

Stopping the Slide:

Frax and Reflex Support Math Achievement and Growth Across Grades 3–5

STUDY AT A GLANCE

Study Sample:

- 331 5th-grade students
- Large, suburban US school district
- District Student Racial Diversity: 43% Hispanic/Latino, 13% Black/African American, 36% White, 36% economically disadvantaged
- All students scored one grade level below math standards (31st–60th percentiles) at the start of 3rd grade

Research Methodology:

- 2021–2024 school years
- Benchmark math assessments were completed at the beginning of grade 3 and end of grade 5
- Compared grade 5 math and fractions performance of students who used Frax and/or Reflex to that of students with low/no usage

Main Findings:

- High fidelity usage of Frax and Reflex predicts 2.5x higher rates of math achievement in 5th grade compared to typical math instruction
- Relative math performance dropped for non-users—but with Frax and Reflex students moved up in rank by 19 percentile points
- Students who completed Frax Sectors 1 and 2 were nearly 5x as likely to exceed fractions standards as students with typical fractions instruction

"Mathematics is ruthlessly cumulative, all the way back to counting to ten."

—"How the Mind Works" by Steven Pinker

Introduction

In elementary math classrooms across the country, a troubling pattern persists: more students than ever are struggling with foundational skills gaps, and more children are falling further behind each year. Recent comparisons of student achievement to pre-pandemic testing reveal that students today are missing more prerequisite grade-level math skills than just five years ago. Without targeted support, these gaps widen over time. This "math slide" is particularly pronounced in grades 3 through 5, when students are expected to master increasingly complex concepts built on fluency with basic operations and number sense. Teachers face the dual challenge of remediating critical gaps while also moving students forward with grade-level content, often with limited resources for providing individualized support.

Math facts and fractions represent two of the most critical pressure points in this equation. Automaticity with math facts allows students to devote cognitive resources to problem-solving, while a solid understanding of fractions forms the foundation for algebra and later mathematics. Yet these areas are also where many students struggle most, and early weaknesses in them rarely resolve without intervention. These realities provide the rationale for this study's focus on **Reflex** and **Frax**, two programs designed to build these essential skills in engaging, personalized, and standards-aligned ways.

In this study, we examined whether Reflex and Frax could help students overcome these well-documented challenges. The results were clear: **students who used these programs improved their relative standing in math achievement, demonstrating measurable gains in both fluency and conceptual understanding.** These findings suggest that **investments in early, targeted support that students enjoy can make a meaningful difference in long-term success in math.**

Methods

The current study evaluated differences in student math performance across the later elementary years compared to Reflex and Frax usage. Math achievement was based on widely used and validated math benchmark assessments administered at the beginning of third grade (fall 2021) and the end of fifth grade (spring 2024).

- Baseline Equivalency: All students in the current sample were categorized as "One Grade Level Below" on grade-level math standards at the beginning of grade 3. This category indicates that they are *approaching* grade-level expectations and will benefit from grade-level instruction paired with individualized and targeted support to fill specific skill gaps and help them succeed with grade-level content. They may also benefit from review or remediation of material that is one grade level below their chronological grade. To ensure baseline equivalency across user and non-user groups, only the lower range of this group (31st - 60th percentiles) was included in the current sample.
- Math Achievement: Students completed their state math assessment at the end of grade 5. The outcomes analyzed here included both overall scale scores as well as scale scores on a sub-category assessing 5th-grade fractions standards (*Number Sense: Fractions and Decimals*). Additionally, rates of meeting grade-level expectations on both overall math and fractions sub-categories, as defined by the test, were compared across usage groups.

All teachers in the district had access to Reflex and Frax (Sectors 1 and 2), and some teachers chose to implement it with their students. All students had no or low usage of Reflex and Frax prior to their fall 2021 pre-test date. Fidelity usage for each product between pre-test and post-test dates was defined as follows:

- Reflex: students who used Reflex for 30 or more days and achieved 85% or higher fluency in Multiplication and Division are defined as high users of Reflex. Low users had fewer than 30 days of usage.
- Frax: Frax Sector 1 consists of 27 missions broadly aligned to 3rd-grade fractions standards. Sector 2 consists of 30 missions broadly aligned to 4th-grade fractions standards. Each mission takes, on average, 30 minutes to complete, and must be completed in order, with usage limited to one mission per day to encourage spaced learning. High usage is defined as completing 90% or more of the missions in the sector prior to taking the post-test. Low usage is defined as completing 5 or fewer missions in a sector.

Below, we compare results for 5th-grade students across the following usage groups:

1. No or low fidelity usage of Reflex and Frax (n = 49)
2. High fidelity usage of Reflex and no or low usage of Frax (n = 93)
3. High fidelity usage of Reflex and high fidelity usage of Frax Sector 1 (n = 142)
4. High fidelity usage of Reflex and high fidelity usage of Frax Sectors 1 and 2 (n = 47)

Results

High fidelity usage of Frax and Reflex predicts 2.5x higher rates of math achievement in 5th grade compared to typical math instruction

The first analysis looked at the impact of Reflex and Frax use on 5th-grade math achievement by conducting an ANCOVA test¹. This test controls for baseline performance to isolate the impact of the intervention. The results indicated that the use of Frax and Reflex had a large and significant impact on post-test scores. With means adjusted for pre-test performance, **students who used either Reflex alone or Reflex + Frax performed significantly better at post-test, scoring between 9 and 20 points higher on average than the control group.** The overall effect size of the intervention (partial eta squared) was .16, which indicates a large effect.

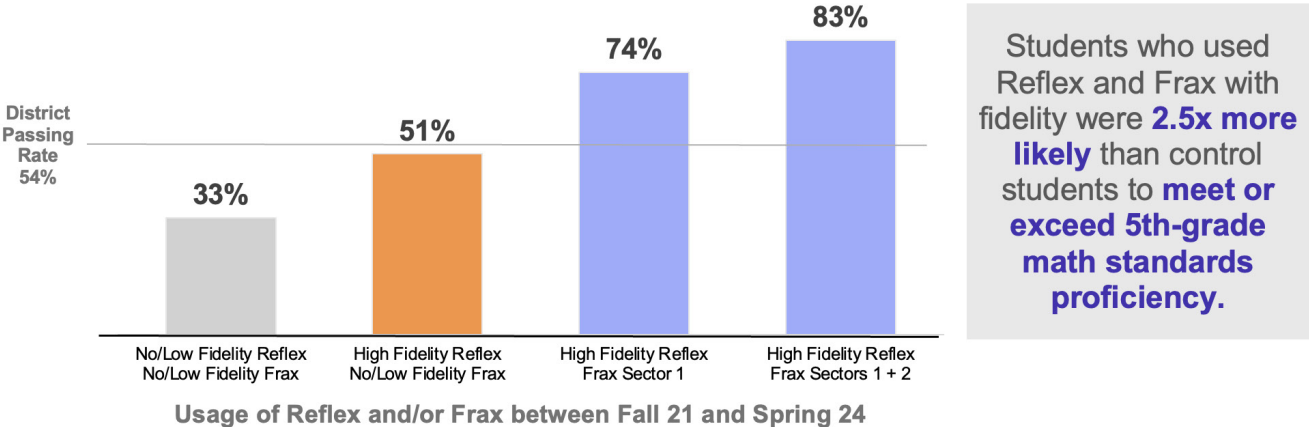
Group	Average Scale Score (Post-test)	Mean Difference between Usage and Control Group	Effect Size (Cohen's d) between Usage and Control Group
Control	213.05	-	-
Reflex Only	222.44	+9.40	.61
Reflex + Frax S1	229.50	+16.46	.98
Reflex + Frax S2	233.41	+20.37	1.39

Average scale score reflects the estimated marginal means, adjusted for baseline scale score.

Cohen's d can be interpreted as 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect

We also looked at the percentage of students in each group who met or exceeded grade-level math standards by the end of 5th grade. **Only 33% of students with no program usage met grade-level math standards—compared to 83% of students who used both programs with fidelity².** This means that over two-thirds of 5th-grade students in our sample without the support of Reflex and Frax are entering middle school with significant math skill gaps.

Percent of Students Meeting or Exceeding 5th-Grade State Math Test Expectations, by Fidelity Usage of Frax and/or Reflex

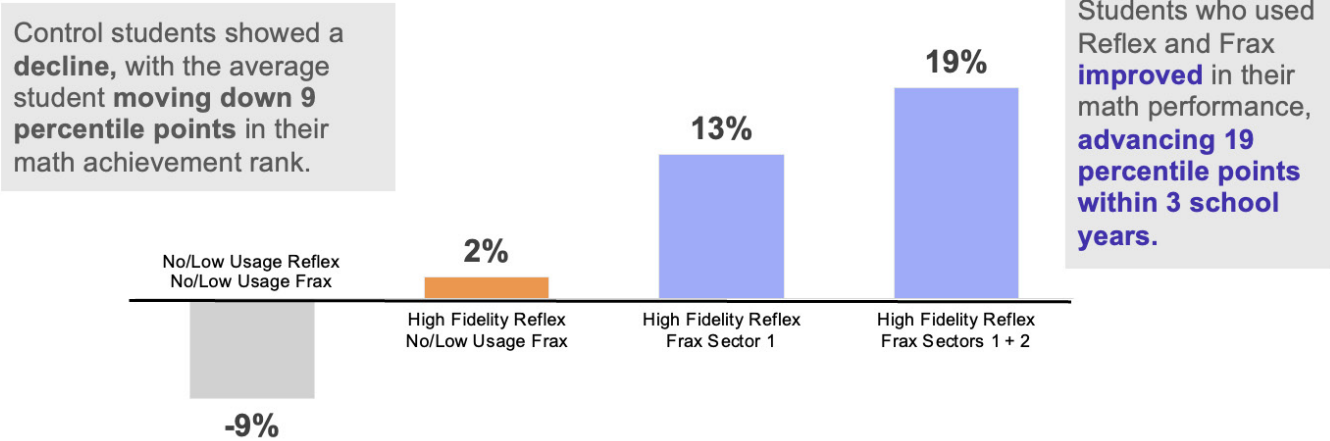


Results

Relative math performance dropped for non-users—but with Frax and Reflex, students moved up in rank by 19 percentile points

The next analysis looked at individual students' change in percentile rank from the beginning of 3rd grade to the end of 5th grade. Both Reflex and Frax supported students in achieving higher levels of growth in math performance compared to non-users. Students with no usage of Frax and low/no fidelity usage of Reflex showed a **decline** in achievement, with the average student moving down 9 percentile points in their relative achievement ranking. The foundational skills supported by Reflex and Frax helped those students **improve their rank compared to their peers on average by 19 percentile points** within three school years.

Average Change in Math Percentile Rank from 3rd - 5th Grade, by Fidelity Usage of Frax and Reflex



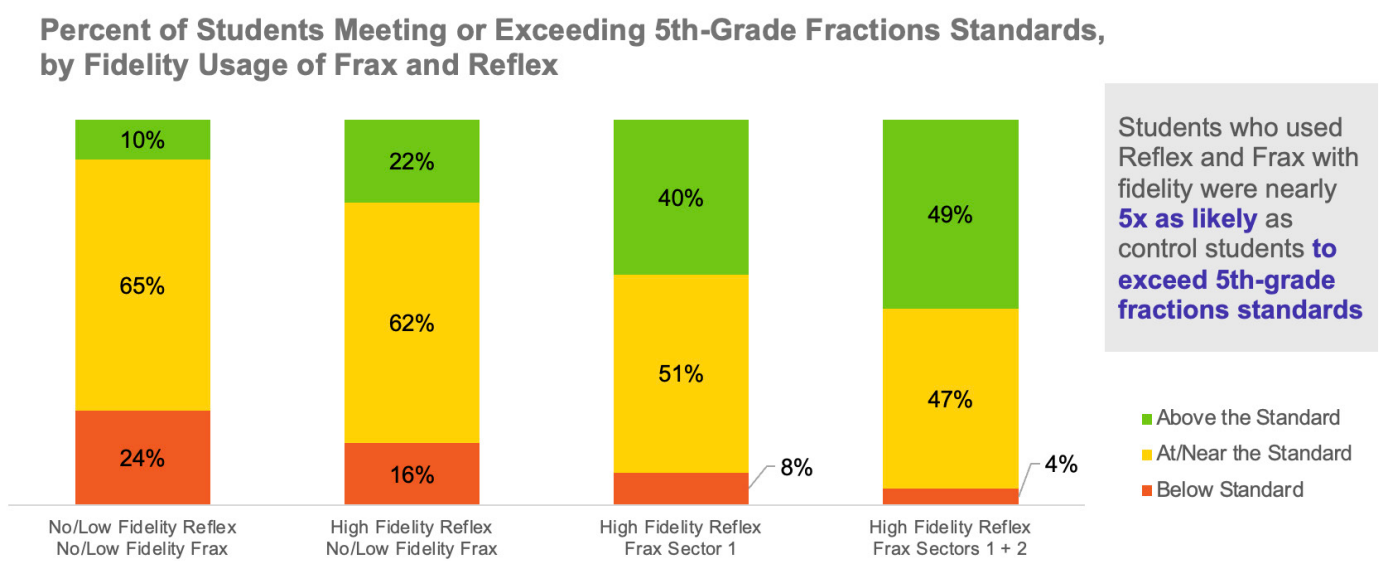
Results

Students who completed Frax Sectors 1 and 2 were nearly 5x as likely to exceed fractions standards as students with typical fractions instruction

In the final analysis, we looked at performance on the fractions sub-category of the 5th-grade math. While math fact fluency improvement should support improved performance across all of the subdomains equally, Frax should provided targeted support to standards-aligned fractions performance, and we should see an additional benefit to Frax Sector 1 and Sector 2 compared to both control and Reflex only conditions on the fractions subscale specifically.

With Frax Sectors 1 and 2, students were significantly more likely to both meet and exceed fractions standards compared to students with only standard fact fluency and fractions instruction. Reflex use alone reduced the number of students who failed fractions, from 24% to 16%, and more than doubled the number of students who exceeded standards. Most impressively, completing Frax Sectors 1 and 2 led to a nearly 5x increase in the number of students exceeding grade-level fractions expectations.

It is notable that Frax Sectors 1 and 2 address only 3rd and 4th-grade fractions standards, but combined with Reflex, they provided students with a strong foundation for building more advanced fractions knowledge in fifth grade, with 96% of these students meeting or exceeding grade-level expectations.



Conclusions

Prior research has consistently shown that early difficulties in mathematics persist without targeted intervention. Two areas are especially consequential: **math fact fluency and fractions understanding**. Automaticity with math facts enables students to tackle complex problem-solving without being held back by basic calculations, while proficiency with fractions is a cornerstone for success in algebra and higher-level mathematics. **Weaknesses in either domain create barriers that extend well beyond elementary school, limiting students' readiness for advanced coursework in middle and high school and contributing to long-term achievement gaps.**

The results of this study demonstrate that Reflex and Frax can effectively address these critical skills and support sustained academic growth. **Students who engaged consistently with both programs over a three-year period improved their relative achievement by an average of 19 percentile points and were more than twice as likely to meet or exceed grade-level math standards as those with no or low usage.** Reflex supported broad-based improvement in fluency, giving students the cognitive space to learn new skills, while Frax built the conceptual understanding necessary for mastering fractions. Notably, **completion of Frax Sectors 1 and 2 resulted in nearly half of students demonstrating fraction skills above grade level expectations—a nearly fivefold increase compared to peers receiving only typical classroom instruction.**

These findings underscore the long-term importance of addressing math fact fluency and fraction knowledge early and systematically. As schools and districts seek scalable, evidence-based solutions to improve math achievement, **Reflex and Frax offer a proven approach for equipping students with the essential skills they will need not only to succeed in elementary school but to thrive in middle and high school mathematics.**

IMPLICATIONS FOR PRACTICE

1. Prioritize Math Fact Fluency and Fractions Early

These two areas are not just “basic skills”—they are gateways to algebra and advanced mathematics. Addressing them in grades 3-5 helps prevent long-term struggles in middle and high school.

2. Fidelity of Implementation Matters

Students who engaged consistently with both Reflex and Frax achieved the strongest outcomes. Schools should set clear expectations for usage, provide teacher support, and monitor fidelity to maximize impact.

3. Support Teachers with Targeted Interventions

Teachers often juggle remediation and grade-level instruction. Reflex and Frax offer individualized, adaptive practice that lightens this load by giving every student practice tailored to their needs.

4. Plan for Long-Term Success

By strengthening fluency and fractions now, schools equip students with the skills to thrive in later grades. Early investment pays dividends in middle and high school readiness.

Statistical Analyses and Technical Notes

¹A one-way ANCOVA was conducted to examine the effect of Reflex and Frax on 5th-grade math achievement (overall scale score), controlling for prior math performance (3rd-grade overall scale score). The results indicated a significant effect of intervention, $F(3, 326) = 20.932$, $p < .001$, $\eta^2 = .162$. This indicates a large effect size.

Source	SS	df	MS	F	p	η^2
Pre-Test	5474.07	1	5474.07	25.14	<.001	.072
Groups	13674.86	3	4558.286	20.93	<.001	.162
Error	70990.37	326	217.762			
Total	90448.50	330				

Post-hoc test using Bonferroni's correction revealed a significant difference between all three usage conditions and the control group (all p 's < .01). In addition, there were significant differences between the Reflex only condition and both the Reflex + Frax Sector 1 condition ($p = .002$) and the Reflex + Frax Sectors 1 + 2 condition ($p < .001$). The difference between Frax Sector 1 and Frax Sectors 1 + 2 was not significant ($p = .689$).

Group	Adjusted Mean	Std. Error	N	95% Confidence Interval	
				Lower Bound	Upper Bound
Control	213.05	2.11	49	208.90	217.19
Reflex Only	222.44	1.53	93	219.43	225.45
Reflex + Frax S1	229.50	1.24	142	227.06	231.94
Reflex + Frax S2	233.412	2.15	47	229.18	237.65

²A 2x2 chi-square was conducted to analyze the rates of meeting grade-level proficiency standards on the 5th-grade state math test for students with both Reflex and Frax Sectors 1 and 2 compared to typical instruction (no or low fidelity Reflex and Frax usage). 83% of the students who used Reflex and Frax met or exceeded math standards compared to only 33% of typical instruction students. The chi-square was significant, $\chi^2(1, N = 96) = 24.83$, $p < .001$.

³2x2 chi-squares were conducted to analyze the rates of meeting or exceeding grade-level proficiency standards on the 5th-grade *Number Sense: Fractions and Decimals* sub-score of the state math test for students who used both Reflex and Frax Sectors 1 and 2 compared to typical instruction (low/no fidelity Reflex and Frax usage). 96% of the students who used Frax and Reflex met fractions standards compared to only 76% of typical instruction students. The chi-square was significant, $\chi^2(1, N = 96) = 7.89$, $p = .005$. Similarly, students who used Frax and Reflex were significantly more likely to exceed grade level fractions standards (49%) compared to students with typical instruction (10%), $\chi^2(1, N = 96) = 17.42$, $p < .001$.