USA District Like Mine (High Student Need) 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

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Abstract

This analysis evaluates grades using ST Math with high student need 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 113 grades, consisting of grades 3, 4, and 5 at 81 schools, with an average baseline z-score of -0.61. Refer to Figures 2 and 3 for the math performance and demographic distributions. They were matched to 113 similar, randomly selected control grades at 106 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 0.44 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 high student need 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 high student need 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).

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 high student need 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)

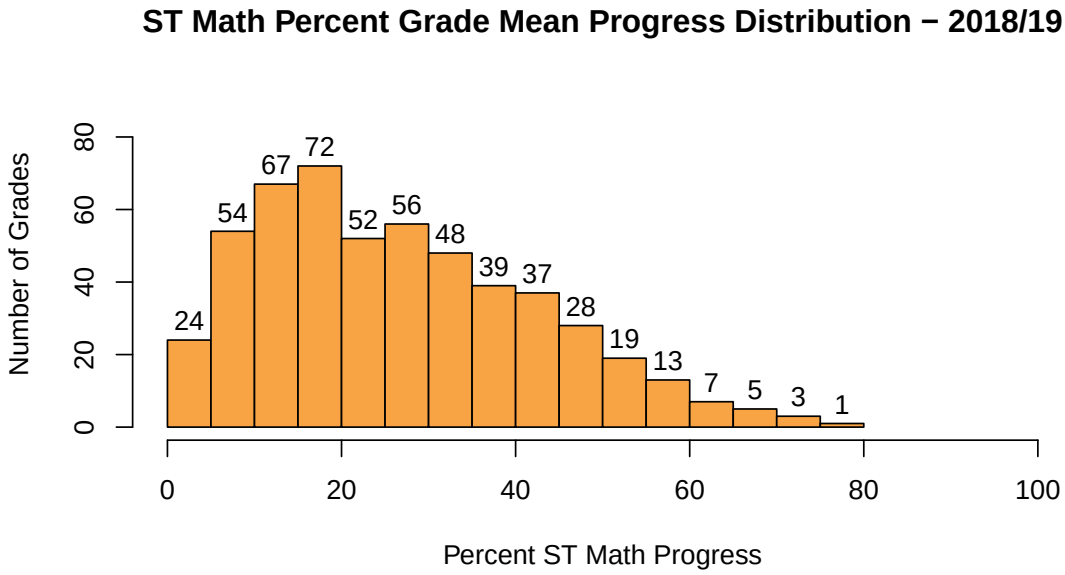

Figure 1: Histogram of ST Math Percent Progress for $\geq$ 85% Enrollment Grades 2018/19

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	0.8	75.5	26.8	15.8

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

Grades with >= 85% Enrollment:	525
Grades with in addition >= 40% Progress:	113

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	307	267	262	836
ST Math Using Schools	306	267	262	435
ST Math Students	21999	18760	19354	60113
ST Math Grades (Enroll >= 85%)	186	178	161	525
TRT Grades (Enroll >= 85% & Prog >= 40%)	39	40	34	113
TRT Schools (Enroll >= 85% & Prog >= 40%)	39	40	34	81
TRT Students (Enroll >= 85% & Prog >= 40%)	3408	3155	2869	9432
CTRL Grades	39	40	34	113
CTRL Schools	38	40	34	106
CTRL Students	3011	2689	2554	8254

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.

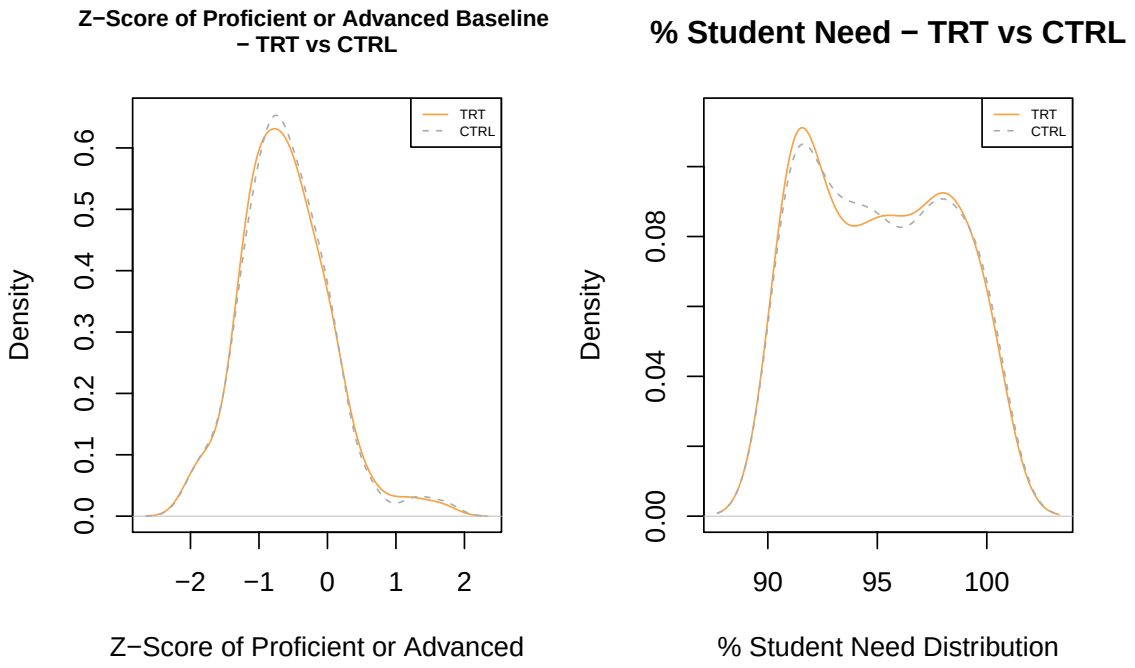

Figure 2: Baseline Year Density Plots Showing Math Scores and Percent Student Need Match between TRT and CTRL - Baseline

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 and for percent of students receiving free or reduced lunch. 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	-0.61	0.64	-0.60	0.65	-0.00	0.96	-0.01
Percent Free or Reduced Lunch	95.09	3.14	95.12	3.14	-0.04	0.93	-0.01

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	113	81	9207	-0.61	29.81	–
TRT.18.19	113	81	8773	-0.32	39.22	50.56
TRT.Delta	–	–	–	0.29	9.41	–
CTRL.Baseline	113	106	8631	-0.60	29.90	–
CTRL.18.19	113	106	8254	-0.75	26.77	–
CTRL.Delta	–	–	–	-0.15	-3.13	–

Table 5: All Grades Together Growth

Figure 3 shows the changes in mean z-scores of percent Proficient or Advanced for the grade-aggregated Treatment and Control sets.

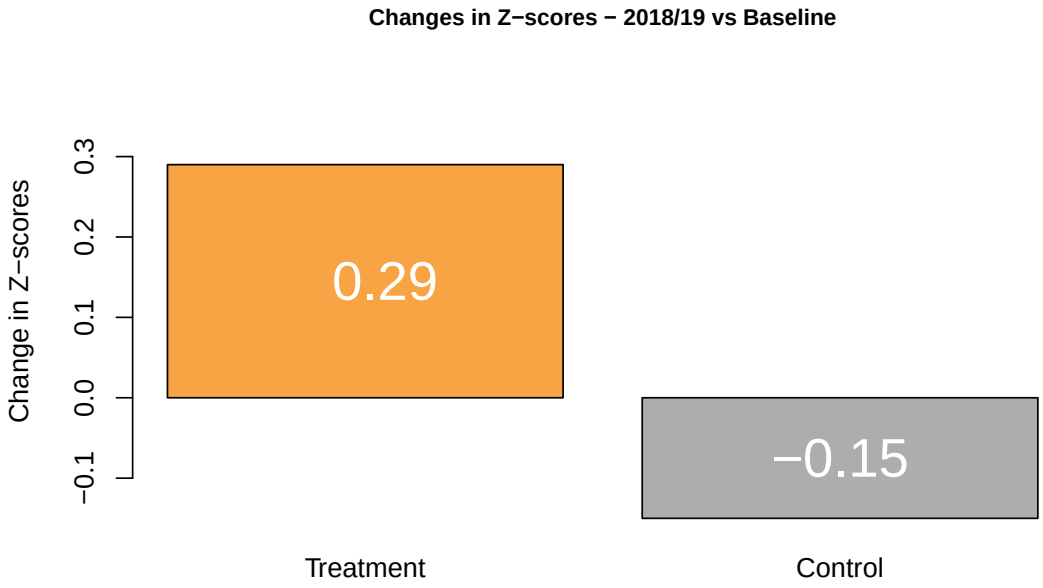

Figure 3: Changes in z-scores (See Section 3.1) for Grade-Aggregated TRT and CTRL datasets between Baseline and 2018/19

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	0.44	0.00*	0.26	0.61

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

Finally, Figure 4 shows the changes in mean percentile ranking between TRT and CTRL.

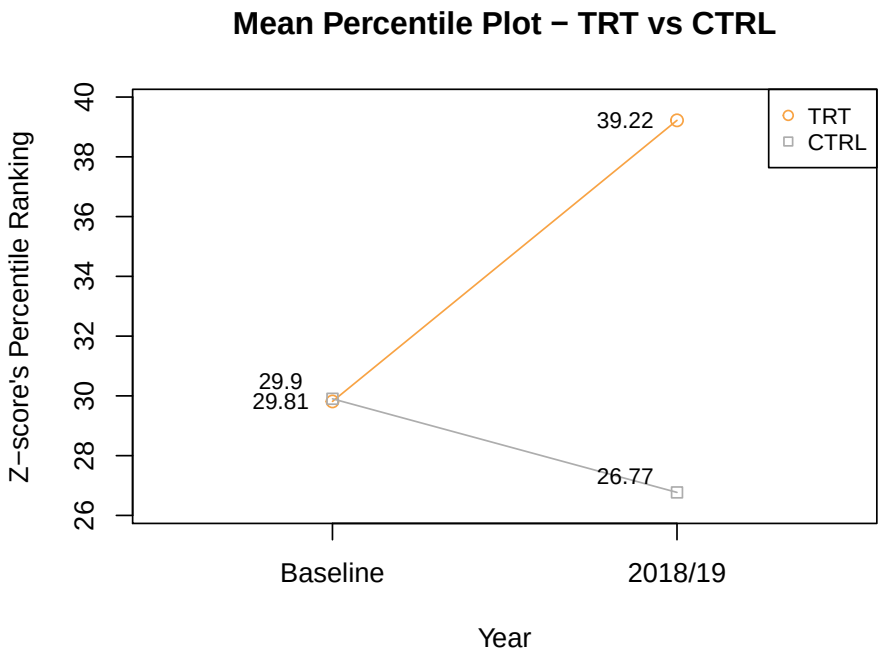

Figure 4: Changes in Percentile Ranking for TRT and CTRL Datasets between Baseline and 2018/19

[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	39	39	3361	-0.59	29.97	–
TRT.18.19	39	39	3194	-0.10	46.49	50.75
TRT.Delta	–	–	–	0.49	16.51	–
CTRL.Baseline	39	38	3105	-0.58	30.26	–
CTRL.18.19	39	38	3011	-0.74	27.62	–
CTRL.Delta	–	–	–	-0.17	-2.64	–

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	40	40	3041	-0.64	29.80	–
TRT.18.19	40	40	2929	-0.43	35.88	50.73
TRT.Delta	–	–	–	0.21	6.07	–
CTRL.Baseline	40	40	2982	-0.65	29.55	–
CTRL.18.19	40	40	2689	-0.85	23.48	–
CTRL.Delta	–	–	–	-0.20	-6.07	–

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	34	34	2805	-0.60	29.65	–
TRT.18.19	34	34	2650	-0.44	34.82	50.13
TRT.Delta	–	–	–	0.16	5.18	–
CTRL.Baseline	34	34	2544	-0.59	29.91	–
CTRL.18.19	34	34	2554	-0.65	29.68	–
CTRL.Delta	–	–	–	-0.06	-0.24	–

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

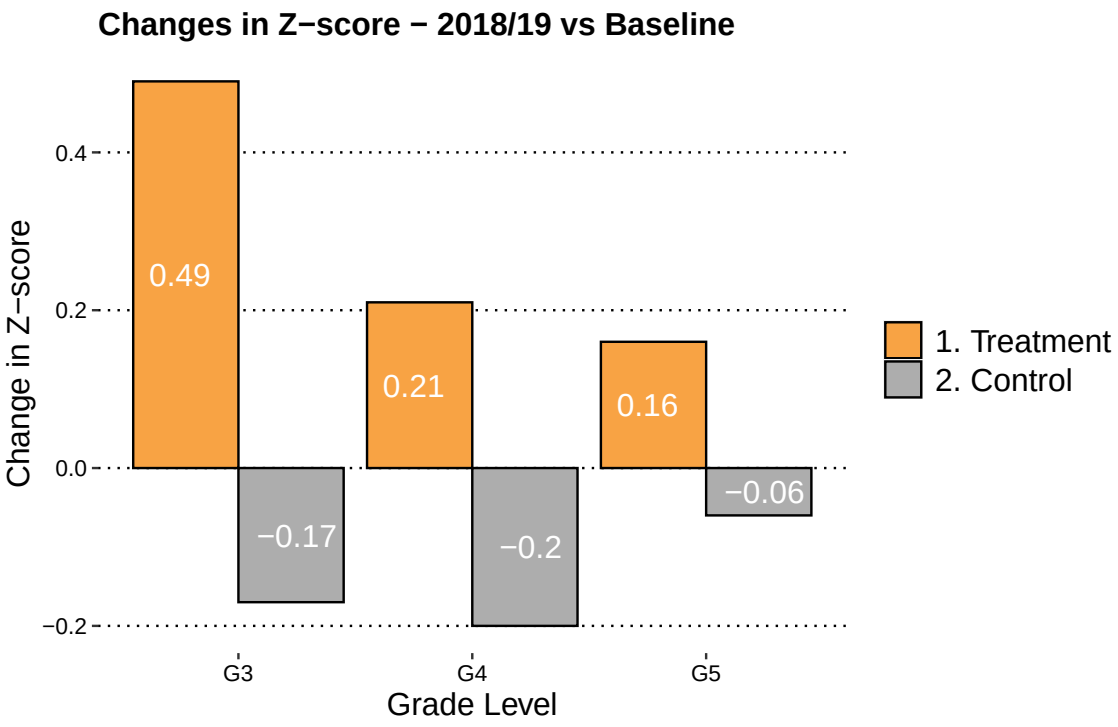

Figure 5: Changes in Grade-Mean Z-score (See Section 3.1) for TRT and CTRL Datasets between Baseline and 2018/19

Table 10 shows the statistics for the differences between TRT and CTRL (Treatment - Control) for these same z-score changes as shown in Figure 5.

	Estimate	P-Value	Int.Low	Int.High
Grade 3	0.66	0.00*	0.33	0.98
Grade 4	0.41	0.01*	0.09	0.72
Grade 5	0.22	0.09	-0.04	0.47

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	1.28
Grade 4	0.51
Grade 5	0.37
All Grades	0.67

Table 11: Cohen's d Effect Size

5 Findings Summary

USA grades 3, 4, and 5 using ST Math with high student need for the year 2018/19 averaged 21.4% ST Math Progress. 130/836 grades (16%) averaged covering more than 40% of ST Math content. Statistically significant differences were found in this analysis for both grade-aggregated and individual grade levels. Looking at Table 6, a statistically significant differences was found for grade-aggregated z-score, with an estimate of 0.44 points favorable for the ST Math treatment set. Furthermore, referring to table 10, grades 3 and 4 ST math treatment sets outperformed their matched controls for z-scores with statistically significant differences of 0.66 and 0.41, respectively.

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
39403	MEL6KY	AZ	Glendale Elementary District	Melvin E Sine School	5, 4
10912940	ORA75S	CA	Anaheim Elementary	Orange Grove Elementary	3
66171	MOU72Q	CA	Azusa Unified	Mountain View Elementary	3
95017	CAR6ZQ	CA	Buena Park Elementary	Carl E. Gilbert Elementary	3
110318	LEX73L	CA	Cajon Valley Union	Lexington Elementary	4
68832	COR72T	CA	El Monte City	Cortada Elementary	5, 4
68856	GID72T	CA	El Monte City	Gidley Elementary	4
68868	ANN72T	CA	El Monte City	Legore Elementary	5, 3
68894	NEW72T	CA	El Monte City	New Lexington Elementary	5
68911	POT72T	CA	El Monte City	Potrero Elementary	4, 5, 3
68947	SHI72T	CA	El Monte City	Shirpser Elementary	3, 4, 5
68961	WIL72T	CA	El Monte City	Wilkerson Elementary	3
68973	WRI72T	CA	El Monte City	Wright Elementary	5
135227	CAP0RT	CA	Empire Union Elementary	Capistrano Elementary	4
4925153	GRE0RX	CA	Fresno Unified	David L. Greenberg Elementary	3, 4, 5
96097	CLI75W	CA	Garden Grove Unified	Clinton Elementary	5
70495	ZEL6YP	CA	Hawthorne	Zela Davis	5, 3
11132313	KIP6Y3	CA	KIPP Raices Academy	KIPP Raices Academy	4
60531	TRI7DH	CA	Klamath-Trinity Joint Unified	Trinity Valley Elementary	3
71528	BUR709	CA	Long Beach Unified	Bobbie Smith Elementary	3
71803	KIN708	CA	Long Beach Unified	King Elementary	5
71839	ROB708	CA	Long Beach Unified	Olivia Nieto Herrera Elementary	4
71841	ABR709	CA	Long Beach Unified	Lincoln Elementary	3
72053	SIG703	CA	Long Beach Unified	Signal Hill Elementary	4
72144	DAN709	CA	Long Beach Unified	Webster Elementary	3, 4
4286309	JAC708	CA	Long Beach Unified	Robinson Academy	5
5345776	CES708	CA	Long Beach Unified	Chavez Elementary	4
72780	HAR6Z0	CA	Los Angeles Unified	Harbor City Elementary	3
73411	NIN6Y0	CA	Los Angeles Unified	Ninety-Sixth Street Elementary	3
73538	STA0RS	CA	Los Angeles Unified	State Street Elementary	5, 3
74001	PAR6Y0	CA	Los Angeles Unified	Parmelee Avenue Elementary	3
76231	GAR0RT	CA	Los Angeles Unified	Garvanza Elementary	4, 5, 3
77338	RES71P	CA	Los Angeles Unified	Reseda Elementary	3
77730	HER71Q	CA	Los Angeles Unified	Herrick Avenue Elementary	5, 3
10013702	PAN0RS	CA	Los Angeles Unified	Panorama City Elementary	3
4875895	REA75A	CA	Newport-Mesa Unified	Everett A. Rea Elementary	5
49965	GAR7AS	CA	Oakland Unified	Garfield Elementary	3
4949381	INT7AS	CA	Oakland Unified	International Community	5
4949496	ACO7AU	CA	Oakland Unified	ACORN Woodland Elementary	4, 3
4919180	RAM0RT	CA	Oxnard	Ramona Elementary	4
130198	MAC7C3	CA	Pajaro Valley Unified	T. S. MacQuiddy Elementary	5
80335	ABR700	CA	Paramount Unified	Abraham Lincoln	5
80907	LEX72W	CA	Pomona Unified	Lexington Elementary	3
138358	ROC0RS	CA	Porterville Unified	Roche Elementary	4
102476	HIG74Y	CA	Riverside Unified	Highgrove Elementary	3, 5
102555	LON74Y	CA	Riverside Unified	Longfellow Elementary	5, 3
2068814	CAR75I	CA	Santa Ana Unified	Carl Harvey Elementary	4
11134206	HER75I	CA	Santa Ana Unified	Heroes Elementary	4
119869	AUG7CG	CA	Stockton Unified	August Elementary	3
119998	GRU7CG	CA	Stockton Unified	Grunsky Elementary	4
120234	VIC7CG	CA	Stockton Unified	Victory Elementary	3
2105072	KIN7CG	CA	Stockton Unified	King Elementary	4
3401439	WIL7CG	CA	Stockton Unified	Wilson Elementary	5
11720051	WEB78A	CA	W.E.B. DuBois Public Charter	W.E.B. DuBois Public Charter	5

Table 12: Treatment Schools (TRT Dataset)

PID	IID	State	District	School Name	GRADE
146355	BAR0RX	CO	DENVER COUNTY 1	BARNUM ELEMENTARY SCHOOL	3, 4, 5
10007090	RAY2MC	FL	LEE	RAY V. POTTORF ELEMENTARY SCHOOL	4
250487	BUC42O	IA	Davenport CSD	Buchanan Elementary School	3, 4
277526	GUN4OF	IL	City of Chicago SD 299	Gunsaulus Elem Scholastic Academy	5
4291330	CHA4OC	IL	City of Chicago SD 299	Chavez Elem Multicultural Acad Ct	3
1540637	LOR4N0	IL	SD U-46	Lords Park Elem School	3
407343	JOH5ER	LA	ORLEANS PARISH	PHILLIS WHEATLEY COMMUNITY SCHOOL	4
407525	SAM5ER	LA	ORLEANS PARISH	SAMUEL J. GREEN CHARTER SCHOOL	4, 3
10914039	LAN5ER	LA	ORLEANS PARISH	LANGSTON HUGHES CHARTER ACADEMY	3
10914211	ART5ER	LA	ORLEANS PARISH	ARTHUR ASHE CHARTER SCHOOL	4
438093	HUN06E	MA	Brockton	Gilmore Elementary School	4
2907076	COM054	MA	Lawrence	Community Day Arlington	3, 4
3245546	HAN4VC	MO	HANCOCK PLACE	HANCOCK PLACE ELEM.	5, 4
595770	NIC31M	MS	Picayune School District	Nicholson Elementary School	4, 5, 3
703874	BAR6PY	NM	Albuquerque Public Schools	Barcelona Elementary School	4
704220	ALA6PZ	NM	Albuquerque Public Schools	Alameda Elementary School	4
1523469	DOL6PY	NM	Albuquerque Public Schools	Dolores Gonzales Elementary School	4, 5
711869	WEN6VI	NV	Achievement	Wendell P. Williams Elementary School	5
712148	SUN6VI	NV	Achievement	Sunrise Acres Elementary School	3
712277	WHI0RV	NV	Achievement	Whitney Elementary School	4, 5
3401661	RIC6VJ	NV	Achievement	Richard J Rundle Elementary School	5
742935	PS10RW	NY	NEW YORK CITY GEOGRAPHIC DISTRICT # 6	PS 152 DYCKMAN VALLEY	5
1064499	ACA6HO	UT	Granite District	Academy Park School	4
1064970	PHI6HO	UT	Granite District	Philo T. Farnsworth School	4, 5, 3
1528213	MEA6HN	UT	Salt Lake District	Meadowlark School	3
1133076	MIT43S	WI	Milwaukee	Mitchell Elementary	4
1133155	VIE43S	WI	Milwaukee	Vieau Elementary	4
10010607	ROG43S	WI	Milwaukee	Rogers Street Academy	4

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
13473	AL	NA	Fort Deposit Elementary School	5
45543	AZ	Eloy Elementary District	Eloy Intermediate School	5
40775	AZ	Phoenix Elementary District	Maie Bartlett Heard School	4
91853	CA	Alisal Union	Alisal Community	3
3049093	CA	Alisal Union	Virginia Rocca Barton Elementary	5
10913621	CA	Alum Rock Union Elementary	Adelante Dual Language Academy	5
4889406	CA	Aspire Monarch Academy	Aspire Monarch Academy	4
90732	CA	Atwater Elementary	Bellevue Elementary	5
90770	CA	Atwater Elementary	Shaffer Elementary	5
62101	CA	Bakersfield City	Horace Mann Elementary	5
62204	CA	Bakersfield City	Munsey Elementary	5
62228	CA	Bakersfield City	Bessie E. Owens Primary	3
62278	CA	Bakersfield City	Voorhies Elementary	3
66274	CA	Baldwin Park Unified	Central Elementary	4
1169362	CA	Brawley Elementary	J. W. Oakley Elementary	3
107440	CA	Colton Joint Unified	Crestmore Elementary	3
67876	CA	Compton Unified	Tibby Elementary	5
137847	CA	Ducor Union Elementary	Ducor Union Elementary	3
90926	CA	El Nido Elementary	El Nido Elementary	4
103028	CA	Elk Grove Unified	Charles E. Mack Elementary	3
57405	CA	Fresno Unified	Kirk Elementary	5
57730	CA	Fresno Unified	Turner Elementary	3
62929	CA	Greenfield Union	Fairview Elementary	4
62967	CA	Greenfield Union	Planz Elementary	4
70366	CA	Hacienda la Puente Unified	Workman Elementary	4
58150	CA	Kings Canyon Joint Unified	McCord Elementary	3
71243	CA	Lennox	Buford Elementary	5
138102	CA	Lindsay Unified	Reagan Elementary	5
2222618	CA	Lodi Unified	Clairmont Elementary	3
73318	CA	Los Angeles Unified	Liberty Boulevard Elementary	4
75835	CA	Los Angeles Unified	Lorena Street Elementary	4
75914	CA	Los Angeles Unified	Second Street Elementary	4
77962	CA	Los Angeles Unified	Sylmar Elementary	3, 5
10009919	CA	Los Angeles Unified	Aurora Elementary	3
91140	CA	Los Banos Unified	R. M. Miano Elementary	4
88557	CA	Madera Unified	George Washington Elementary	4
88583	CA	Madera Unified	James Monroe Elementary	4
4430835	CA	McGill School of Success	McGill School of Success	3
102012	CA	Moreno Valley Unified	Sunnymead Elementary	3
1549750	CA	Mountain Empire Unified	Potrero Elementary	3
108339	CA	Ontario-Montclair	Euclid Elementary	3, 5
108389	CA	Ontario-Montclair	Lehigh Elementary	5
11448459	CA	Palm Springs Unified	Cabot Yerxa Elementary	3
138205	CA	Palo Verde Union Elementary	Palo Verde Elementary	3, 4
102270	CA	Perris Elementary	Good Hope Elementary	4
1558531	CA	Pond Union Elementary	Pond Elementary	4
90407	CA	Round Valley Unified	Round Valley Elementary	5
104797	CA	Sacramento City Unified	Nicholas Elementary	4
104838	CA	Sacramento City Unified	Parkway Elementary	3
104840	CA	Sacramento City Unified	Peter Burnett Elementary	5
108999	CA	San Bernardino City Unified	Ramona-Alessandro Elementary	5
109058	CA	San Bernardino City Unified	Bradley Elementary	5
109084	CA	San Bernardino City Unified	Manuel A. Salinas Creative Arts Elementary	3, 3
10004737	CA	San Bernardino City Unified	Roger Anton Elementary	3
11927508	CA	San Bernardino City Unified	Dr. Mildred Dalton Henry Elementary	5

Table 14: Matched Control Schools (CTRL Dataset)

PID	State	District	School Name	GRADE
102751	CA	San Jacinto Unified	San Jacinto Elementary	5
58631	CA	Sanger Unified	Centerville Elementary	3
58643	CA	Sanger Unified	Del Rey Elementary	3
124606	CA	Santa Barbara Unified	Harding University Partnership	4
128858	CA	Santa Clara Unified	Scott Lane Elementary	3
75445	CA	Santa Monica Boulevard Community Charter	Santa Monica Boulevard Community Charter	4
140478	CA	Santa Paula Unified	Grace Thille Elementary	3, 5
10029268	CA	Soledad Unified	Jack Franscioni Elementary	3
63868	CA	Standard Elementary	Standard Elementary	5
138669	CA	Traver Joint Elementary	Traver Elementary	5
138724	CA	Tulare City	Lincoln Elementary	4
73655	CA	Val Verde Unified	Mary McLeod Bethune Elementary	4
102828	CA	Val Verde Unified	Val Verde Elementary	3
147220	CO	DENVER COUNTY 1	CHARLES M. SCHENCK (CMS) COMMUNITY SCHOOL	5
147440	CO	DENVER COUNTY 1	CASTRO ELEMENTARY SCHOOL	3, 4
182220	FL	BREVARD	ENDEAVOUR ELEMENTARY SCHOOL	4
247973	IA	Des Moines Independent CSD	Howe Elementary	3
248070	IA	Des Moines Independent CSD	Lovejoy Elementary School	4
2107563	IL	City of Chicago SD 299	Cardenas Elem School	3
263707	IL	DePue USD 103	DePue Elem School	5
318986	IL	Springfield SD 186	Harvard Park Elem School	3
401739	LA	EAST BATON ROUGE PARISH	PARK ELEMENTARY SCHOOL	3
402898	LA	EVANGELINE PARISH	VILLE PLATTE ELEMENTARY SCHOOL	4
403957	LA	JEFFERSON PARISH	G.T. WOODS ELEMENTARY SCHOOL	4
404494	LA	JEFFERSON PARISH	WILLIAM HART ELEMENTARY SCHOOL	3
410649	LA	PLAQUEMINES PARISH	SOUTH PLAQUEMINES ELEMENTARY SCHOOL	4
425890	MA	Springfield	Elias Brookings	4
425943	MA	Springfield	Hiram L Dorman	4
426040	MA	Springfield	Lincoln	3
573796	MO	LUTIE R-VI	LUTIE ELEM.	4
12034697	MO	NORTHEAST RANDOLPH CO. R-IV	NORTHEAST ELEM.	5
596748	MS	South Delta School District	South Delta Elementary School	3
597766	MS	Vicksburg Warren School District	Bowmar Avenue School	5
4876332	MS	Vicksburg Warren School District	Warren Central Intermediate	4
4839815	NM	Estancia Municipal Schools	Upper Elementary School	5
3326671	NM	Los Lunas Public Schools	Tome Elementary School	4
704995	NM	Roswell Independent Schools	Pecos Elementary School	4
1486691	NM	Taos Municipal Schools	Enos Garcia Elementary School	4
711338	NV	Achievement	Bertha Ronzone Elementary School	4
711821	NV	Achievement	Lincoln Elementary School	3
712033	NV	Achievement	Rex Bell Elementary School	5
4919893	NV	Achievement	William K. Moore Elementary School	5
713740	NV	Washoe	Rita Cannan Elementary School	5
732710	NY	ROCHESTER CITY SCHOOL DISTRICT	SCHOOL 4-GEORGE MATHER FORBES	5
1065003	UT	Granite District	Redwood School	4
1065211	UT	Granite District	Western Hills School	3
1067477	UT	Nebo District	Goshen School	3
1068134	UT	Ogden City District	Odyssey School	5
1068213	UT	Ogden City District	James Madison School	4
1117266	WI	Green Bay Area Public	Fort Howard Elementary	4
1117278	WI	Green Bay Area Public	Howe Elementary	4
11726407	WI	Milwaukee Scholars Charter School	Milwaukee Scholars Charter School	4

Table 15: Matched Control Schools (CTRL Dataset)