



**ST Math**  
Created by MIND Education



**MIND**  
RESEARCH INSTITUTE

**TEA**  
Texas Education Agency

# EXECUTIVE SUMMARY

## YEAR 3

**Prepared for the Texas Education Agency**  
ST Math Impact Study

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The report examined STAAR Math performance growth from spring 2022 to spring 2023 in grades 3, 4, and 5 for students using ST Math compared to matched non-users.

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**It's easy to differentiate. I can go in and assign them a game or activity and “boom” they can go off and do it themselves.**

- Rita Tong, 5th Grade Teacher  
Eagle Mountain-Saginaw ISD

**One of the things that really appealed to us about ST Math was that it is nonverbal. It was great to be able to use one platform that all students could use.**

- Sandra Doria, Executive Director of Math & Science  
Aldine ISD

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## INTRODUCTION

In 2020, the Texas Education Agency (TEA) announced that ST Math would be made freely available to all Texas students through TEA's Texas Home Learning 3.0 (THL 3.0) initiative. This visionary move embraced a completely novel strategy: leveraging all Texas children's innate visual reasoning abilities through the introduction of a unique, patented visualization approach that enabled mastery of mathematics. The state of Texas has cultivated a passion for and self-belief in math ability in all students, and ensures every student perseveres and receives an equal opportunity to succeed in math.

Over a 3-year longitudinal period—with consistent nominal usage—students who used ST Math increased STAAR scores and moved up in performance levels when rigorously compared to non-users, nearly eliminating students in the Did Not Meet category and adding 20.9 percentage points to the Masters Performance Level.

ST Math uniquely provides a simplified yet challenging math learning environment that provides equitable opportunity for students from every student group: Special Education, Economically Disadvantaged, ESL, Hispanic, Gifted Talented, and by race/ethnicity. The patented learning method of ST Math uniquely addresses the shortcomings of other approaches by reducing cognitive load, utilizing innate visual reasoning through interactive and rigorous math-based puzzles, and requiring mastery progression. By avoiding unnecessary abstractions and incorporating video game-based mechanics, ST Math encourages perseverance when faced with non-routine problems.

By the 2022-2023 school year, over 2,700 Texas schools across 440 districts were impacted through ST Math use:



**440**  
Districts using \*



**1,299,387**  
Students rostered



**815,525**  
Students impacted \*



**337,926**  
Students at >400 minutes



**2,687**  
Schools \*



**384,741,613**  
Puzzles collected \*



**535,104,910**  
Minutes



**9,618,540**  
STAAR Math Scale Score  
Points growth earned \*



**0.40**  
Average quiz  
effect size

\* 10 or more students at >400 minutes

\*  $\geq 1$  puzzle

\*  $> 2$  students at  $> 1$  puzzle

\* 100 puzzles relates to 2.5 STAAR Math scale score points

\* based on full state dose study and applied to all grade-levels including K-1-2 equivalent

## ST MATH BENEFITS

This approach features the presentation of TEKS to students as visual puzzles, introducing each new individual math concept concretely, then gradually scaffolded. This eliminates any need to simultaneously learn a new math vocabulary term, a new abstract symbolic representation, or to memorize procedures with no conceptual grasp. Visual puzzles make each math problem unambiguous—and avoid any language proficiency prerequisite. Because the game mechanics require mastery to progress while providing unlimited attempts, the students can form their own strategies and connections to the rigorous TEKS in the puzzles without instructions. The puzzles and games provide intentionally simple introductions to concepts, removing the need for math proficiency prerequisites. By gradually increasing complexity (such as going from 3 on-screen objects to 4), all students, up to high performers and Gifted and Talented, are eventually challenged. Students know that “making mistakes” in a game is expected; the game mechanics in ST Math animate the consequences of every student choice, including “mistakes,” enabling formative learning, and students persist to success and earn self-confidence in their math abilities.

## AN EQUITABLE APPROACH

As the results bear out remarkably, this visionary adoption has equitably leveraged the innate abilities of all Texas children. Effect sizes (which measure the apples-to-apples benefits of moving children at any performance level) are closely matched for all groups. English Learners aren't hampered by a language requirement, students below grade-level in math performance are afforded a low-floor entry point to show their persistence and win, Special Education students are provided a learning environment that eliminates unnecessary cognitive load, and GT students are challenged.

## 2022-2023 STUDY

TEA and MIND share data to evaluate the performance of ST Math each year. The TEA datashare includes demographics and STAAR Math performance, which are matched to ST Math use for each study year (20/21, 21/22, 22/23). A rigorous quasi-experimental study compares the STAAR performance growth for a treatment group using ST Math above a very achievable dose level vs. a matched control group. The differences show ST Math's impact and are evaluated in terms of changes in performance level percentages and normalized into effect sizes. Note that qualitative changes were made to the STAAR math test items for spring 2023 to increase its rigor and equity.

This year's study covered 8,742 students using ST Math at a nominal level of 1,500 or more puzzles – about 60% or more of their on-grade-level ST Math curriculum. This treatment group was matched to an 8,742 student control group on baseline spring 2022 STAAR Math scale scores and represents all student demographics, including race/ethnicity.

Overall, performances repeated similar robust results seen for spring 2022. The equity of results across student groups was even more tightly grouped. The grade 3, 4, 5 longitudinal cohort at a nominal usage level nearly eliminated students in the “Did Not Meet” performance level.

## INCREASED STUDY RIGOR

For the spring 2023 datashare and quasi-experimental study, MIND Research Institute improved the rigor of our methods.

The larger control pool of non-user students was similar students but with zero ST Math use. This is in contrast to last year’s analysis when we had to compromise on a far less rigorous control pool of students with “very low” ST Math use as controls.

The improved control pool matching further revealed the equity of impact across groups. It is unparalleled. All student groups were within 10% of each other in effect size impacts. This includes higher performers and lower performers, from Gifted and Talented to Special Education and across race/ethnicity and economic disadvantage.

This year, our study eliminated the use of "low-use" students as controls and tightened study rigor. We found that studies that allow "low use" students to be the control group are getting an overly favorable effect magnitude, likely due to other negative educational factors associated with a student's extremely low usage of any program.

## LONGITUDINAL COHORT RESULTS

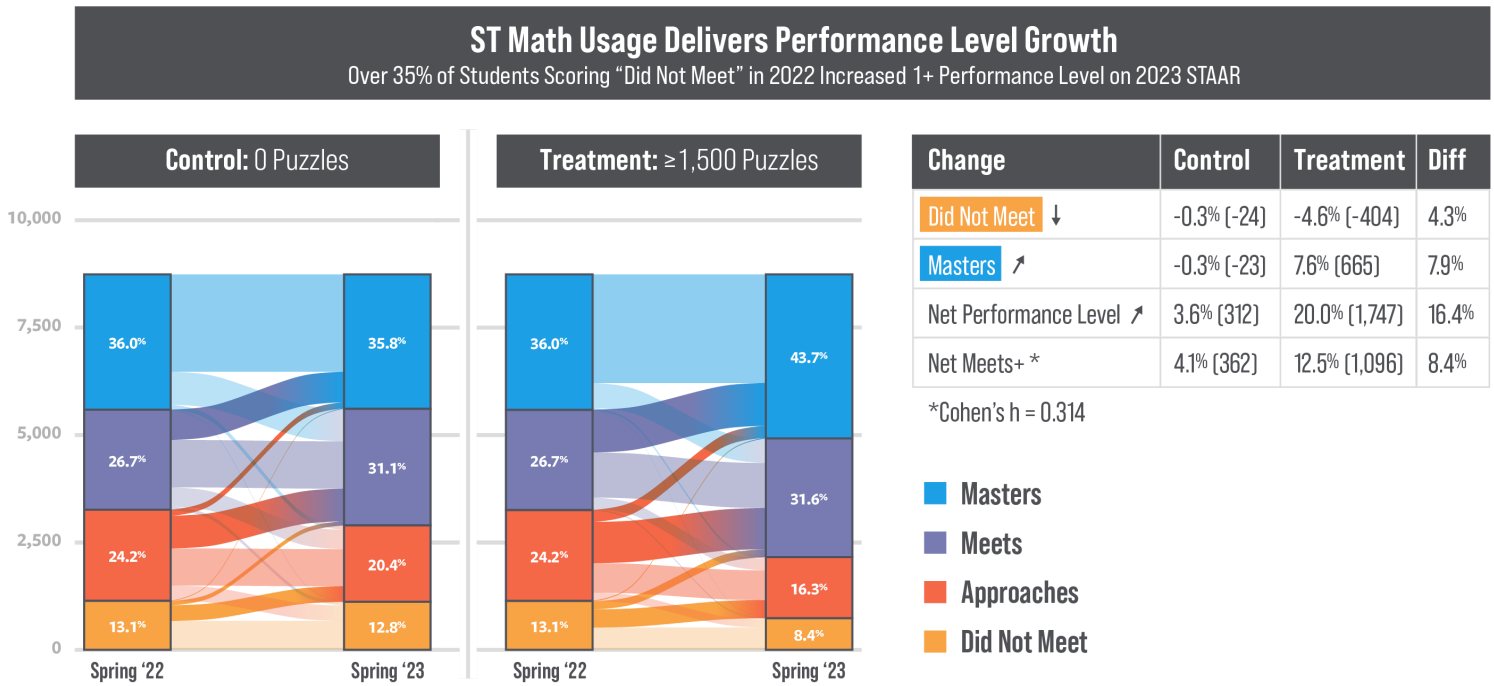
With 2023 being the 3rd year of the program, we were able to follow a longitudinal cohort of Texas students from grade 3 (spring 2021) to grade 4 (spring 2022) to grade 5 (spring 2023). Students who used a nominal amount across those three school years (1,000 puzzles per year), exhibited dramatic jumps in performance levels, with 48% of students moving up at least one performance level, and remarkably, the near elimination of students at Did Not Meet, down to only 3.1%.

## RESULTS

MIND is reporting out its rigorous math performance level studies with all performance levels visualized. We believe it is crucial to see all this information about every student's Performance Level change. What happens to the "Did Not Meet" students moving up to "Nearly Met," for example, or from "Met" to "Exceeds," is just as important as moving across the "Met" cut score for our program, which provides equitable benefit for every learner.

The charts below start with the spring 2022 year students grouped into their Math performance levels from Did Not Meet to Masters. They then track each student with a line toward where they ended up in spring 2023 in performance level – up or down. The thickness of each “flow” line indicates the number of students who followed that trajectory from 2022 to 2023.

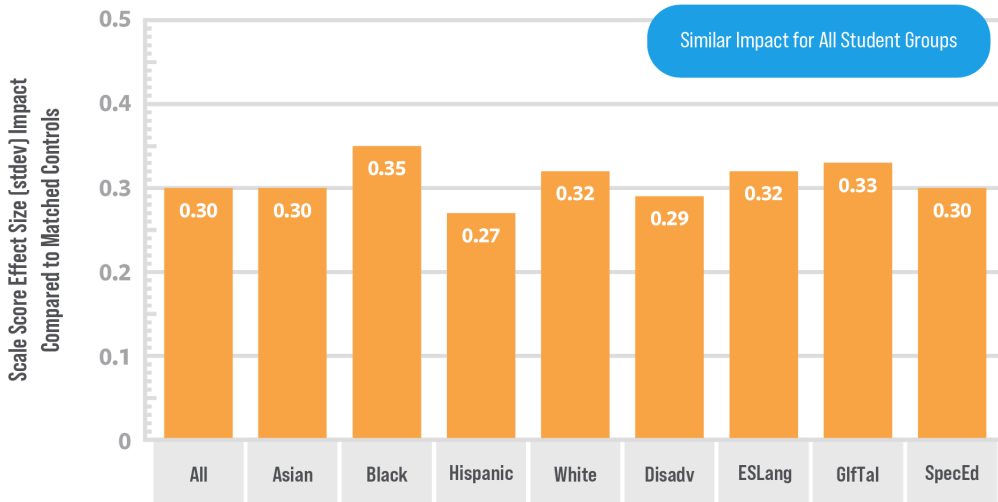
There are two charts showing this 2022 vs. 2023 flow: one for the ST Math users “treatment” on the right, and one on the left, for the zero ST Math matched “controls.”



These alluvials show “thicker” lines moving up for the ST Math user group than for the control group, totaling 7.9 percentage points more students moving from Meets to Masters, 8.4 percentage points more from below Meets to Meets+, and 4.3 percentage points fewer students left behind in the lowest “Did Not Meet” category.

## ST Math Impacts are Equitable Across Student Groups

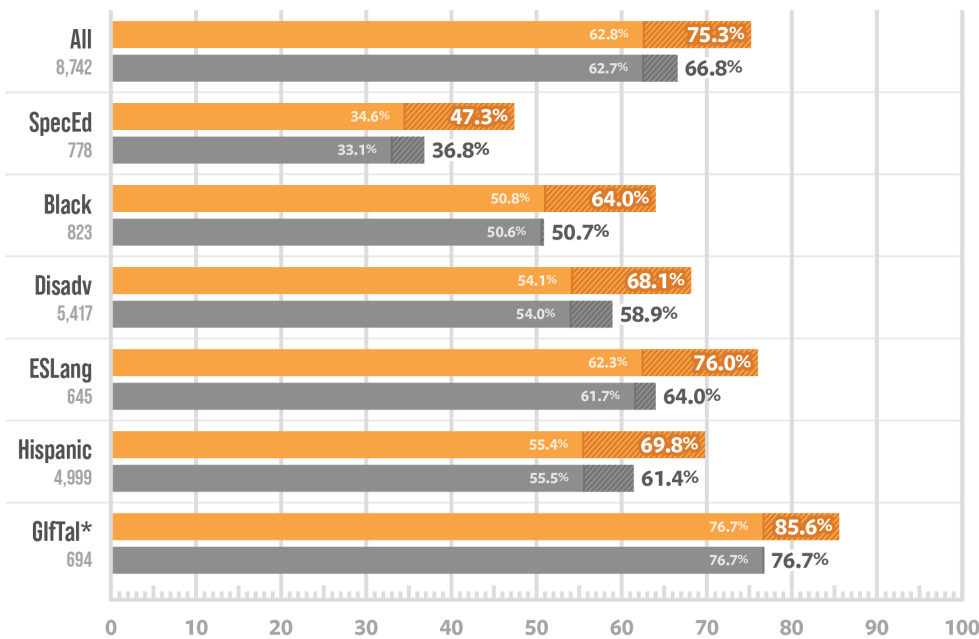
Effect Size on Scale Score Growth at High Level Usage



Because different student subgroups have different levels of math performance, the apples-to-apples comparison to judge results of ST Math's level-playing field and productive-engagement equity across student subgroups is in terms of impact effect size (standard deviations of ST Math advantage). The improvement in controls matching has revealed unparalleled uniformity (within 10%) across all groups.

## Equitable Growth Impact Across All Student Groups

Students Matched on Demographics & Spring 2022 STAAR Achievement



### Impact Equity: Percent Meets/Masters Advantage at High Usage Level (1,500 puzzles)

- Comparing Spring 2023 percent of student group Meets or Masters
- Control group % Meets or Masters was matched to treatment group in Spring 2022

### Students scoring Meets or Masters on 2023 STAAR

Students using ST Math completed >1,500 puzzles

'22 Texas Students using ST Math Matched Comparison Group

'23 Texas Students using ST Math Matched Comparison Group

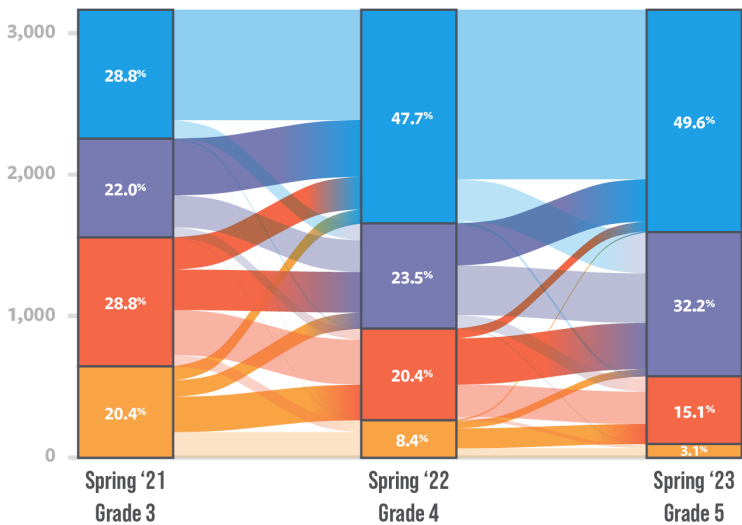
\*Gifted % Masters @ 2,500 puzzles

Showing the actual percentages of each group at or above the Meets Performance Level provides additional evidence that the unique ST Math approach is delivering added math learning for each group.

## High Usage Across 3 Years Nearly Eliminates “Did Not Meet”

“Did Not Meet” Performance Level Decreased to only 3.1% of students

**Treatment:  $\geq 1,000$  Puzzles Per Year (3,000 Over 3 Years)**



Change	Control	Treatment	Diff
Did Not Meet ↓	-12.0% [-380]	-17.3% [-548]	5.3%
Masters ↗	18.9% [598]	20.9% [659]	2.0%
Net Performance Level ↗	34.6% [1,092]	48.0% [1,516]	13.4%
Net Meets+ *	20.4% [644]	31.0% [980]	10.6%

\*Cohen's h = 0.674

- Masters
- Meets
- Approaches
- Did Not Meet

*Alluvial charts available for each subgroup upon request*

## PERSEVERANCE DEMONSTRATED

Texas students' perseverance at the mastery progression ST Math learning environment was also evaluated. Students are afforded unlimited attempts to master a “Level” consisting of a set of 4 to 8 puzzles to solve with a 100% score. The difficulty of passing levels was indicated by an initial pass rate of <70.4%> – the puzzles are not “too easy,” but neither are they “too hard.” Texas students exhibited excellent perseverance to pass as they continued to make attempts, see visually animated feedback of their posed solutions, form their own sense-making of the game and the Math TEKS aligned to it, improve their solution hypotheses, and try again. Given additional attempts, over <98.6%> of the game levels were ultimately passed through student motivation and effort.

## SUMMARY

From this year's study, we are pleased to find and report confirmation of ST Math learning results impact magnitude on the revised STAAR Math assessment and improved equity impact rigor with tightly grouped effect sizes for all subgroups. The level playing field, including for below-grade-level performing students, was reconfirmed. Adding a 3rd year enabled a grade 3/4/5 user cohort analysis showing the near elimination of the Did Not Meet performance level. Texas students' outstanding motivation and perseverance to beat the unique ST Math visual games were evaluated and found to be exemplary.

This Texas study and partnership powerfully and widely extends the range of proof points for ST Math's unique patented visual game-based approach. MIND is grateful for this opportunity to partner with TEA to help validate Texas' move to the forefront of visionary educational leadership, including in program evaluation of both usage and impact.



**ST Math**  
stmath.com

To learn more about ST Math results,  
visit [stmath.com/impact/results](https://stmath.com/impact/results)

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