CIGNITION

INDIVIDUAL (1:1) TUTORING SOLUTION - RANDOMIZED CONTROLLED TRIAL (RCT)

## Description

During Spring 2020, Cignition conducted a randomized controlled trial (RCT) to assess their online tutoring solution using an approach that combined online 1:1 tutoring with a fractions game, called "Fogstone Isle." The game provided students with additional learning opportunities and tutors with the information they could use to plan tutoring sessions. The RCT investigated whether students who participate in online tutoring and a related mathematical game learn more about fractions than students who only have access to the game.

During the study, we were able to collect complete data from 144 5th-grade students. The students were enrolled in four school sites, all serving low-income students with low prior mathematics achievement. After taking the same diagnostic pre-test, students in each research site were paired based on pre-test scores. Each pair was randomized: one student was assigned to the treatment condition and the other to the control condition. Students in the treatment and control groups started with similar mathematics scores. The number of students who completed the study was 144, evenly divided between the two conditions. In the treatment condition, students were assigned to a tutor and also assigned to play the game. Students were offered 10 weeks of tutoring, twice a week. Each session was approximately 25 minutes long. The topic of tutoring sessions focused on equivalence of fractions, comparing fractions, and adding fractions both with like and unlike denominators. In the control condition, students were able to play the game only and playing was optional. In both conditions, students continued to attend their existing classrooms and received ongoing instruction on fractions.
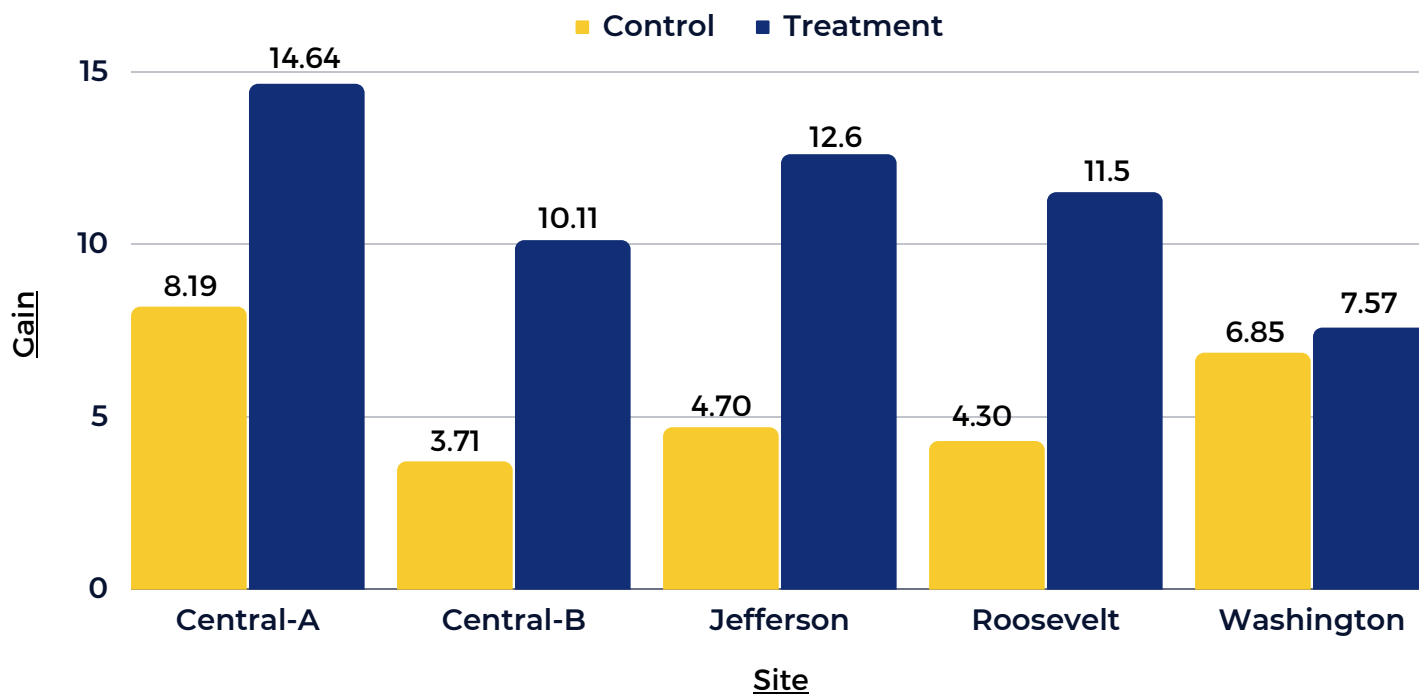
Summary of Findings

An interest in this study was to investigate whether students who received online tutoring and played the "Fogstone Isle" game learned more than students who only had access to the game. This randomized controlled study found that students who received one-to-one tutoring from Cignition scored, on average, 12 percentage points higher on the post-math assessment compared with students who only had the option to play the "Fogstone Isle" game **(see figure 1)**. The 12 percentage point difference between tutored participants and non-participants translates to an effect size of 0.46 standard deviations (Hedge's g).

Figure 1. Pre and post-tutoring math assessment scores (percentage correct)
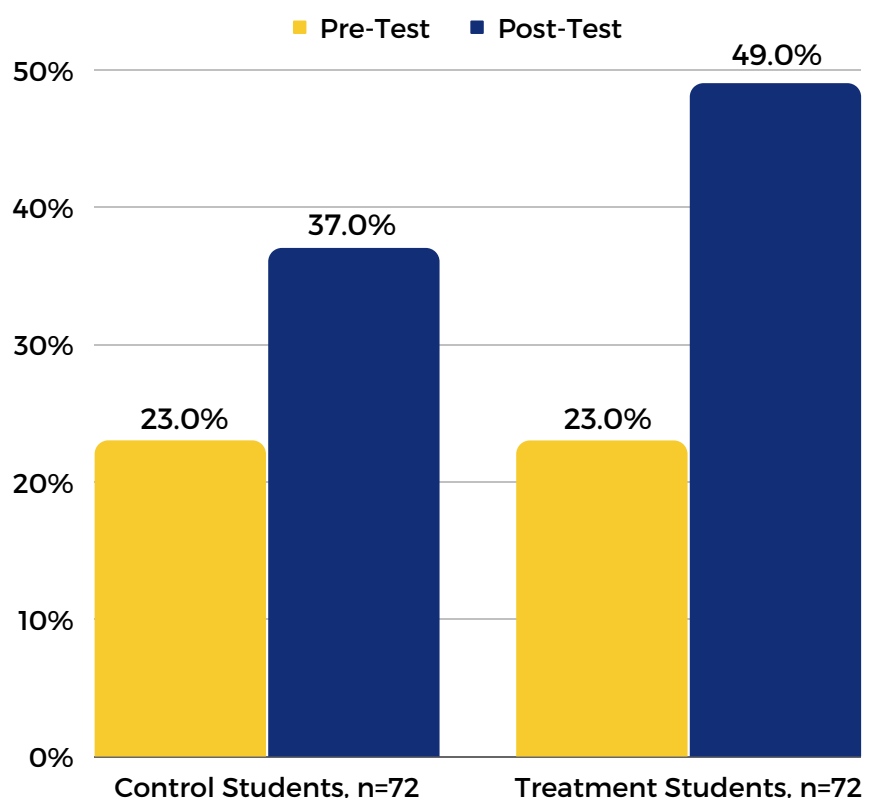
To interpret an effect size, Lipsey et al. (2012) recommend using the expected amount of mathematics learning gained from a full year of instruction as a benchmark. For grades 5-6, the effect size benchmark is 0.41. Hence the interpretation of an effect size of 0.46 is that if low-performing students were provided a full year of Cignition group tutoring, instead of only 10 weeks, they would gain about as much in that single year as normally would be expected in two years of instruction. This is based on the assumption that a 0.46 effect size would be maintained if Cigniton tutoring lasted the entire year.

Bar chart comparing Control and Treatment gain by Site.

Site	Control	Treatment
Central-A	8.19	14.64
Central-B	3.71	10.11
Jefferson	4.70	12.6
Roosevelt	4.30	11.5
Washington	6.85	7.57

Conclusion

The Pelligrini et al. (2018) meta-analysis of elementary math tutoring programs found g = .26 and was based largely on face-to-face tutoring studies. Thus, this study compares favorably to prior research on face-to-face mathematics tutoring with elementary students. Such results lend to further exploring online tutoring for elementary math students as worthwhile for two reasons. First, the costs may be lower and the logistics simpler for online tutoring compared to face-to-face tutoring because travel is not required. Second, the supply of highly qualified tutors may be in one geographic location, while demand for tutoring may be in another region. Online tutoring could bring talented tutors into settings where qualified tutors are not otherwise readily available.

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