Texas Math Outcomes Analysis 2015/16

Grade Levels: 3, 4, 5
ST Math Program: Gen-4
Analysis Type: Two-Year
Treatment-Years: 2014/15, 2015/16
Baseline-Year: 2013/14
Subgroup: Economically Disadvantaged

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Abstract

This analysis evaluates the Economically Disadvantaged (Econ Dis) student subgroup in grades using ST Math in Texas in 2015/16. It identifies those grades with nominal or better implementation of the ST Math program, and matches them to randomly selected, similar math-performance and similar economically disadvantaged percent comparison grades. The nominal ST Math users are an aggregation of 48 grades, consisting of grades 3, 4, and 5 at 16 schools, with an average baseline of 30% in Satisfactory or Advanced proficiency levels (refer to Figures 2 and 3 to see how your schools compare to those analyzed in this report).They were matched to 48 similar, randomly selected control grades at 47 schools that never used ST Math. Grade-wise growth in math proficiency was evaluated (i.e. growth in same grade, same school, from 2013/14 to 2015/16) on the percentage proficient, scale scores, and Z-scores of the scale scores (see Section 3.1). Grades 3, 4, and 5 aggregated showed an ST Math effect of 9.25 points at the Satisfactory or Advanced levels, 3.77 points at the Satisfactory Level, 5.48 points at the Advanced Level, and Z-score of 0.59.

Contents

List of Figures

List of Tables

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 2-year changes in grade-mean STAAR Satisfactory or Advanced percentages. The treatment grades used the ST Math program for 2 years, beginning in the 2014/15 school year. 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, math, and economically disadvantaged attributes to the treatment grades during the baseline year (2013/14), and did not use ST Math in 2014/15, and 2015/16. The treatment grades' selection pool was all schools using ST Math in grades 3, 4, and 5 in Texas. The control grades' pool was all schools not using ST Math in grades 3, 4, and 5 in Texas. This study method measures effectiveness of the ST Math program when nominally implemented.

1.2 Program Description

The ST Math program is a supplemental math program covering grade-level Texas math standards. The ST Math content consists of visual representations of math standards, concepts, and procedures, presented to students as "Puzzles" of virtual manipulatives, with which they interact to pose solutions. Each time the student poses a solution, the computer visually animates the Puzzle, diagram, or symbols to show why the posed solution correctly solves, or why it does not solve, the math problem (puzzle). The Puzzles are arranged into sequential groups, called "Levels". To proceed to the next Level in sequence, the student needs to master his/her current Level. Mastering a Level requires solving 100% of the math problems, or Puzzles correctly. In this way, the program is self-paced. Students must correctly solve approximately 4-12 Puzzles, with only 1 failure and retry allowed, to proceed. Levels are sequenced together into Games and, again, the student must master each Game to get to the next Game in sequence. Games are sequenced into "Learning Objectives" (e.g. 'Fractions Concepts'). The ST Math curriculum of approximately 20-25 Learning Objectives can be rearranged in a year-long, grade-level syllabus to match district math pacing through the school year.

The Puzzles typically start with concrete representations of the math, without abstract symbols, math vocabulary, or even English words. Gradually, through subsequent Levels or Games, abstractions are introduced. For example, a Puzzle might start with "n" green blocks on the screen, and then at a subsequent Level may represent the quantity with the numeral for "n" (no green blocks anymore). In this way, three things 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.

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.

To achieve nominal progress through the program, there is a time-on-task requirement. While student progress rates through the program vary, MIND Research Institute has found that consistent application of 90 minutes per week throughout the school year is sufficient to get most students through at least half of the ST Math Learning Objectives. Students are recommended to use the program in school for at least two 45-minute sessions per week, or 90 minutes per week, over about 35 weeks. Analyses of ST Math usage have shown that consistently following this schedule throughout the school year is usually sufficient to achieve 50% or more Progress through ST Math content. Progress is a percentage of ST Math content coverage, and is defined as Levels completed by the student, divided by the total number of Levels in the curriculum. In addition, MIND's historical analyses have shown that it is necessary to complete at least 50% of the program in order to expect significantly higher performance compared to non-users.

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 Proficiency Levels Definition

The following (Table 1) is Texas's proficiency level descriptions:

Proficiency Level	State Proficiency Level Name
L1	Unsatisfactory
L2	Satisfactory
L3	Advanced

Table 1: Proficiency Level Naming

2.2 Treatment Grades Pool and Selection

The Treatment grades pool originated with all schools and grades using ST Math in Texas. From these schools, every grade that had used the ST Math program was identified. They comprise the Treatment grades pool for this evaluation of 2-year usage.

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 Texas's 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%.

Furthermore, the outcomes measure is a summative year-end test, i.e. Texas's standardized math assessment (STAAR). 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 Texas 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 50% by year-end.

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 50% 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.

2.3 Control Grades Pool and Selection

The control grades are randomly selected from a control pool of schools in Texas. Though they are randomly selected, they are also matched to be similar to the Treatment grades' math attributes and demographics during the baseline 2013/14 year. The matched attributes include:

- scale score
- student percentages at each math proficiency level
- number of economically disadvantaged students
- percentage of economically disadvantaged students.

To mitigate the risk of randomly picking a set of Control grades that generates an outlier for effect, a Monte Carlo approach is used to perform many random picks. The control pool's size is large enough that there are many possible "picks" of closely matched control grades.

One hundred randomly matched picks are made and sets of matched control grades are generated. For each set, the quality of the match as well as the math growth of the potential control set is evaluated. Some picked sets have high average math growth, some have low average math growth. From the set of all picks, a median pick is chosen. This avoids either an unlikely overestimate, or underestimate, of the Control grades' growth. When multiple median picks exist, the control set with the minimal math score differences in the baseline year is chosen.

3 Data Analysis

The set of all schools and grades using ST Math in Texas is evaluated for Enrollment percentage and Progress percentage parameters. A filtered Treatment set (TRT) of all ST Math grades with $\geq$ 85% Enrollment and $\geq$ 50% 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

When states change their state assessment throughout the years, they also change the range of possible scale scores achieved on the exam. This makes it difficult to compare changes in grade mean scale scores across years with a different exam. To deal with this issue, a new Z-score is calculated. For each year being analyzed, by grade, a Z-score takes the difference of the grade mean scale score and the mean of all scale scores statewide for that year, and then divides it by the standard deviation of all scale scores 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, Mean scale score: 300
Average across all schools statewide, Grade 3: 350
Standard deviation across all schools statewide, Grade 3: 30
Z-score=((School A, Grade 3, Mean scale score)-(Average across all schools, Grade 3))/(Standard deviation across all schools, Grade 3)

$$\text{Z-score}=\frac{300-350}{30}=-1.67$$

The Z-score is calculated for every grade across all years being analyzed, using the full state data set of Texas 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 will include both mean scale scores and their accompanying Z-scores.

3.2 Final Treatment and Control

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

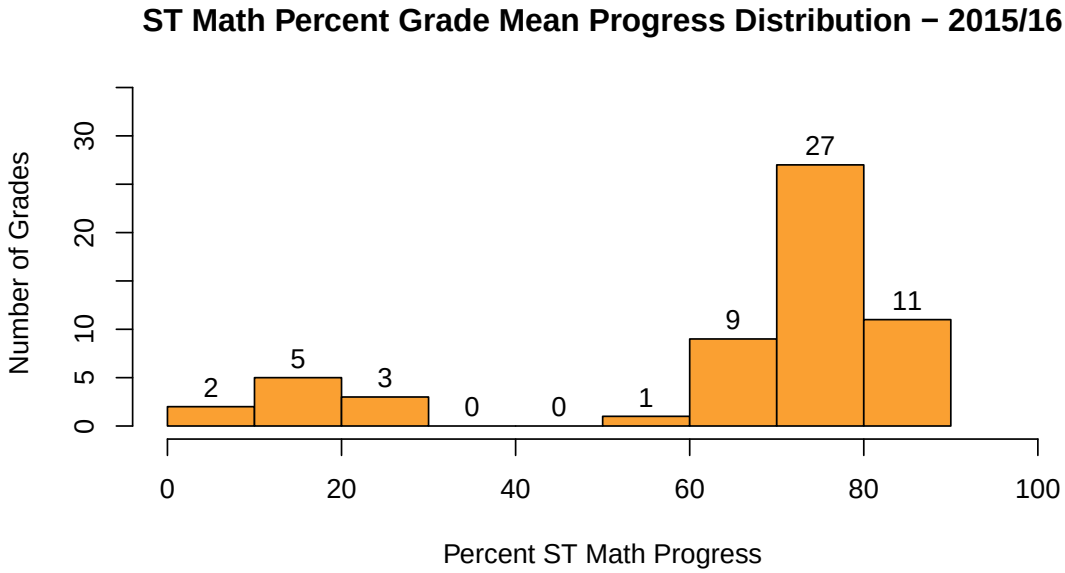

Figure 1: Histogram of ST Math Percent Progress for $\geq$ 85% Enrollment Grades 2015/16

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 $\geq$ 50% Progress as the Treatment Group.

Table 2 provides descriptive statistics of the Progress distribution. Table 3 shows the number of remaining treatment grades after applying enrollment and progress filters.

	Min.	Max.	Average	S.D.
ST Math % Progress	7.1	87.9	65.4	22.9

Table 2: Descriptive Statistics of ST Math Percent Progress for >= 85 percent Enrollment Grades

Grades with >= 85% Enrollment:	58
Grades with in addition >= 50% Progress:	48

Table 3: Number of ST Math Grades with >= 85 percent Enrollment and with >= 50 percent progress

3.2.2 Filtering Treatment and Controls

Table 4 shows the total number of grades in the Treatment pool, the number of grades that exceeded the 85% Enrollment figure, and also the 50% Progress filter. Other rows in the table indicate counts of numbers of students (2015/16 from state testing count) and counts of number of schools represented. The number of matched Control (CTRL) grades, students, and schools is also shown.

	Grade3	Grade4	Grade5	Total
ST Math Using Grades	20	21	17	58
ST Math Students	2019	2148	1621	5788
ST Math Econ Dis Students	1174	1216	828	3218
ST Math Grades (Enroll >= 85%)	20	21	17	58
TRT Grades (Enroll >= 85% & Prog >= 50%)	16	16	16	48
TRT Schools (Enroll >= 85% & Prog >= 50%)	16	16	16	16
TRT Students (Enroll >= 85% & Prog >= 50%)	1668	1692	1574	4934
TRT Econ Dis Students (Enroll >= 85% & Prog >= 50%)	933	890	804	2627
CTRL Schools	16	16	16	47
CTRL Grades	16	16	16	48
CTRL Students	1584	1702	1392	4678
CTRL Econ Dis Students	881	1017	817	2715

Table 4: Treatment Pool Filtering and Controls: Counts of Grades, Schools, and Students

3.2.3 Match of Controls to Treatment

Figure 2 shows the density plot of the baseline STAAR Math scale scores (left plot) and baseline percent students at STAAR Satisfactory or Advanced (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, 2013/14.

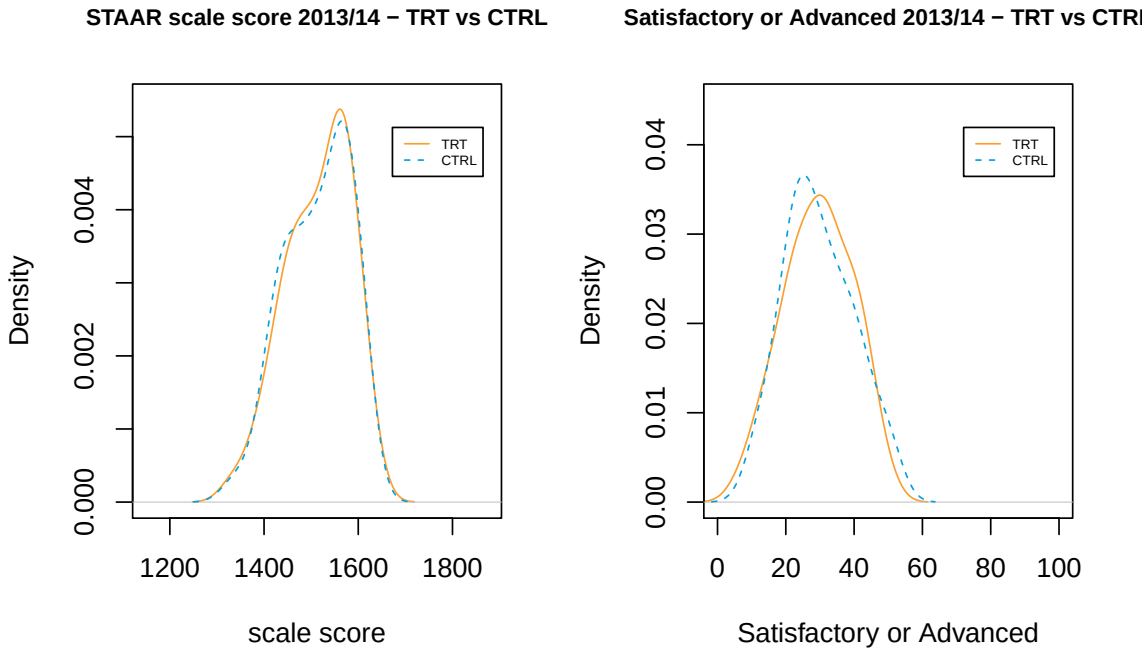

Figure 2: Baseline Year Density Plots Showing Math Scores Match between TRT and CTRL - 2013/14

This analysis specifically uses state data for economically disadvantaged students only. Thus, the grades were also matched based on both the number of economically disadvantaged students and the percentage of economically disadvantaged students (see Figure 3).

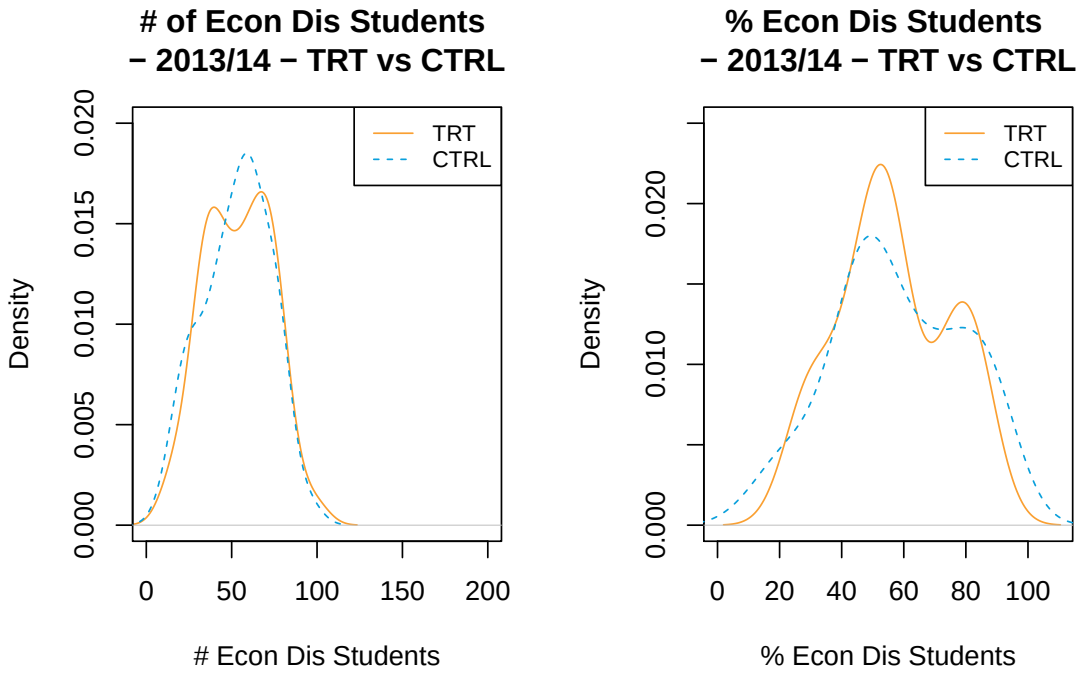

Figure 3: ECONDIS - Baseline Year Density Plot Showing Match between TRT and CTRL - 2013/14

3.3 Grade-Aggregated Analysis

Table 5 shows for both Treatment (TRT) and Control (CTRL) aggregation across grades of scale scores, Z-scores, and proficiency level distributions. The far right column also shows the average ST Math Progress for the TRT set.

	# Grades	# Schools	# Students	Scale score	Z-score	L1	L2	L3	Satisfactory or Advanced	ST Math Per Comp.
TRT.13.14	48	16	2587	1515.0	0.09	70.50	17.65	11.88	29.52	–
TRT.14.15	48	16	2549	1529.2	0.64	61.90	23.65	14.48	38.12	79.03
TRT.15.16	48	16	2627	1545.2	0.66	57.73	24.54	17.75	42.29	75.32
TRT.Delta	–	–	–	30.2	0.57	-12.77	6.90	5.88	12.77	–
CTRL.13.14	48	47	2541	1513.5	0.06	70.27	18.04	11.69	29.73	–
CTRL.14.15	48	47	2563	1497.3	-0.01	69.96	20.67	9.38	30.04	–
CTRL.15.16	48	47	2715	1514.8	0.04	66.77	21.17	12.08	33.25	–
CTRL.Delta	–	–	–	1.3	-0.02	-3.50	3.12	0.40	3.52	–

Table 5: Yearly Math Proficiency and Counts for TRT and CTRL Grade-Aggregated Datasets

The following chart (Figure 4) shows the changes in percentage of students at each math proficiency level for the grade-aggregated Treatment and Control sets (TRT.delta and CTRL.delta).

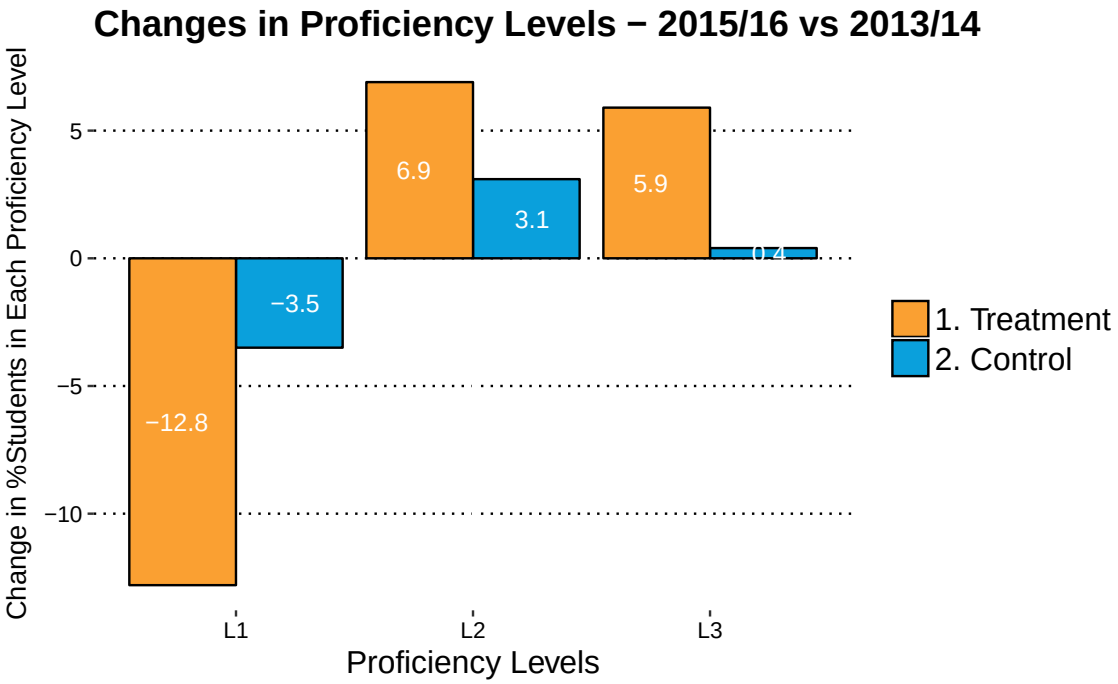

Figure 4: Change at each Proficiency Level for Grade-Aggregated TRT and CTRL Datasets between 2013/14 and 2015/16

Similarly, Figure 5 shows the changes in STAAR Math scale scores and changes in Z-scores for the grade-aggregated Treatment and Control sets.

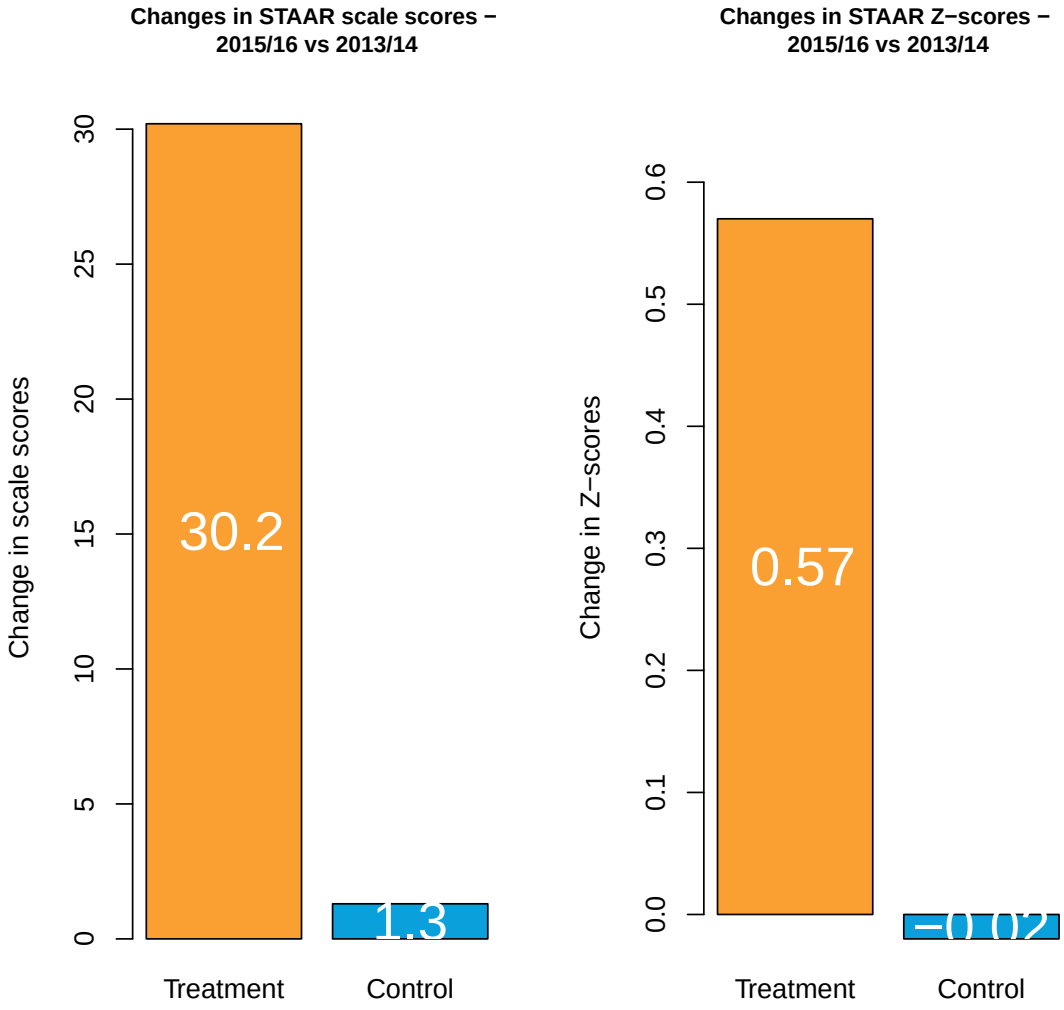

Figure 5: Changes in STAAR Math scale scores and Z-scores (See Section 3.1) for Grade-Aggregated TRT and CTRL datasets between 2013/14 and 2015/16

Further, Figure 6 shows the changes in percent of students at STAAR Satisfactory or Advanced for the grade-aggregated Treatment and Control sets.

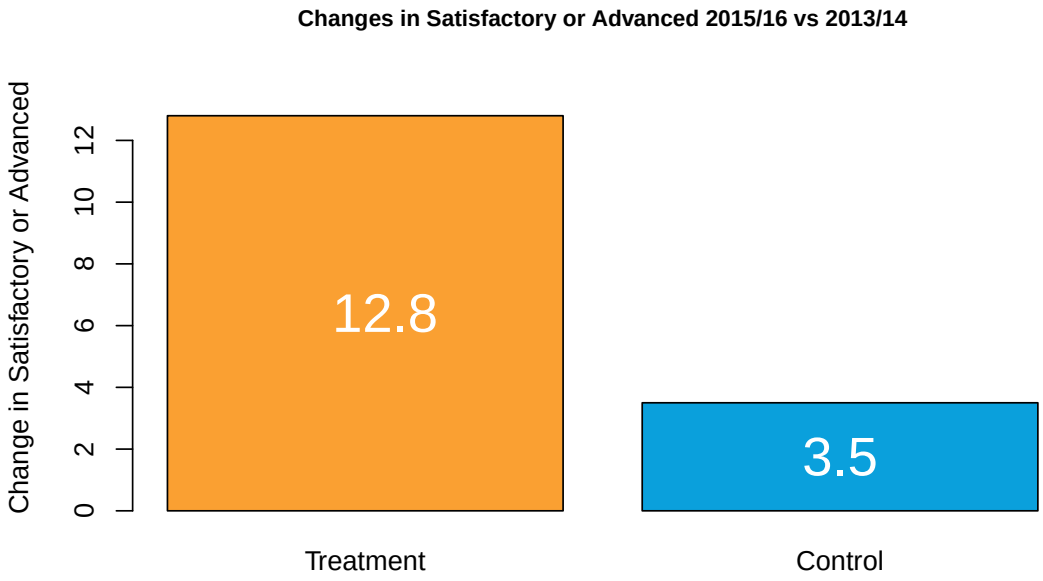

Figure 6: Changes in Satisfactory or Advanced for Grade-Aggregated TRT and CTRL datasets between 2013/14 and 2015/16

Finally, Table 6 shows the statistics for the *differences* in changes between TRT and CTRL (Treatment - Control) for these same STAAR math proficiency and scale score changes as in the above figures. [1]

	Estimate	P-Value	Int.Low	Int.High
Satisfactory or Advanced	9.25	0.00*	3.87	14.63
scale score	28.90	0.00*	12.18	45.61
Z-score	0.59	0.00*	0.26	0.92
L1	-9.27	0.00*	-14.65	-3.89
L2	3.77	0.05*	0.02	7.52
L3	5.48	0.01*	1.62	9.33

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

[1] * statistically significant $p<0.05$

3.4 Grade-Level Analysis

3.4.1 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	Scale score	Z-score	L1	L2	L3	Satisfactory or Advanced	ST Math Per Prog.
TRT.13.14	16	16	898	1437.3	0.03	74.69	16.75	8.62	25.38	–
TRT.14.15	16	16	871	1451.9	0.67	58.19	27.75	14.12	41.88	76.56
TRT.15.16	16	16	933	1473.1	0.80	55.31	25.38	19.31	44.69	78
TRT.Delta	–	–	–	35.8	0.78	-19.38	8.62	10.69	19.31	–
CTRL.13.14	16	16	814	1435.1	-0.02	74.94	16.25	8.81	25.06	–
CTRL.14.15	16	16	856	1408.9	-0.20	70.25	23.38	6.38	29.75	–
CTRL.15.16	16	16	881	1426.9	-0.15	68.56	21.31	10.12	31.44	–
CTRL.Delta	–	–	–	-8.1	-0.13	-6.38	5.06	1.31	6.38	–

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

	# Grades	# Schools	# Students	Scale score	Z-score	L1	L2	L3	Satisfactory or Advanced	ST Math Per Prog.
TRT.13.14	16	16	858	1526.7	0.08	71.50	15.75	12.75	28.50	–
TRT.14.15	16	16	857	1541.0	0.74	65.94	17.81	16.25	34.06	78.65
TRT.15.16	16	16	890	1550.9	0.51	62.12	20.56	17.31	37.88	73.61
TRT.Delta	–	–	–	24.2	0.43	-9.38	4.81	4.56	9.38	–
CTRL.13.14	16	16	890	1524.9	0.05	71.75	15.62	12.62	28.25	–
CTRL.14.15	16	16	933	1512.3	0.16	73.56	15.00	11.44	26.44	–
CTRL.15.16	16	16	1017	1533.6	0.17	68.69	17.38	13.94	31.31	–
CTRL.Delta	–	–	–	8.8	0.12	-3.06	1.75	1.31	3.06	–

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

	# Grades	# Schools	# Students	Scale score	Z-score	L1	L2	L3	Satisfactory or Advanced	ST Math Per Prog.
TRT.13.14	16	16	831	1581.1	0.16	65.31	20.44	14.25	34.69	–
TRT.14.15	16	16	821	1594.6	0.50	61.56	25.38	13.06	38.44	81.89
TRT.15.16	16	16	804	1611.6	0.65	55.75	27.69	16.62	44.31	74.36
TRT.Delta	–	–	–	30.5	0.49	-9.56	7.25	2.38	9.62	–
CTRL.13.14	16	16	837	1580.6	0.15	64.12	22.25	13.62	35.88	–
CTRL.14.15	16	16	774	1570.8	0.02	66.06	23.62	10.31	33.94	–
CTRL.15.16	16	16	817	1583.8	0.10	63.06	24.81	12.19	37.00	–
CTRL.Delta	–	–	–	3.2	-0.05	-1.06	2.56	-1.44	1.12	–

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

3.4.2 Grade-Level Analysis of Changes in Math Satisfactory or Advanced

Figure 7 shows the difference in the growth of percentages of students at math Satisfactory or Advanced, for the TRT and CTRL datasets, disaggregated by grade:

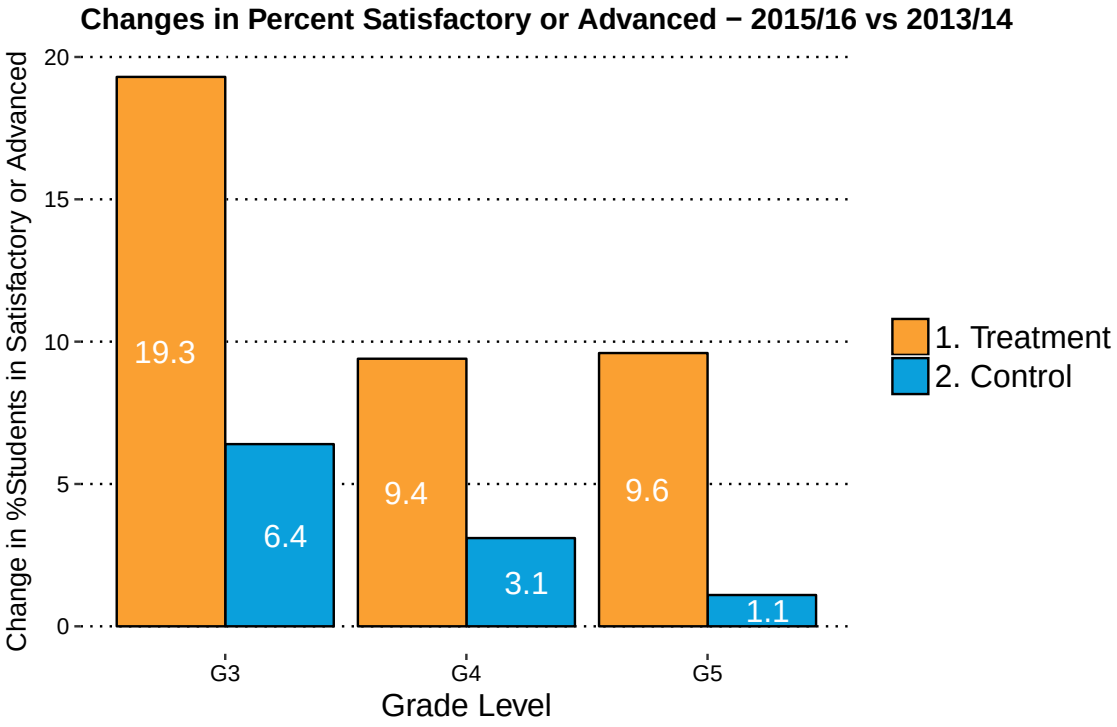

Figure 7: Changes in Percent of Students at Satisfactory or Advanced for TRT and CTRL Datasets between 2013/14 and 2015/16

Table 10 shows the statistics for the *differences* in changes between TRT and CTRL (Treatment - Control) for these same Satisfactory or Advanced math proficiency changes as shown in Figure 7.

	Estimate	P-Value	Int.Low	Int.High
Grade 3	12.94	0.03*	1.65	24.23
Grade 4	6.31	0.12	-1.80	14.43
Grade 5	8.50	0.05	-0.16	17.16

Table 10: Statistics for the Differential Changes in Satisfactory or Advanced, (TRT - CTRL)

3.4.3 Grade-Level Analysis of Changes in STAAR Math scale scores

Figure 8 shows the changes in the grade-mean math scale scores of students for the TRT and CTRL datasets, disaggregated by grade:

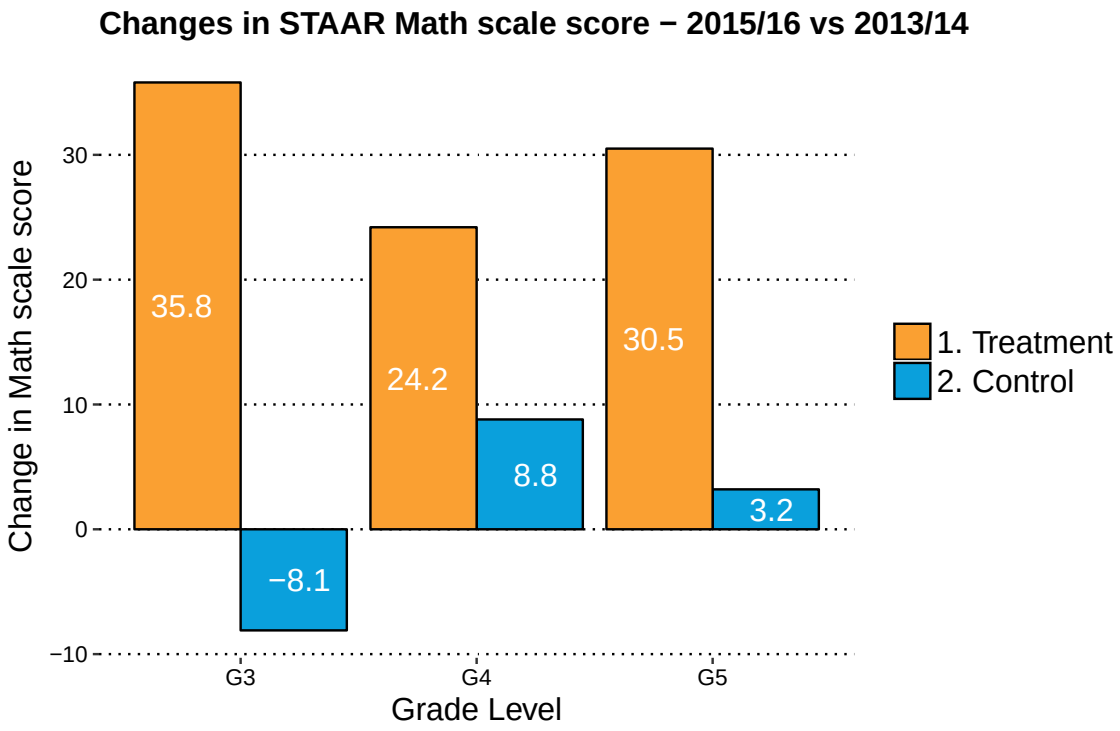

Figure 8: Changes in Grade-Mean STAAR Math scale score for TRT and CTRL Datasets between 2013/14 and 2015/16

Table 11 shows the statistics for the differences between TRT and CTRL (Treatment - Control) for these same STAAR math scale score changes as shown in Figure 8.

	Estimate	P-Value	Int.Low	Int.High
Grade 3	43.94	0.03*	5.69	82.19
Grade 4	15.44	0.25	-11.38	42.26
Grade 5	27.31	0.02*	3.76	50.86

Table 11: Statistics for the Differential Changes in STAAR Math scale scores Growth, (TRT - CTRL)

3.4.4 Grade-Level Analysis of Changes in STAAR Z-scores of scale scores

Figure 9 shows the changes in the grade-mean Z-scores of students for the TRT and CTRL datasets, disaggregated by grade:

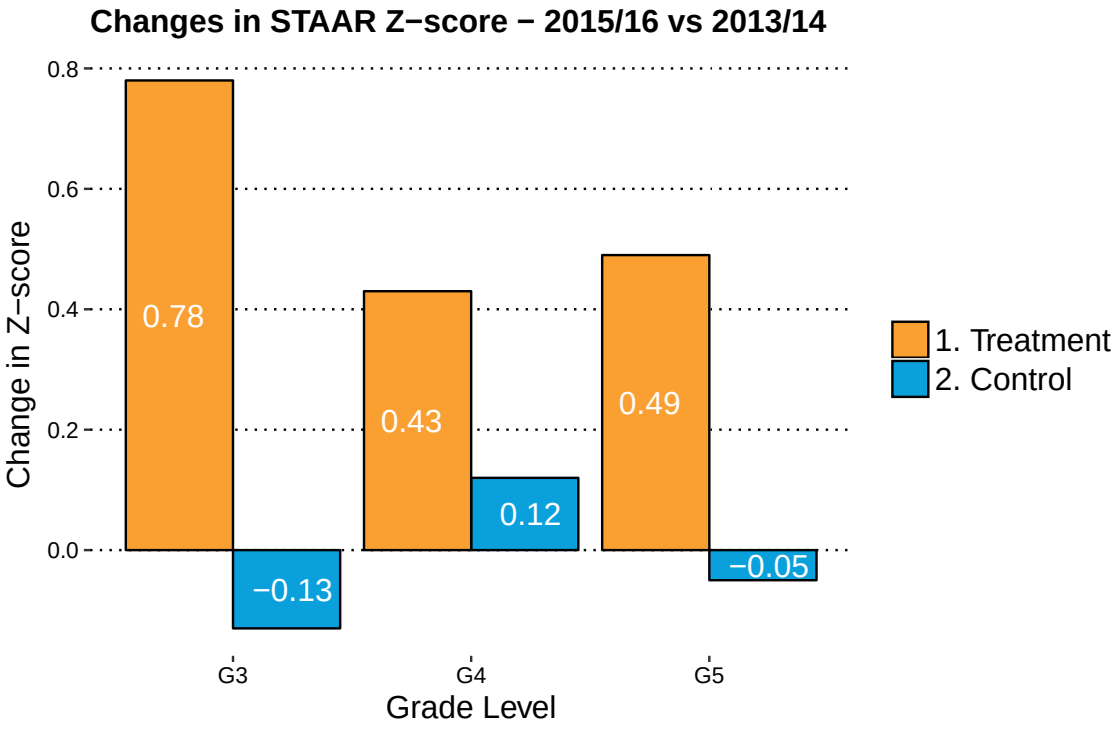

Figure 9: Changes in Grade-Mean STAAR Z-score (See Section 3.1) for TRT and CTRL Datasets between 2013/14 and 2015/16

Table 12 shows the statistics for the differences between TRT and CTRL (Treatment - Control) for these same STAAR Z-score changes as shown in Figure 9.

	Estimate	P-Value	Int.Low	Int.High
Grade 3	0.91	0.02*	0.16	1.66
Grade 4	0.31	0.23	-0.20	0.82
Grade 5	0.55	0.02*	0.08	1.01

Table 12: Statistics for the Differential Changes in STAAR Z-scores (See Section 3.1) Growth, (TRT - CTRL)

4 Effect Size

The following table shows the effect sizes for Satisfactory or Advanced, STAAR scale score, and accompanying Z-score.

	Scale score Effect Size	Z-score Effect Size	Satisfactory or Advanced Effect Size
Grade 3	1.07	1.23	1.58
Grade 4	0.39	0.43	0.54
Grade 5	1.20	1.25	1.16
All Grades	0.41	0.92	0.91

Table 13: Cohen's d Effect Size

5 Findings Summary

Texas grades 3, 4, and 5 using ST Math for the year 2015/16 averaged 65.4% ST Math Progress. 48/58 grades (83%) averaged covering more than 50% of ST Math content. Statistically significant differences were found in this analysis for both grade-aggregated and individual grade levels. Looking at Table 7, statistically significant differences were found for grade-aggregated Z-score, with an estimate of 0.59 points favorable for the ST Math treatment set, as well as for grade-aggregated Satisfactory or Advanced proficiency levels, with a 9.25 point favorable differential for the ST Math treatment set. Further, in Table 7, grade-aggregated ST Math treatment set outperformed their matched controls at both the Satisfactory level and the Advanced level, with statistically significant differences of 3.77 and 5.48, respectively. Referring to Table 11, statistically significant differences were found for grades 3 and 5 Satisfactory or Advanced proficiency levels, with estimates of 12.94 and 8.5 respectively, in favor of the ST Math treatment set. Looking at Table 13, grades 3 and 5 ST math treatment sets outperformed their matched controls for STAAR Z-scores with statistically significant differences of 0.91 and 0.55, 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 50% 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. The Monte Carlo Method is used to mitigate the possibility of control picks being favorable or unfavorable (see Section 2.3).

7 Reference Tables Grouped By School Year

The following tables show grade-level details, grouped by school year and for treatment (Table 14) and controls (Table 15) separately.

	# Grades	# Schools	# Students	Scale score	Z-score	L1	L2	L3	Satisfactory or Advanced	ST Math Per Comp.
Grade 3 (13.14)	16	16	898	1437.3	0.03	74.69	16.75	8.62	25.38	–
Grade 4 (13.14)	16	16	858	1526.7	0.08	71.50	15.75	12.75	28.50	–
Grade 5 (13.14)	16	16	831	1581.1	0.16	65.31	20.44	14.25	34.69	–
All Grades (13.14)	48	16	2587	1515.0	0.09	70.50	17.65	11.88	29.52	–
Grade 3 (14.15)	16	16	871	1451.9	0.67	58.19	27.75	14.12	41.88	76.56
Grade 4 (14.15)	16	16	857	1541.0	0.74	65.94	17.81	16.25	34.06	78.65
Grade 5 (14.15)	16	16	821	1594.6	0.50	61.56	25.38	13.06	38.44	81.89
All Grades (14.15)	48	16	2549	1529.2	0.64	61.90	23.65	14.48	38.12	79.03
Grade 3 (15.16)	16	16	933	1473.1	0.80	55.31	25.38	19.31	44.69	78
Grade 4 (15.16)	16	16	890	1550.9	0.51	62.12	20.56	17.31	37.88	73.61
Grade 5 (15.16)	16	16	804	1611.6	0.65	55.75	27.69	16.62	44.31	74.36
All Grades (15.16)	48	16	2627	1545.2	0.66	57.73	24.54	17.75	42.29	75.32

Table 14: TRT Grades Detail Sorted by Year

	# Grades	# Schools	# Students	Scale score	Z-score	L1	L2	L3	Satisfactory or Advanced	ST Math Per Comp.
Grade 3 (13.14)	16	16	814	1435.1	-0.02	74.94	16.25	8.81	25.06	–
Grade 4 (13.14)	16	16	890	1524.9	0.05	71.75	15.62	12.62	28.25	–
Grade 5 (13.14)	16	16	837	1580.6	0.15	64.12	22.25	13.62	35.88	–
All Grades (13.14)	48	47	2541	1513.5	0.06	70.27	18.04	11.69	29.73	–
Grade 3 (14.15)	16	16	856	1408.9	-0.20	70.25	23.38	6.38	29.75	–
Grade 4 (14.15)	16	16	933	1512.3	0.16	73.56	15.00	11.44	26.44	–
Grade 5 (14.15)	16	16	774	1570.8	0.02	66.06	23.62	10.31	33.94	–
All Grades (14.15)	48	47	2563	1497.3	-0.01	69.96	20.67	9.38	30.04	–
Grade 3 (15.16)	16	16	881	1426.9	-0.15	68.56	21.31	10.12	31.44	–
Grade 4 (15.16)	16	16	1017	1533.6	0.17	68.69	17.38	13.94	31.31	–
Grade 5 (15.16)	16	16	817	1583.8	0.10	63.06	24.81	12.19	37.00	–
All Grades (15.16)	48	47	2715	1514.8	0.04	66.77	21.17	12.08	33.25	–

Table 15: CTRL Grades Detail Sorted by Year

8 Lists of Schools

8.1 Treatment Schools

The following table lists the treatment schools and grades (after 85% enrollment and 50% progress filtering) used in the analysis.

PID	IID	District	School Name	GRADE
4027634	CED5WM	KILLEEN ISD	CEDAR VALLEY EL	3, 4, 5
996459	CLI5WM	KILLEEN ISD	CLIFTON PARK EL	3, 4, 5
2128581	DUN5WM	KILLEEN ISD	DUNCAN EL	3, 4, 5
996497	HAR5WM	KILLEEN ISD	HARKER HEIGHTS	3, 4, 5
2897213	HAY5WM	KILLEEN ISD	HAY BRANCH EL	3, 4, 5
11718474	HAY5WN	KILLEEN ISD	HAYNES EL	3, 4, 5
996540	MEA5WM	KILLEEN ISD	MEADOWS EL	3, 4, 5
3051503	MOU5WM	KILLEEN ISD	MOUNTAIN VIEW E	3, 4, 5
996564	NOL5WN	KILLEEN ISD	NOLANVILLE EL	3, 4, 5
996576	PEE5WM	KILLEEN ISD	PEEBLES EL	3, 4, 5
3244700	REE5WM	KILLEEN ISD	REECES CREEK EL	3, 4, 5
11449336	RIC5WN	KILLEEN ISD	RICHARD E CAVAZ	3, 4, 5
10030736	SKI5WM	KILLEEN ISD	SKIPCHA EL	4, 5, 3
10002052	TIM5WM	KILLEEN ISD	TIMBER RIDGE EL	4, 5, 3
4806571	TRI5WM	KILLEEN ISD	TRIMMIER EL	3, 4, 5
4368799	VEN5WM	KILLEEN ISD	VENABLE VILLAGE	3, 4, 5

Table 16: Treatment Schools (TRT Dataset)

8.2 Control Schools

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

PID	District	School Name	GRADE
1047178	AMARILLO ISD	BELMAR EL	4
4949317	ARLINGTON ISD	BECKHAM EL	5
1051739	ARLINGTON ISD	DUNN EL	5
3250711	ARLINGTON ISD	FARRELL EL	3
4918992	CELINA ISD	CELINA INT	4
1006930	COMAL ISD	GARDEN RIDGE EL	5
1052367	CROWLEY ISD	BESS RACE EL	3
1056820	DEL VALLE ISD	POPHAM EL	3
1042855	DUMAS ISD	GREEN ACRES EL	3
1014781	ECTOR COUNTY IS	PEASE EL	4
1016117	EL PASO ISD	WESTERN HILLS E	5
1052513	EVERMAN ISD	SOUDER EL	4
1061306	FLORESVILLE ISD	NORTH EL	4
1024956	HOUSTON ISD	PARKER EL	3
1024293	HOUSTON ISD	WAINWRIGHT EL	5
3319513	HUNTINGTON ISD	HUNTINGTON INT	4
10007258	INTERNATIONAL L	INTERNATIONAL L	5
1011167	IRVING ISD	HANES EL	3
10754970	JUDSON ISD	RICARDO SALINAS	5
2896855	JUDSON ISD	SPRING MEADOWS	4
1832117	KATY ISD	MEMORIAL PARKWA	4
10028094	KLEIN ISD	BENIGNUS EL	3
4286969	KLEIN ISD	SCHULTZ EL	5
1018244	LAMAR CISD	JACKSON EL	5
1011349	LANCASTER ISD	HOUSTON EL	4
1060649	LASARA ISD	LASARA EL	3
4913423	LLANO ISD	PACKSADDLE EL	5
11127095	MAGNOLIA ISD	MAGNOLIA PARKWA	3
11073690	MANSFIELD ISD	LOUISE CABANISS	4
3240699	NEW BRAUNFELS I	WALNUT SPRINGS	5
1042714	NEW CANEY ISD	PORTER EL	3
997996	NORTH EAST ISD	WINDCREST EL	3
1013531	NORTHWEST ISD	JUSTIN EL	3
1001851	PEARLAND ISD	E A LAWHON EL	4
1030498	PHARR-SAN JUAN-	AIDA C ESCOBAR	4
1021954	PLAINVIEW ISD	EDGEMERE EL	5
1011935	RICHARDSON ISD	SKYVIEW EL	5
5096779	ROYSE CITY ISD	ANITA SCOTT EL	3
1055565, 1047324	SAN ANGELO ISD, AMARILLO ISD	LAMAR EL	3, 4
1004229	SAN BENITO CISD	LA ENCANTADA EL	5
3011632	SOUTHWEST ISD	BIG COUNTRY EL	3
1001289	TEXARKANA ISD	NASH EL	4
10007387	UNITED ISD	DR MALAKOFF EL	4
4038437	UNITED ISD	MATIAS DE LLANO	4
1055864	WALL ISD	WALL EL	5
4762949	WHITNEY ISD	WHITNEY INT	5
1032628	WOLFE CITY ISD	WOLFE CITY EL	3

Table 17: Matched Control Schools (CTRL Dataset)