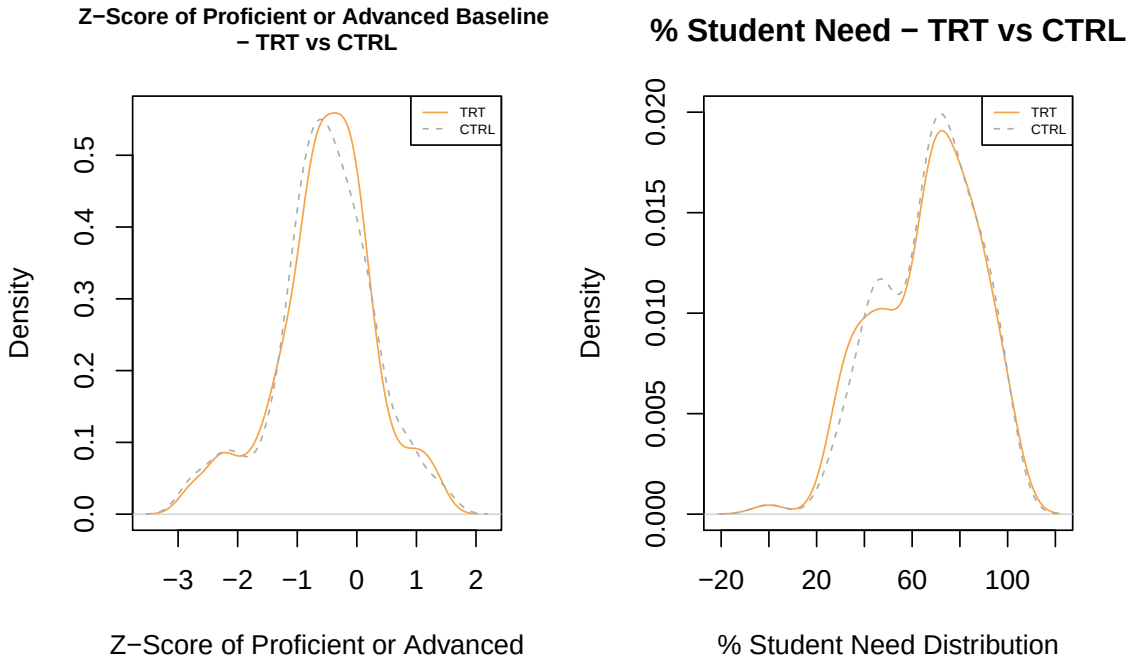

Figure 2: Baseline Year Density Plots Showing Math Scores and Percent Student Need Match between TRT and CTRL - Baseline

Further, figure 3 shows the density plot of the percentage of African American students for treatment grades overlayed on control grades, showing the closeness of the match obtained between Treatment and Control sets of grades in the baseline year, Baseline.

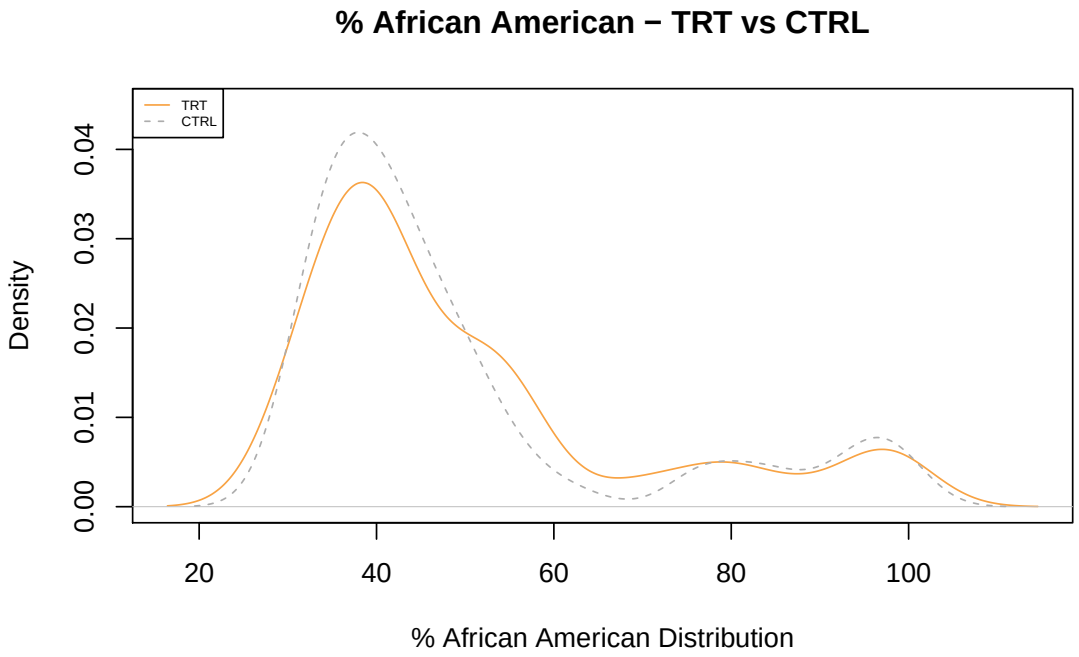

Figure 3: Baseline Year Density Plots Showing Percent ELL Match between TRT and CTRL - Baseline

Table 4 shows the difference of the means of Treatment versus Control in the baseline year, with accompanying p-values, for mean z-score of percent Proficient or Advanced, for percent of students receiving free or reduced lunch, and for percent of African American students. The large p-values show the differences between the Treatment and Control grades are not statistically significant.

	Mean(TRT)	SD(TRT)	Mean(CTRL)	SD(CTRL)	Estimate	P-Value	Effect Size
Z-Score of Proficient or Advanced - Baseline	-0.52	0.82	-0.54	0.84	0.02	0.85	0.02
Percent Free or Reduced Lunch	66.57	20.94	67.37	20.01	-0.80	0.76	-0.04
Percent African American	50.26	19.32	49.26	19.43	1.01	0.68	0.05

Table 4: Matching TRT and CTRL

3.4 Grade-Aggregated Analysis

Table 5 shows for both Treatment (TRT) and Control (CTRL) aggregation across grades of z-score distributions. The far right column also shows the average ST Math Progress for the TRT set.

	# Grades	# Schools	# Students	Z-Score	Percentile	ST Math Per Comp.
TRT.Baseline	125	67	10572	-0.52	34.51	–
TRT.18.19	125	67	10169	-0.32	40.58	51.8
TRT.Delta	–	–	–	0.21	6.07	–
CTRL.Baseline	125	111	9744	-0.54	34.04	–
CTRL.18.19	125	111	9694	-0.56	34.34	–
CTRL.Delta	–	–	–	-0.02	0.30	–

Table 5: All Grades Together Growth

Figure 4 shows the changes in mean z-scores of percent Proficient or Advanced for the grade-aggregated Treatment and Control sets.

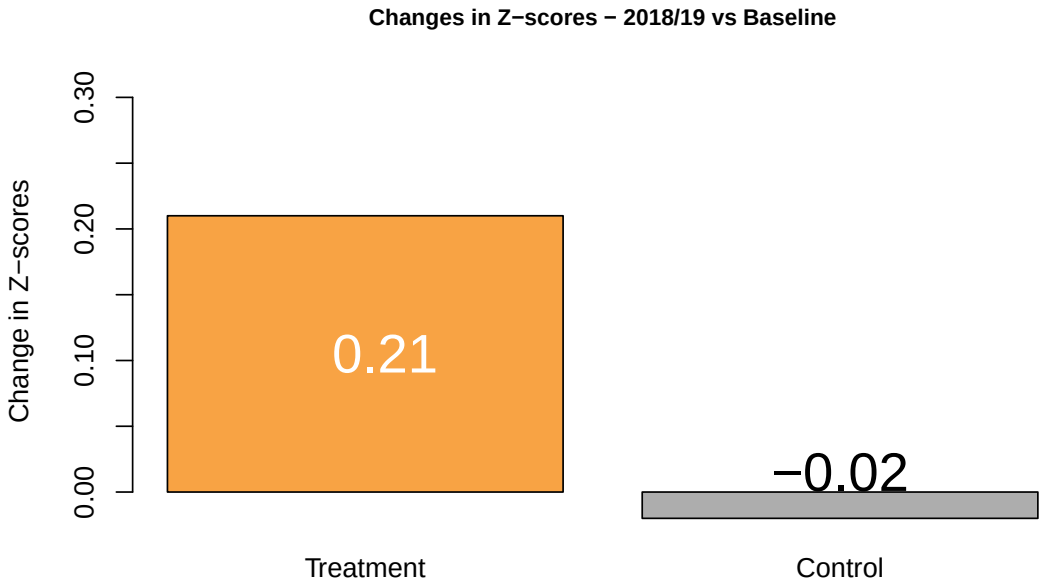

Figure 4: Changes in z-scores (See Section 3.1) for Grade-Aggregated TRT and CTRL datasets between Baseline and 2018/19

Further, Table 6 shows the statistics for the *differences* in changes between TRT and CTRL (Treatment - Control) for these same z-score changes as in the above figure. [1]

	Estimate	P-Value	Int.Low	Int.High
Z-Score	0.22	0.02*	0.03	0.42

Table 6: Statistics for the Differential Changes in Math Scores Growth (TRT - CTRL)

Finally, Figure 5 shows the changes in mean percentile ranking between TRT and CTRL.

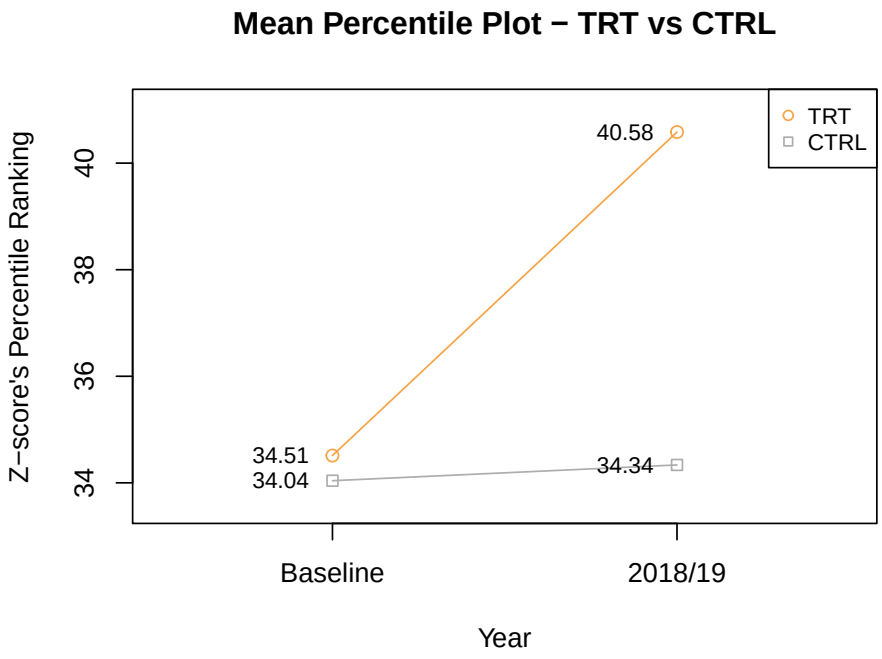

Figure 5: Changes in Percentile Ranking for TRT and CTRL Datasets between Baseline and 2018/19

[1] * statistically significant p<0.05

3.5 Grade-Level Analysis

3.5.1 Grade Level Result Tables

The following tables (Table 7, 8, and 9) present a disaggregation of results by grade level. The far right column in each table also shows the average ST Math Progress for the TRT set.

	# Grades	# Schools	# Students	Z-Score	Percentile	ST Math Per Prog.
TRT.Baseline	43	43	3592	-0.52	33.98	–
TRT.18.19	43	43	3417	-0.31	39.51	51.56
TRT.Delta	–	–	–	0.20	5.53	–
CTRL.Baseline	43	42	3160	-0.53	32.88	–
CTRL.18.19	43	42	3005	-0.63	32.56	–
CTRL.Delta	–	–	–	-0.09	-0.33	–

Table 7: Grade 3 - Yearly Math Performance and Counts for TRT and CTRL Datasets

	# Grades	# Schools	# Students	Z-Score	Percentile	ST Math Per Prog.
TRT.Baseline	42	42	3644	-0.47	35.36	–
TRT.18.19	42	42	3505	-0.28	41.98	52.08
TRT.Delta	–	–	–	0.19	6.62	–
CTRL.Baseline	42	42	3122	-0.52	34.31	–
CTRL.18.19	42	42	2935	-0.47	36.88	–
CTRL.Delta	–	–	–	0.04	2.57	–

Table 8: Grade 4 - Yearly Math Performance and Counts for TRT and CTRL Datasets

	# Grades	# Schools	# Students	Z-Score	Percentile	ST Math Per Prog.
TRT.Baseline	40	40	3336	-0.59	34.20	–
TRT.18.19	40	40	3247	-0.36	40.27	51.76
TRT.Delta	–	–	–	0.23	6.07	–
CTRL.Baseline	40	40	3462	-0.58	35.00	–
CTRL.18.19	40	40	3754	-0.58	33.58	–
CTRL.Delta	–	–	–	0.01	-1.42	–

Table 9: Grade 5 - Yearly Math Performance and Counts for TRT and CTRL Datasets

3.5.2 Grade-Level Analysis of Changes in Z-scores of Proficient or Advanced

Figure 6 shows the changes in the grade-mean z-scores of students for the TRT and CTRL datasets, disaggregated by grade:

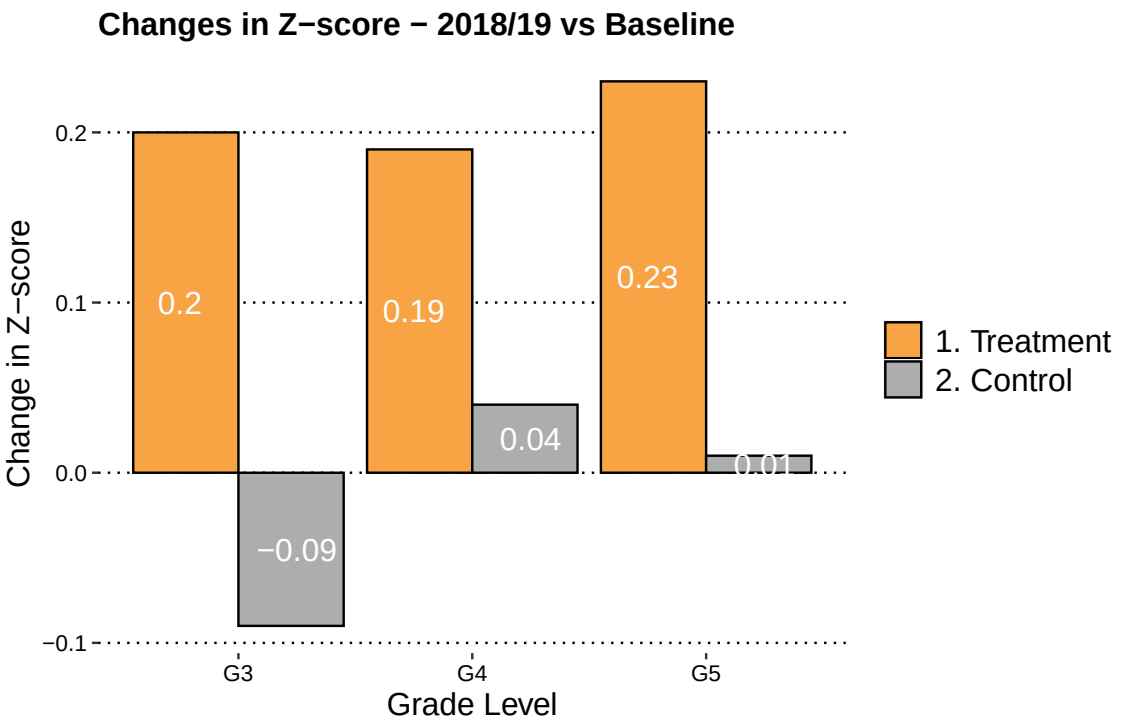

Figure 6: Changes in Grade-Mean Z-score (See Section 3.1) for TRT and CTRL Datasets between Baseline and 2018/19

Table 10 shows the statistics for the differences between TRT and CTRL (Treatment - Control) for these same z-score changes as shown in Figure 6.

	Estimate	P-Value	Int.Low	Int.High
Grade 3	0.30	0.07	-0.02	0.62
Grade 4	0.15	0.40	-0.20	0.50
Grade 5	0.22	0.21	-0.13	0.57

Table 10: Statistics for the Differential Changes in Z-scores (See Section 3.1) Growth, (TRT - CTRL)

4 Effect Size

The following table shows the effect sizes for z-score of Proficient or Advanced.

	Z-Score of Proficient or Advanced Effect Size
Grade 3	0.39
Grade 4	0.20
Grade 5	0.22
All Grades	0.26

Table 11: Cohen's d Effect Size

5 Findings Summary

USA grades 3, 4, and 5 using ST Math with a high percentage of African American students for the year 2018/19 averaged 23.5% ST Math Progress. 152/703 grades (22%) averaged covering more than 40% of ST Math content. Statistically significant differences were found in this analysis for grade-aggregated results. Looking at Table 6, a statistically significant differences was found for grade-aggregated z-score, with an estimate of 0.22 points favorable for the ST Math treatment set.

6 Confounders

Despite best efforts in minimizing confounders to the results of this analysis, there still remain a few input variables that could be significant in affecting differences of state test score outcomes between the Treatment and Control sets. One issue is the lack of randomization of grades chosen to receive the ST Math treatment. Instead of randomized selection, Treatment grades are self-selected. Self-selection can be an indication of districts or schools with a focus on math, an appetite for change, and with a spotlight on math training. Furthermore, not all grades using the ST Math program are chosen for analysis. Each grade must pass two specific filters to be considered for the Treatment set: the first being an enrollment filter of at least 85% of students in each grade using the program, and the second being a progress filter of at least 40% of the program completed on average by students in that grade. These filters might indicate relatively high-functioning schools with a team of relatively effective teachers in that grade, thus resulting in better instruction overall. A mitigation of this possible confounder is our selection of treatment groups on the grade level, rather than the teacher level, so there is no cherry picking of teachers: the full range of teachers in each grade is included. Moreover, the specific teachers may often be the same in the baseline year as in the current year, so the Treatment growth is not due to teacher differences. Finally, a possible confounder lies in the "business as usual" conditions at the matched control grades chosen for each analysis. It's unknown whether these control grades used other programs that could affect the comparison of the two sets of grades.

7 Lists of Schools

7.1 Treatment Schools

The following tables list the treatment schools and grades (after 85% enrollment and 40% progress filtering) used in the analysis.

PID	IID	State	District	School Name	GRADE
13588	TUS2S8	AL	NA	Tuskegee Public Elementary	5
70495	ZEL6YP	CA	Hawthorne	Zela Davis	5, 3
71463	BAR708	CA	Long Beach Unified	Barton Elementary	3
50110	SEQ7AS	CA	Oakland Unified	Sequoia Elementary	3
165442	CLO0GX	CT	Windsor School District	Clover Street School	5, 4, 3
165480	JOH0GX	CT	Windsor School District	John F. Kennedy School	4, 5
10007090	RAY2MC	FL	LEE	RAY V. POTTORF ELEMENTARY SCHOOL	4
199510	BAY2LM	FL	PINELLAS	BAY VISTA FUNDAMENTAL ELEM.	3, 4, 5
199912	LEA0RS	FL	PINELLAS	LEALMAN INNOVATION ACADEMY	5
200004	MOU2LN	FL	PINELLAS	MOUNT VERNON ELEMENTARY SCHOOL	5, 4, 3
200171	PER2LN	FL	PINELLAS	PERKINS ELEMENTARY SCHOOL	4, 3, 5
221890	LIV2BD	GA	GRIFFIN	LIVINGSTON ELEMENTARY SCHOOL	4
10902945	BET2C0	GA	GRIFFIN	BETHLEHEM ELEMENTARY SCHOOL	5, 4
220834	MOU2GD	GA	WEST GEORGIA	MOUNTAIN VIEW ELEMENTARY SCHOOL	5, 4, 3
243226	JOH41K	IA	Cedar Rapids CSD	Johnson Elementary School	5, 3
250542	FIL42O	IA	Davenport CSD	Fillmore Elementary School	5, 4, 3
250657	JEF42O	IA	Davenport CSD	Jefferson Elementary School	4, 3, 5
250683	MAD42O	IA	Davenport CSD	Madison Elementary School	5, 3, 4
250786	WAS42O	IA	Davenport CSD	Washington Elementary School	3, 5, 4
275554	EAR4OD	IL	City of Chicago SD 299	Earhart Elem Opt for Knowl School	4
276132	MCD4OE	IL	City of Chicago SD 299	McDowell Elem School	4, 3
269359	DRB4MV	IL	Evanston CCSD 65	Dr Bessie Rhodes Sch Global Studies	5
269476	WAL4N8	IL	Evanston CCSD 65	Walker Elem School	5
11918351	BRI5ER	LA	NA	BRICOLAGE ACADEMY	3
407343	JOH5ER	LA	ORLEANS PARISH	PHILLIS WHEATLEY COMMUNITY SCHOOL	4
407525	SAM5ER	LA	ORLEANS PARISH	SAMUEL J. GREEN CHARTER SCHOOL	4, 3
408385	MCD5ER	LA	ORLEANS PARISH	KIPP MORIAL	3
10914039	LAN5ER	LA	ORLEANS PARISH	LANGSTON HUGHES CHARTER ACADEMY	3
10914211	ART5ER	LA	ORLEANS PARISH	ARTHUR ASHE CHARTER SCHOOL	4
11560007	KIP5EX	LA	ORLEANS PARISH	KIPP CENTRAL CITY	3
441167	PHI0RT	MA	Boston	Phineas Bates	3
438093	HUN06E	MA	Brockton	Gilmore Elementary School	4
556047	PAR514	MO	COLUMBIA 93	PARKADE ELEM.	5
11816832	CRO0RT	MO	CROSSROADS CHARTER SCHOOLS	CROSSROADS - CENTRAL STREET	5
565751	MEA4XV	MO	GRANDVIEW C-4	MEADOWMERE ELEM.	3, 5
595770	NIC31M	MS	Picayune School District	Nicholson Elementary School	4, 5, 3
634699	GWB258	NC	Edgecombe County Public School	G W Bulluck Elementary	3, 4
634704	CAR25E	NC	Edgecombe County Public School	G W Carver Elementary	3
634819	MAR25G	NC	Edgecombe County Public School	Martin Millennium Academy	3, 5, 4
679651	SET0JK	NJ	South Orange-Maplewood	Seth Boyden Elementary Demonstration School	3, 4
683858	EVE0MH	NJ	Woodbury City	Evergreen Avenue Elementary School	5
683872	WES0MH	NJ	Woodbury City	West End Memorial Elementary School	3
711869	WEN6VI	NV	Achievement	Wendell P. Williams Elementary School	5
4038932	HPF0RS	NV	Achievement	H P Fitzgerald Elementary School	4, 3
745925	PS20RS	NY	NEW YORK CITY GEOGRAPHIC DISTRICT #17	PS 289 GEORGE V BROWER	5, 4, 3
10008989	AFE0V4	NY	NEW YORK CITY GEOGRAPHIC DISTRICT #19	ACHIEVEMENT FIRST EAST NEW YORK CHARTER SCHOOL	4
747143	PS10VG	NY	NEW YORK CITY GEOGRAPHIC DISTRICT #22	PS 119 AMERSFORT	4, 5
996447	BEL5WM	TX	KILLEEN ISD	BELLAIRE ELEM.	3, 4
996461	EAS5WM	TX	KILLEEN ISD	EAST WARD ELEM.	4, 5, 3
996588	PER5WM	TX	KILLEEN ISD	PERSHING PARK E	3, 5
996605	SUG5WM	TX	KILLEEN ISD	SUGAR LOAF ELEM	4, 3, 5
996617	WES5WM	TX	KILLEEN ISD	WEST WARD ELEM.	3
2897213	HAY5WM	TX	KILLEEN ISD	HAY BRANCH ELEM	4, 3
3244700	REE5WM	TX	KILLEEN ISD	REECES CREEK EL	5, 4, 3
4027634	CED5WM	TX	KILLEEN ISD	CEDAR VALLEY EL	3, 4

Table 12: Treatment Schools (TRT Dataset)

PID	IID	State	District	School Name	GRADE
4027646	BRO5WM	TX	KILLEEN ISD	BROOKHAVEN ELEM	5, 3, 4
4806571	TRI5WM	TX	KILLEEN ISD	TRIMMIER ELEM.	4, 5, 3
4941896	MAX5WM	TX	KILLEEN ISD	MAXDALE ELEM.	5, 4
5271864	IDU5WM	TX	KILLEEN ISD	IDUMA ELEM.	5, 4
5271876	IRA5WM	TX	KILLEEN ISD	IRA CROSS JR. E	3, 5
10002052	TIM5WM	TX	KILLEEN ISD	TIMBER RIDGE EL	3, 5, 4
10030724	SAE5WM	TX	KILLEEN ISD	SAEGERT ELEM.	4, 3, 5
11718474	HAY5WN	TX	KILLEEN ISD	HAYNES ELEM.	4
1078385	CHA1UG	VA	Mecklenburg County	Chase City Elementary	3
1078414	CLA1UG	VA	Mecklenburg County	Clarksville Elementary	4, 5
1078476	SOU1UL	VA	Mecklenburg County	South Hill Elementary	4, 5
1088421	FIS1UP	VA	Roanoke City	Fishburn Park Elementary	5

Table 13: Treatment Schools (TRT Dataset)

7.2 Control Schools

The following tables list the control schools and grades (matched control grades to treatment grades) used in the analysis.

PID	State	District	School Name	GRADE
15158	AL	NA	Forest Hill Elementary School	5
67723	CA	Compton Unified	Longfellow Elementary	5
68246	CA	Culver City Unified	El Rincon Elementary	3
104618	CA	Sacramento City Unified	John Bidwell Elementary	3
2106636	CA	Vallejo City Unified	Grace Patterson Elementary	3
163078	CT	East Hartford School District	Joseph O. Goodwin School	4
169450	CT	Hamden School District	Dunbar Hill School	5
169486	CT	Hamden School District	Helen Street School	3, 4, 5
181408	FL	ALACHUA	SIDNEY LANIER CENTER	5
183535	FL	BROWARD	CROISSANT PARK ELEMENTARY SCHOOL	5
10001515	FL	CLAY	ARGYLE ELEMENTARY SCHOOL	4, 5
185117	FL	COLUMBIA	MELROSE PARK ELEMENTARY SCHOOL	4
192380	FL	HILLSBOROUGH	KENLY ELEMENTARY SCHOOL	4
192823	FL	HILLSBOROUGH	ROLAND PARK K-8 MAGNET SCHOOL	3
4811411	FL	HILLSBOROUGH	RAMPELLO K-8 MAGNET SCHOOL	4
194780	FL	LEON	WOODVILLE SCHOOL	3
11077141	FL	LEON	J MICHAEL CONLEY ELEM SCHOOL AT SOUTHWOOD	3
198803	FL	PALM BEACH	BANYAN CREEK ELEMENTARY SCHOOL	5
221498	GA	CHATTAHOOCHEE-FLINT	GENTIAN ELEMENTARY SCHOOL	5
221785	GA	CHATTAHOOCHEE-FLINT	WADDELL ELEMENTARY SCHOOL	4
3327235	GA	FIRST DISTRICT	SCREVEN COUNTY ELEMENTARY SCHOOL	4
3046974	GA	GRIFFIN	NEWTON COUNTY THEME SCHOOL AT FICQU	5
210114	GA	METRO	TEASLEY ELEMENTARY SCHOOL	4
217552	GA	SOUTHWEST GEORGIA	SOUTHSIDE ELEMENTARY SCHOOL	3
243197	IA	Cedar Rapids CSD	Hoover Elementary School	5
247806	IA	Des Moines Independent CSD	Edmunds Fine Arts Academy	5
248185	IA	Des Moines Independent CSD	Monroe Elementary School	5
248202	IA	Des Moines Independent CSD	Moulton Elementary School	3
241759	IA	Iowa City CSD	Grant Wood Elementary School	4
241826	IA	Iowa City CSD	Kirkwood Elementary School	3, 5
241852	IA	Iowa City CSD	Mark Twain Elementary	3, 4, 5
231039	IA	Waterloo CSD	Fred Becker Elementary School	3, 4
231120	IA	Waterloo CSD	Irving Elementary School	4
231194	IA	Waterloo CSD	Lowell Elementary School	3
275970	IL	City of Chicago SD 299	Kipling Elem School	4
4875704	IL	City of Chicago SD 299	Locke A Elem Charter Academy	3
11719208	IL	City of Chicago SD 299	STEM Magnet Academy Elem	5
1529205	IL	ESD 159	Woodgate Elem School	4
4914582	IL	Springfield SD 186	Lindsay School	5
398209	LA	ASSUMPTION PARISH	BELLE ROSE PRIMARY SCHOOL	4
399576	LA	CADDO PARISH	E.B. WILLIAMS STONER HILL ELEMENTARY SCH	4
401193	LA	EAST BATON ROUGE PARISH	BERNARD TERRACE ELEMENTARY SCHOOL	3
401351	LA	EAST BATON ROUGE PARISH	CRESTWORTH ELEMENTARY SCHOOL	3
401739	LA	EAST BATON ROUGE PARISH	PARK ELEMENTARY SCHOOL	3
402070	LA	EAST BATON ROUGE PARISH	BATON ROUGE CENTER FOR VISUAL AND PERFOR	3
403957	LA	JEFFERSON PARISH	G.T. WOODS ELEMENTARY SCHOOL	4
407915	LA	ORLEANS PARISH	HARRIET TUBMAN CHARTER SCHOOL	3
439968	MA	Boston	Charles H Taylor	4
440943	MA	Boston	Maurice J Tobin	3
573875	MO	CARUTHERSVILLE 18	CARUTHERSVILLE ELEMENTARY	3
578100	MO	HAZELWOOD	GARRETT ELEM.	5
579489	MO	PATTONVILLE R-III	ROBERT DRUMMOND ELEM.	5
579611	MO	PATTONVILLE R-III	WILLOW BROOK ELEM.	5
595835	MS	Picayune School District	West Side Elementary School	5
11443681	MS	Vicksburg Warren School District	Bovina Elementary School	4

Table 14: Matched Control Schools (CTRL Dataset)

PID	State	District	School Name	GRADE
598710	MS	Yazoo Co School District	Bentonia Gibbs School	3
641460	NC	Charlotte-Mecklenburg Schools	Oakdale Elementary	4
632770	NC	Cumberland County Schools	Cumberland Road Elementary	3, 4
633102	NC	Cumberland County Schools	Westarea Elementary	3
633229	NC	Cumberland County Schools	Lucile Souders Elementary	5
635667	NC	Franklin County Schools	Laurel Mill Elementary	3
677287	NJ	Bloomfield Twp	Carteret Elementary School	3
699584	NJ	Franklin Twp	Macafee Road School	4
686032	NJ	Hamilton Twp	Greenwood Elementary School	5
1552082	NJ	Winslow Twp	Winslow Township Elementary School Four	3
711778	NV	Achievement	Kermit R Booker Sr Elementary School	3, 4
4747262	NV	Achievement	West Prepatory Academy at Charles I West Hall Elem	5
780913	NY	MOUNT VERNON SCHOOL DISTRICT	HOLMES SCHOOL	5
10008915	NY	NEW YORK CITY GEOGRAPHIC DISTRICT # 5	THURGOOD MARSHALL ACADEMY LOWER SCHOOL	5
4923985	NY	NEW YORK CITY GEOGRAPHIC DISTRICT #14	BROOKLYN CHARTER SCHOOL (THE)	3, 4
5096157	NY	NEW YORK CITY GEOGRAPHIC DISTRICT #17	EXPLORE CHARTER SCHOOL	4
11561051	NY	NEW YORK CITY GEOGRAPHIC DISTRICT #19	HYDE LEADERSHIP CHARTER SCHOOL - BROOKLYN	4
3248031	TX	AMARILLO ISD	CARVER ELEM. AC	3, 4
2109262	TX	ARLINGTON ISD	SHERROD ELEM.	3
3250711	TX	ARLINGTON ISD	FARRELL ELEM.	4
4757047	TX	ARLINGTON ISD	WEST ELEM.	3
1033531	TX	BEAUMONT ISD	GUESS ELEM.	5
10019718	TX	CROWLEY ISD	SUE CROUCH INTE	5
4020765	TX	DALLAS ISD	HARRY STONE MON	4
1010307	TX	DUNCANVILLE ISD	S. GUS ALEXANDE	3
3048166	TX	DUNCANVILLE ISD	H. BOB DANIEL S	5
1052501	TX	EVERMAN ISD	BISHOP ELEM.	4
4452273	TX	FORT BEND ISD	WALTER MOSES BU	3, 3, 4
10912861	TX	FORT BEND ISD	MARY AUSTIN HOL	5
11448409	TX	FORT BEND ISD	JUAN SEGUIN ELE	4
4919439	TX	FORT WORTH ISD	LOWERY ROAD	4
1010606	TX	GARLAND ISD	HANDLEY ELEM.	3
10008111	TX	GARLAND ISD	GLEN COUCH ELEM	4
1024255	TX	HOUSTON ISD	SMITH ELEM.	5
1024889	TX	HOUSTON ISD	KELSO ELEM.	5
1025314	TX	HOUSTON ISD	MONTGOMERY ELEM	4
1025807	TX	HOUSTON ISD	RODERICK R. PAI	3
1826285	TX	HOUSTON ISD	BELL ELEM.	4
4016087	TX	HOUSTON ISD	SHADOWBRIAR ELE	4
1058713	TX	HUNTSVILLE ISD	SAMUEL HOUSTON	4
1040699	TX	JEFFERSON ISD	JEFFERSON ELEM.	3
11452280	TX	JUDSON ISD	JAMES L. MASTER	3
5271852	TX	LEWISVILLE ISD	ROCKBROOK ELEM.	5
994944	TX	LUFKIN ISD	BROOKHOLLOW ELE	5
2128543	TX	MESQUITE ISD	PRICE ELEM.	3
4807226	TX	MESQUITE ISD	SMITH ELEM.	4
1011715	TX	RICHARDSON ISD	HAMILTON PARK P	5
11080382	TX	SHELDON ISD	H.M. CARROLL EL	3
4010289	TX	STAFFORD MSD	STAFFORD INTERM	5
1050840	TX	TYLER ISD	CALDWELL ARTS A	5
1050981	TX	TYLER ISD	WOODS ELEM.	3
1084334	VA	Chesapeake City	G.A. Treakle Elementary	5
1072006	VA	Chesterfield County	J.A. Chalkley Elementary	3
1085182	VA	Hampton City	Booker Elementary	4
1079145	VA	Nottoway County	Nottoway Intermediate	5
1079640	VA	Pittsylvania County	Mount Airy Elementary	5
1089308	VA	Virginia Beach City	Lynnhaven Elementary	4

Table 15: Matched Control Schools (CTRL Dataset)