

ONLINE GROUP (4:1) TUTORING SOLUTION - RANDOMIZED CONTROLLED TRIAL (RCT)

Description

During Spring 2022, Cignition conducted a randomized controlled trial (RCT) to assess their online group tutoring solution (4:1 student-tutor ratio). The RCT investigated whether students who receive group tutoring score higher on the math assessment than students who do not receive group tutoring. Secondly, we wanted to understand students' math confidence and enjoyment.

The study included 157 5th-grade students who were enrolled in eleven schools in one rural/suburban school district in the United States. All the students in the study were performing below grade level in mathematics and were recommended for tutoring by their teachers. Students were randomly assigned to either the treatment or control condition.

In the treatment condition, students received 30-minute tutoring sessions (4:1 student-tutor ratio). The sessions were scheduled four times a week during the school day. On average students in the treatment condition attended 26 tutoring sessions. In the control condition, students did not receive tutoring rather they attended their regular classes and received whatever the teacher decided on. Students in both groups continued to attend their assigned mathematics classrooms. The topic of the tutoring sessions focused on fractions - fractions on a number line, comparing and ordering fractions, mixed numbers and fractions > 1 , and equivalent fractions. Prior to launching the study, Cignition worked closely with Digital Promise to develop a unique set of tutoring lessons and problem designs specifically designed for group tutoring. The design also included a unique suite of supports for both students and tutors specifically to establish productive social norms, interaction processes, and mathematical discourse for group tutoring sessions. We also developed a training and coaching program to help tutors grow and work in a collaborative learning environment.

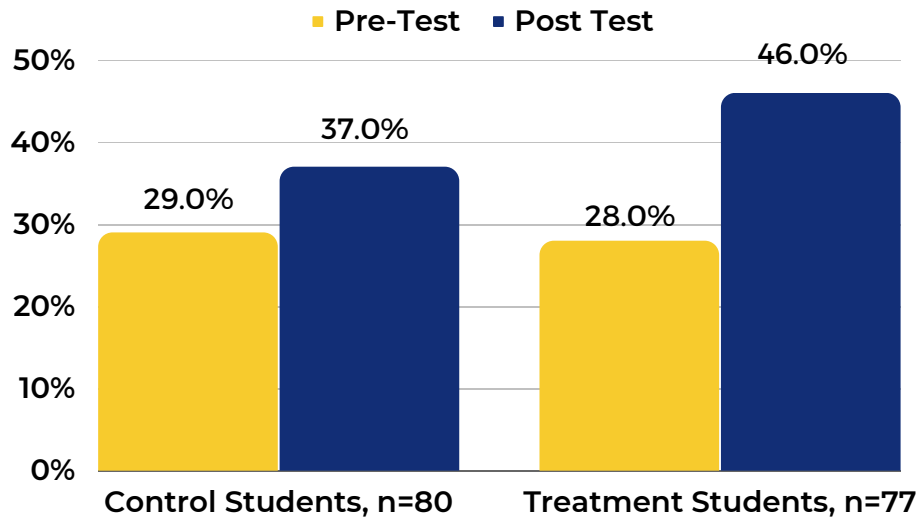
Before tutoring began and after tutoring ended, students in both conditions completed a math confidence and enjoyment survey and a math assessment on the topic of fractions. Additionally, for the treatment condition only, students completed a relationship survey to measure what the students thought about their relationship with their tutors.

Summary of Findings

Students who participated in Cignition group tutoring gained more knowledge of fractions.

- Students who received group tutoring from Cignition scored, on average, **9 percentage points higher** on the post-math assessment than students who did not receive group tutoring (see **Figure 1**).
- The analysis supports **99 percent confidence** that Cignition tutoring had a positive effect on student learning.

Figure 1. Pre and post-tutoring math assessment scores (percent correct)

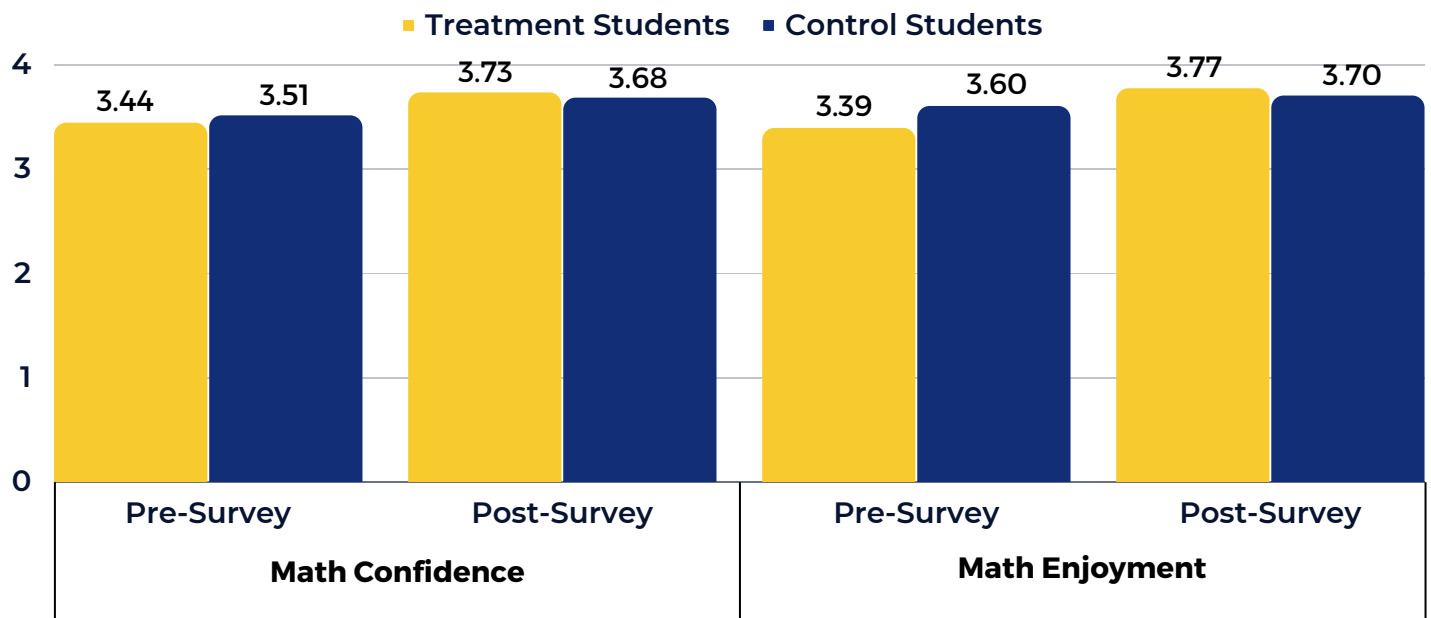


The 9 percentage point difference between tutored participants and nonparticipants translates to **an effect size of 0.44 standard deviations (Hedge's g)**. To interpret an effect size, Lipsey et al. (2012) recommends using the expected amount of mathematics learning gained from a full year of instruction as a benchmark. For grades 5-6, the effect size benchmark is 0.41. Hence the interpretation of an effect size of 0.44 is that if low-performing students were provided a full year of Cognition group tutoring, instead of only 9 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 0.44 effect size would be maintained if Cigniton tutoring lasted the entire year.

Students who participated in Cognition group tutoring reported high levels of math confidence and enjoyment (see figure 2) compared to the control group.

- When asked students to rate the extent to which they agreed with several statements about their math confidence on a 5-point Likert scale, on average, and controlling for baseline responses, **students who were randomly selected to participate in Cognition group tutoring expressed confidence in math that was greater than that of students who did not participate by .05 points.**
- Questions included items such as:
 - “How confident are you that you can do all the work in math class if you don’t give up?”
 - “How certain are you that you can learn everything taught in math?”
- When asked students to rate the extent to which students agreed with several statements about their enjoyment of math on a 5-point Likert scale, on average, **students who were randomly selected to participate in Cognition group tutoring expressed enjoyment that was greater than that of students in the control group by .07 points.**
- Questions included items such as:
 - “I am really good at math.”
 - “I can solve difficult math problems.”

Figure 2. Change in math confidence and enjoyment scores (scale units)



Students who participated in Cognition group tutoring reported positive relationships with their tutors, with little variation by tutor.

- The study measured student-to-tutor relationships on a 5-point Likert scale. Students who were randomly selected to participate in Cognition group tutoring reported a 4.25 average rating on questions related to their relationship with their tutor, which places them between agreement or strong agreement on average.
- Questions included:
 - “My tutor treated me with respect.”
 - “My tutor is glad that I am in their class.”

Conclusion

The findings from this study provide evidence of the effectiveness of Cigniton’s 4:1 math tutoring offering in increasing students’ math knowledge. In addition to increased math achievement as evidenced by the post-tutoring math assessment, students who participated in Cignition group tutoring expressed more confidence in, and enjoyment of math. The degree of effect size on math knowledge found in this study of group tutoring (4:1) was similar to the effect previously measured in a study of Cignition’s one-to-one tutoring (1:1), which suggests that Cignition’s 4:1 tutoring is as effective as the 1:1 offering. As a result of the similar effect sizes between 1:1 and 4:1 tutoring, there can be a higher potential to reach more students through math tutoring in a more cost-effective way. Cignition looks forward to sharing our unique and cost-effective group tutoring approach with more students nationwide.

References

- Lipsey, M. W., Puzio, K., Yun, C., Hebert, M. A., Steinka-Fry, K., Cole, M. W., ... & Busick, M. D. (2012). Translating the Statistical Representation of the Effects of Education Interventions into More Readily Interpretable Forms. National Center for Special Education Research.
- Roschelle, J., Cheng, B. H., Hodkowski, N., Neisler, J. & Haldar, L. (2020). Evaluation of an online tutoring program in elementary mathematics [Project Report]. San Mateo, CA: Digital Promise. Retrieved from: <http://hdl.handle.net/20.500.12265/94>