

Frax Foundations I Helps At-Risk 3rd & 4th Grade Students Meet Achievement Benchmarks

Correlational Study of Frax Usage and Math Assessment Growth

Study Sample:

- 1,280 3rd and 4th grade students
- Large, suburban CA district
- Community demographics: 44% White, 37% Hispanic, 13% Asian
- 2021-2022 school year
- Completed Renaissance Star Math® Assessments in Fall 2021 and Spring 2022

Product Usage:

- 547 students with no usage (<5 Frax missions)
- 429 students with Partial usage (5-19 missions)
- 294 students with Fidelity usage (20+ Frax missions)

Analyses Conducted:

- Correlational analysis comparing student scale score changes from Fall 2021 to Spring 2022 across usage groups, controlling for BOY scale scores
- Analysis conducted separately by Fall Achievement Level Ranges (Levels 1, 2, 3, 4)
- Categorical movement from below proficiency (Levels 1 and 2) to above proficiency (Levels 3 and 4) by Frax usage was analyzed using chi-square

The pandemic resulted in unparalleled levels of learning loss. A [recent longitudinal report from Cambium Assessment](#) found that the number of students observed on grade level for mathematics dropped as much as 21% percentage points post-pandemic.

Fractions are a foundational math area relevant where young students struggle. Importantly, fractions knowledge in 5th grade uniquely predicts students' mathematics achievement in high school. However, teachers rate fractions as one of the top barriers to students' mastery of higher level mathematics.

INTRODUCTION

The current research report provides evidence of the efficacy of *Frax Foundations I* for supporting students' academic growth. In this sample of 1,280 students in 3rd and 4th grade within a large, suburban district in CA, students completed a baseline assessment (Fall 2021) and a follow-up assessment (Spring 2022) using Renaissance Star Math® Assessments. During the course of the school year, all schools in the district had access to Frax. Student usage resulted in the following groups:

- **Non-Users:** 547 Students who did not use Frax (0-4 missions completed)
- **Partial Usage:** 439 students who partially completed the *Frax Foundations I* (5-19 missions completed). These students averaged 11 Frax missions (range 5-19 missions).
- **Fidelity Usage:** 294 students who completed 20 or more Frax missions. These students averaged 26 Frax missions (range 20-27).

The current report details correlational analyses between program usage and growth on Renaissance Star Math® Assessments from Fall 2021 to Spring 2022. In all the analyses here, overall math **scale scores** were used to provide the most stringent test of the impact of *Frax* on student's overall ability to perform grade-level mathematics, using Fall scores as control variables where relevant.

Additionally, student scale scores were categorized into four **achievement levels** that were determined through [research by Renaissance](#) to correlate to the Smarter Balanced assessment Achievement Levels (see ranges in Table 1 below). Students performing at Levels 3 and 4 by the end of the year are considered to be meeting proficiency, while student at Levels 1 and 2 are considered below proficiency. Fall achievement levels were used to create equivalent baseline groups in the analyses that follow.

| Grade | Level 1 | Level 2 | Level 3 | Level 4 |
|-------|---------|---------|---------|----------|
| 3 | 0-546 | 547-620 | 621-686 | 687-1400 |
| 4 | 0-602 | 603-695 | 696-771 | 772-1400 |

FINDING 1: Students who had higher Frax usage demonstrated higher math achievement in Spring 2022

Researchers examined the relationship between higher spring Star scale scores and higher usage of Frax with a partial correlation that included fall Star scale score as a covariate. There was a positive, significant relationship, such that students who completed more Frax missions had higher Star math scores, $r(1277) = .123, p < .001$.

Achievement by grade. Researchers also examined this relationship for each grade separately. Within the cohort of 3rd grade students, there was a positive, significant relationship, such that students who completed more Frax missions had higher Star math scores, $r(654) = .118, p = .002$. Similarly, within the cohort of 4th grade students there was a positive, significant relationship, such that students who completed more Frax missions had higher Star math scores, $r(620) = .137, p < .001$.

FINDING 2: At-risk students who used Frax were more likely to achieve grade-level proficiency than non-users

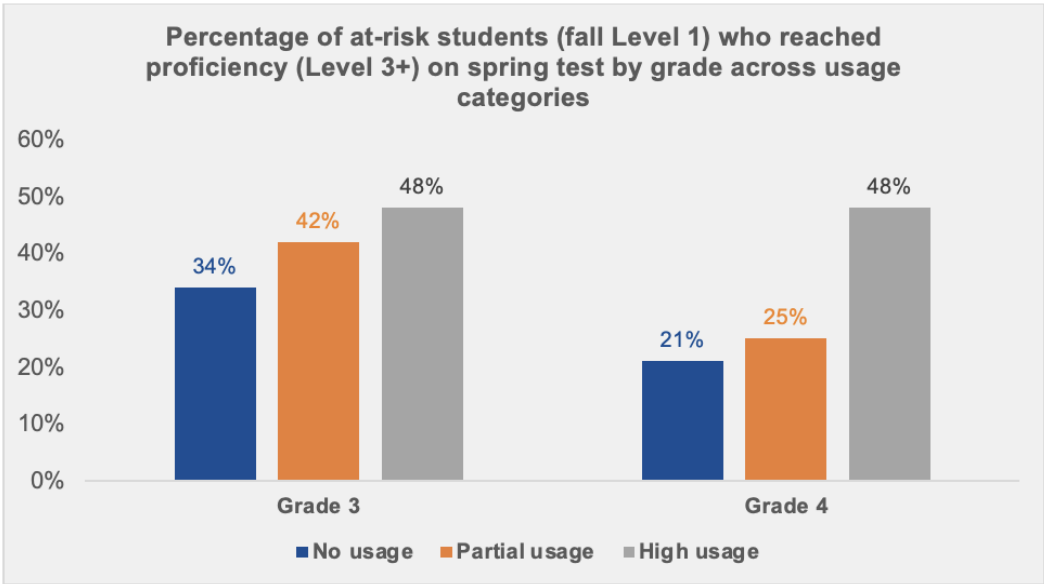
Researchers also examined student growth by looking at the relationship between Frax usage and likelihood of meeting proficiency by the Spring 2022 testing. The table below shows the number of students at each testing date, Fall 2021 and Spring 2022, who fell into each Achievement Level. Levels 1 and 2 are considered not meeting proficiency, while Levels 3 and 4 are considered meeting and exceeding proficiency, respectively. Students are not expected to meet proficiency for their grade in the fall, but should meet proficiency levels in the spring.

| Testing Date | Grade | Level 1 | Level 2 | Level 3 | Level 4 |
|--------------|-------|---------|---------|---------|---------|
| Fall | 3 | 376 | 193 | 72 | 16 |
| | 4 | 301 | 270 | 46 | 6 |
| Spring | 3 | 96 | 158 | 214 | 189 |
| | 4 | 69 | 185 | 217 | 152 |

Since a high percentage of students at Level 2 in the Fall move to levels 3 or 4 by the spring (88%), the following analysis focuses on the most at-risk students, those scoring within Level 1 at Fall testing date. Overall, only 34% of these students reached proficiency levels by the spring, making this an important group for intervention support.

The graph below shows the percentage of students who reached proficiency (Levels 3 or 4) in both 3rd and 4th grade for different levels of Frax usage (no usage, partial usage, high usage). In both grades, high usage was associated with increased likelihood of reaching grade-level proficiency. In particular, **4th grade students who had high Frax usage were 2.3x more likely than non-users to achieve grade-level proficiency on their spring math test.** 3rd grade students with high Frax usage were 1.4x more likely than non-users to achieve grade-level proficiency.

A chi-square analysis confirmed that the difference in reaching proficiency vs not reaching proficiency between non-users and high Frax users was significant, $\chi^2(1, n = 729) = 53.61, p < .001$.



For additional insights and findings, determined to satisfy Level III requirements according to the Every Student Succeeds Act (ESSA), please read the [full LearnPlatform research study](#).