

# Unlocking Potential: Evidence of Reflex and Frax Benefits for 2nd and 3rd Graders Struggling in Math

## STUDY AT A GLANCE

### Study Sample:

- Large suburban US school district
- Two-year longitudinal study
- Cohort of 807 2nd-grade students
- District Student Racial Diversity: 43% Hispanic/Latino, 13% Black/African American, 36% White, 78% Economically disadvantaged

### Research Methodology:

- Analysis was conducted with students who scored two grade levels below their peers on a 2nd-grade baseline (BOY) math assessment
- Students grouped by program usage: (1) no Reflex or Frax usage, (2) high Reflex usage in 2nd grade, or (3) high Reflex usage in 2nd grade and high Frax usage in 3rd grade
- Outcome measure was each student's percentile ranks on their End of Course (EOC) math assessment

### Main Findings:

- Students who used Reflex in 2nd grade showed 2x improvement over students with no usage
- Students who used Frax in 3rd grade also showed a 2x improvement over students with no usage

## Introduction

Extensive research and virtually all standards bodies have identified fractions proficiency and math fact automaticity as foundational pillars of elementary math education. Math fact automaticity, the ability to recall basic math facts quickly and effortlessly, is predictive of long-term success in mathematics, including performance on the SAT. Similarly, fractions knowledge in 5th grade uniquely predicts students' mathematics performance in high school. Unfortunately, many students fail to develop these critical foundations, which undermines their ability to master more advanced material that builds on them. **The current research report provides evidence of the efficacy of Reflex and Frax in supporting struggling learners' academic growth.**

## Methods

The district partnered with ExploreLearning to evaluate differences in student program usage and math standards performance from fall 2021 to spring 2023. Math achievement was based on their scores on diagnostic math benchmark assessments administered at the beginning (BOY) and at the end (EOC) of the academic year. We focus specifically here on struggling learners: students who scored "2 or more grade levels below" their peers on their 2nd-grade BOY math assessment.

Student math growth and progress towards meeting grade-level standards was analyzed within three usage groups:

- **Non-users:** 138 students who did not use Reflex or Frax (<5 total days of Reflex and <5 Frax missions completed).
- **Reflex-only users:** 597 students who used Reflex 40 or more days in 2nd grade.
- **Reflex and Frax users:** 72 students who used Reflex 40 or more days in 2nd grade and completed 20 or more Frax missions in 3rd grade.

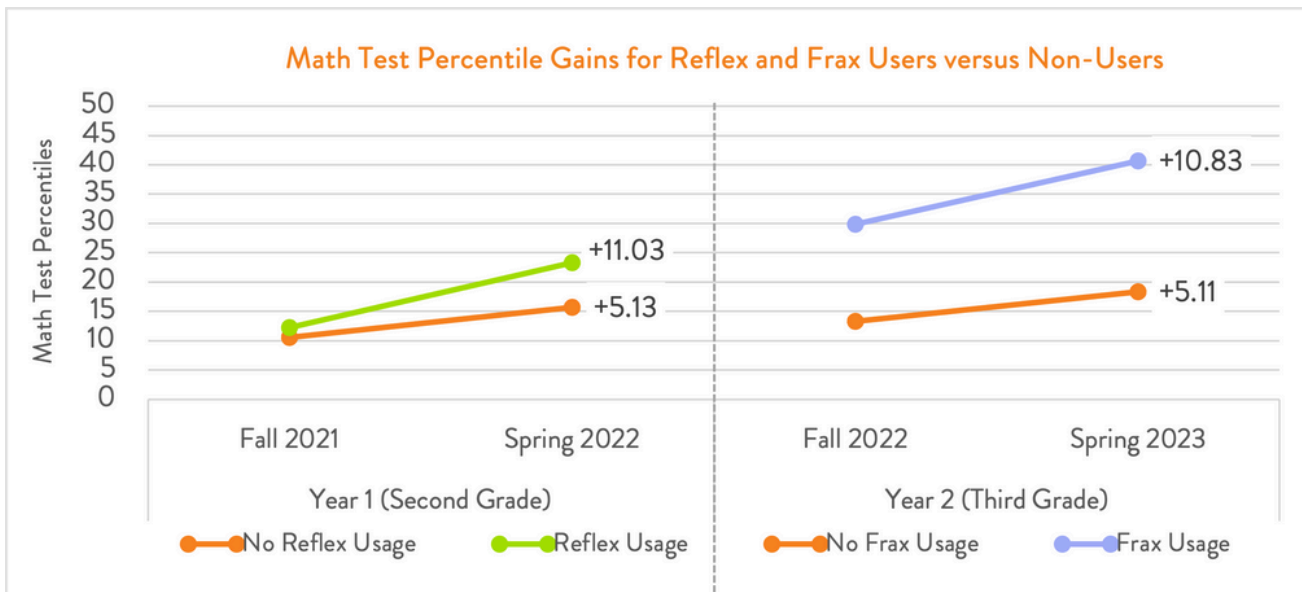
## Results

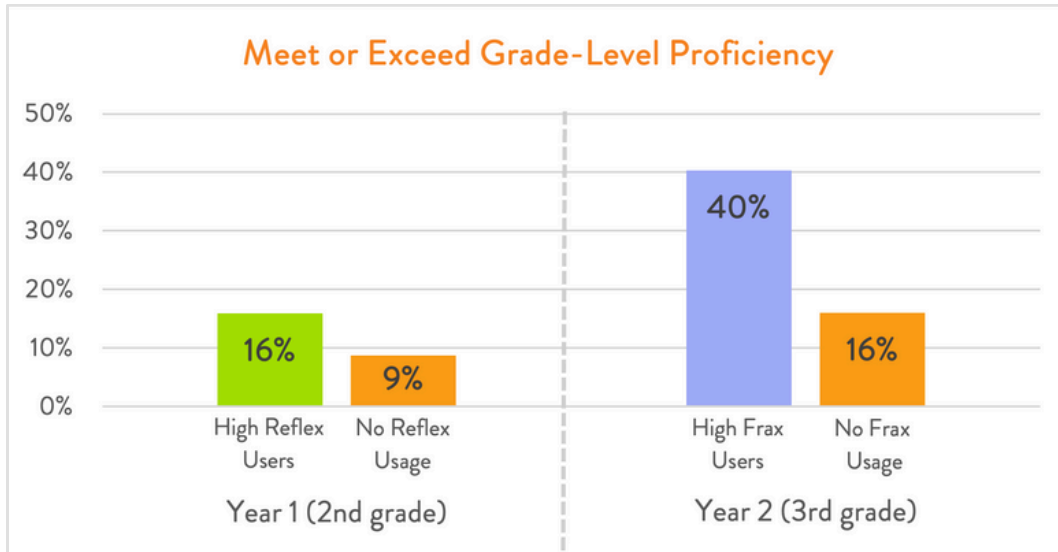
All students scored 2 or more grade levels below their peers on the BOY 2nd grade assessment (range 1st - 29th percentile, median = 11th percentile). Students who had high Reflex usage in 2nd grade improved on average by 11 percentile point percentile points, compared to average growth of 5 percentile points in the no-usage groups<sup>1</sup>. These students were also significantly more likely to move towards grade-level proficiency;

**learners who struggled in math and used Reflex were more likely to approach on-grade level proficiency by the end of 2nd grade (16%) compared to similar non-users (9%)<sup>2</sup>.**

In year 2, some of those Reflex users also went on to use Frax. **Students who used Reflex and Frax reached, on average, 40th percentile on their EOC 3rd grade assessment**, a gain of over 28 percentile points from Fall 21 BOY. Within the 22-23 school year, Frax users showed an average growth of 11 percentile points from fall 22 BOY to spring 23 EOC math assessment, compared to an average increase of 5 percentile points in the no Frax group<sup>3</sup>. Additionally, **learners who struggled in math and used both Reflex and Frax were 2.5x more likely to reach on-grade level proficiency by the end of 3rd grade (40%) compared to similar non-users (16%)<sup>4</sup>.**

Demographics	No Reflex or Frax Usage	Reflex Usage in 2nd grade (40+ days)	Frax Usage in 3rd grade (>20 lessons)
Sample Size	138	597	72
Female	40%	49%	26%
Black	33%	14%	17%
Hispanic	46%	62%	58%
White	16%	19%	22%
English Learner	29%	39%	42%
504 Eligible	1%	6%	4%





## Statistical Analyses and Technical Notes

<sup>1</sup> An independent samples t-test was conducted looking at the difference in individual growth in percentile rank from BOY fall 21 to EOC spring 22 testing for the Reflex users ( $n = 669$ ) compared to non-Reflex users ( $n = 138$ ). Students in the high Reflex usage group demonstrated significantly larger fall-spring math percentile growth ( $M = 11.03$ ,  $SD = 15.66$ ) than the non-Reflex usage group ( $M = 5.13$ ,  $SD = 15.70$ ),  $t(805) = 4.02$ ,  $p < .001$ , Cohen's  $d = .38$ .

<sup>2</sup> A 2x2 chi-square was conducted to analyze the rates of students approaching grade-level proficiency on EOC spring 22 testing (early-on grade level or above/1 grade level below or lower) within each usage group (Reflex Usage year 1/no Reflex usage year 1). Students in the high Reflex usage group were significantly more likely to approach grade-level proficiency (16%) than students with no usage (9%),  $\chi^2(1, N = 807) = 4.68$ ,  $p = .031$ .

<sup>3</sup> An independent samples t-test was conducted looking at the difference in individual growth in percentile rank from BOY fall 22 to EOC spring 23 testing for the Year 2 Reflex + Frax users ( $n = 72$ ) compared to non-product users ( $n = 138$ ). Students in the Frax usage group experienced significantly larger fall-spring math percentile growth ( $M = 11.56$ ,  $SD = 17.76$ ) than the non-Frax usage group ( $M = 5.11$ ,  $SD = 15.75$ ),  $t(208) = 2.39$ ,  $p = .018$ , Cohen's  $d = .35$ .

<sup>4</sup> A 2x2 chi-square was conducted to analyze the rates of students meeting grade-level proficiency (on-grade level or above/below satisfactory or lower) within each usage group (Frax Usage year 2 /no Frax usage year 2). Students in the high Frax usage group were significantly more likely to meet grade-level proficiency (40%) than those without usage (16%),  $\chi^2(1, N = 210) = 15.24$ ,  $p < .001$ .