The Effect of Student-Tutor Ratios:Experimental Evidence from a Pilot Online Math Tutoring Program

Matthew A. Kraft
Brown University

Virginia S. Lovison
Brown University

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Abstract

Budget constraints and limited supplies of local tutors have caused many K-12 school districts to pivot from individual tutoring in-person toward small-group tutoring online to expand access to personalized instruction. We conduct a field experiment to explore the effect of increasing student-tutor ratios on middle school students' math achievement and growth during an online tutoring program. We leverage a novel feature of the program where tutors often taught individual and small-group tutoring sessions, allowing them to directly compare their experiences across these settings. Both experimental estimates and tutor survey responses suggest 1:1 tutoring is more effective than 3:1 tutoring online. Tutoring small groups in an online format presents additional challenges for personalizing instruction, developing relationships, fostering participation, and managing student behavior.

Introduction

The COVID-19 pandemic and subsequent school closures created an acute need to support students' academic acceleration with more individualized instruction. While school-based tutoring programs have traditionally operated at a relatively modest scale, an influx of federal dollars for COVID-19 relief has allowed schools to expand tutoring programs (Dusseault & Pillow, 2021; Institute of Education Sciences, 2022). Still, the high costs of tutoring and limited supply of local tutors have proven to be substantial challenges to taking in-person tutoring to scale. Many districts have addressed these challenges by offering tutoring online and increasing student-tutor ratios. Pivoting from one-on-one (1:1) to small-group tutoring is attractive because it reduces per-pupil costs *and* expands tutoring access (Kraft & Falken, 2021).

In this pilot study, we seek to inform efforts to scale tutoring by comparing the efficacy of individual versus small-group tutoring in the setting of an online math tutoring program. Studies that randomize students to different tutoring group sizes suggest that 1:1 and small-group in-person tutoring produce similar gains in student learning (Clark et al., 2016; Clarke et al, 2017; Clarke et al., 2020; Doabler et al. 2019; Fuchs et al., 2013; Miles et al. 2022; Vadasay & Sanders, 2008; Vaughn et al., 2010), with some studies identifying larger effects for 1:1 tutoring (Clarke et al., 2023; Schwartz, 2012). Meta-analyses that compare tutoring programs with different student-tutor ratios suggest that 1:1 and small-group in-person tutoring are both effective, but that 1:1 tutoring produces larger effects (Neitzel et al., 2021; Nickow et al., 2024).

We know far less about the effect of student-tutor ratios for tutoring delivered via online platforms. There are several reasons why we might suspect that the effect of student-tutor ratios is different across in-person and online settings. Online platforms may limit the ability of tutors to have the types of private, one-on-one conversations with students that are possible during in-

person small-group tutoring. Managing student behavior in small groups could also be a bigger challenge when tutors are not physically present. It might also be more challenging to differentiate instruction across a small group of students in online settings where everyone shares a common screen.

We present new evidence from a randomized control trial and tutor survey on the effect of student-tutor ratios when tutoring is delivered online. A number of experimental studies have established that online tutoring can be effective (Fesler et al., 2023; Gortazar et al., 2023, Kraft et al., 2022; Ready et al., 2024; Roschelle et al., 2020). Two recent studies directly compare the effectiveness of online tutoring with individual students versus in pairs and find larger effects for individual tutoring in both early elementary literacy (Robinson et al. 2024) and middle school math (Carlana & Ferrera, 2024). We complement these studies by exploring the effect of 1:1 versus small-group online tutoring in middle school math.

We randomly assign 180 middle school students to a 10-week online math tutoring program offered during the school day in an individual format or a small group format (3:1) and evaluate the effect on student achievement and growth. We also complement our experimental design with Likert-scale and open-ended survey responses from tutors about their experiences delivering online tutoring. The majority of tutors delivered both 1:1 and 3:1 tutoring, allowing us to conduct novel within-tutor analyses about how tutor perceptions of self-efficacy and student engagement differ under each format.

We find that 1:1 online tutoring produces larger gains in student academic growth in math relative to 3:1 student tutoring, equivalent to 8.10 student growth percentiles. Estimates for effects on student achievement in levels are substantively meaningful [0.14 standard deviation (SD)] units but imprecisely estimated. These results are consistent with tutors' survey responses,

which reveal strong perceptions that tutors were more effective and students learned more in 1:1 tutoring than 3:1 tutoring. Tutors explained that 1:1 tutoring accommodated more personalized connections and instruction and encouraged more student participation, as middle school students were less inclined to speak up in a group and were also more distracted in an online group setting. On the other hand, tutors reported that 3:1 tutoring created unique opportunities for team activities and peer learning. Although the lack of a pure control group limits what we can conclude about the efficacy of online tutoring in small-groups and its relative cost-effectiveness, our results do suggest that 1:1 online tutoring can be an effective model for accelerating student achievement in middle school math.

Methods

Setting and Sample

Three school districts participated in our pilot study: Charles County, Maryland; Monterey Peninsula Unified, California; and Grand Forks, North Dakota. We describe district characteristics in Online Appendix A. Although all three districts implemented the online tutoring program, we restrict our experimental analyses to students from Grand Forks where we were able to successfully implement our randomization protocol and access relevant administrative data.

Grand Forks serves a diverse group of 7,500 students across 18 schools, many of whom are children of military members serving at the Grand Forks Air Force Base. 180 students across three middle schools serving grades 6-8 participated in the study. The district selected students to participate in the study that did not yet meet grade level expectations in mathematics and were eligible for tutoring as part of the district's Response-to-Intervention (RTI) Tier 2 supports. As

shown in Table 1, 54% of the students in our experimental sample identified as white, 16% as Black, 15% as Hispanic, and 2% as multi-racial. Twenty-three percent of students qualified for extra time on assessments, which is the measure Grand Forks uses to identify students with educational needs that required additional support (e.g. students with disabilities and multi-lingual learners with developing English proficiency).

Tutoring Program

The tutoring intervention spanned 10 weeks during the spring of 2023, with students attending an average of twenty-four 45-minute online tutoring sessions. All tutoring took place in-school during the school day under the supervision of school staff. Tutoring was provided by Littera Education via their online platform. Littera Education contracted 150 tutors to deliver tutoring using Renaissance Learning's Nearpod tool, which recommends lessons and activities based on students' performance on the Star Math assessment. To the extent possible, students assigned to the 3:1 tutoring condition were grouped with other students who also required support in the same content areas. Tutors were matched to students based on tutor availability.

Tutors were predominantly female (78%) and racially diverse (51% white, 27% Black, 10% Hispanic, 5% Asian, 5% multi-racial, 1% Native Hawaiian or Pacific Islander). All tutors were high school graduates and 90% held a bachelor's degree or higher. Most tutors were former teachers (83%) with 60% of the sample reporting five or more years of tutoring experience. During the research study, 58% of tutors provided both group and individual tutoring, 13% provided group tutoring only, and 29% provided individual tutoring only.

Data

Star Assessment. District staff administered the Star Math online adaptive assessment to students twice: once between December 2022 and January 2023 (baseline) and once in May 2023

(endline). Ninety-seven percent of students (n=173) completed the baseline assessment and 99% (n=179) completed the endline. We standardize Star Math scale scores using the national mean and standard deviation for each grade. Renaissance also reports Student Growth Percentiles (SGPs) which are a measure of how much students improve over well-defined intervals relative to a national sample of students with the same baseline scores. We use these SGPs to report on winter-to-spring learning gains on the Star Math assessment during the tutoring intervention.

Tutor Surveys. We administered an online survey to tutors working across all three districts in April 2023. Eighty-six tutors completed the survey for a response rate of 57%. The survey asked tutors to rate typical levels of student focus, effort, and excitement during tutoring sessions on 5-point, construct-specific Likert response scales. We also asked tutors to assess their own self-efficacy and impact during tutoring using similar response scales. Online Appendix B contains the full survey instrument. If tutors worked with students in groups of 1:1 and 3:1, we asked them to complete survey items twice – one for each specific tutoring condition. We also asked all tutors what they thought was the most effective student-tutor ratio. Finally, we asked tutors a series of open-ended questions regarding the advantages and limitations of individual and small-group tutoring.

Randomization Design and Analysis

We randomized students to receive individual or small-group online tutoring within blocks according to student schedules. In a small number of instances, students were grouped with peers from different grades with similar skill levels. Table 1 provides descriptive statistics on the students assigned to each treatment condition. Students in the 1:1 and 3:1 groups appear balanced across all pre-treatment student characteristics. A joint-F test fails to reject the null

hypothesis that there are no differences in baseline characteristics between conditions. We estimate the effect of 1:1 versus 3:1 online tutoring as follows:

$$Y_i = \alpha + \beta(Treat_i) + \delta X_i + \pi_b + \epsilon_i$$

where Y_i represents the endline Star Math score for student i, π is a vector of indicators for randomization blocks, and X_i is a vector of student-level covariates including student baseline Star Math score, age, race, and an indicator for whether the student was granted additional time on the assessment. The coefficient β captures the causal effect of 1:1 online tutoring relative to 3:1 online tutoring. We omit baseline scores when modeling SGPs as the outcome.

Survey Analysis

We analyze our quantitative survey data within a regression framework with tutor fixed effects. Coefficients from these fixed effect regressions capture the average within-tutor difference in how each tutor responded to the item for individual and small-group online tutoring. We also summarize key qualitative themes that emerged from tutors' open-ended survey responses.

Findings

Experimental Results

We find suggestive evidence that 1:1 online tutoring increased student achievement in math relative to 3:1 online tutoring. The estimated effect on students' standardized Star Math scores is 0.14 SD in our preferred model with controls, but is imprecisely estimated and not statistically significant. We do find a positive and marginally significant effect on students'

academic growth in math as measured using SGPs, such that 1:1 online tutoring accelerated student growth in math by an additional 8.10 percentile points (p=0.06) relative to students in 3:1 online tutoring.

Tutor Survey Findings

Survey responses further affirm the advantages of individual tutoring, where 88% of tutors judged 1:1 to be the most effect student-tutor ratio for online tutoring. Among tutors who provided both individual and group tutoring, tutors reported that students assigned to 1:1 tutoring demonstrated substantially more effort, excitement, focus, and improvement than students assigned to 3:1 tutoring. For example, when comparing 1:1 and 3:1 tutoring, individual tutors were 36 percentage points more likely to say their 1:1 students put in "quite a bit" or "a great deal of effort." As shown in Table 2, an aggregate factor score measure of tutors' perceptions of student success was a strikingly large 0.92 SD higher for 1:1 tutoring.

Four primary advantages of individual tutoring emerged from tutors' open-ended responses. Tutors commonly reported that individual tutoring allowed them to: 1) "personalize the lesson" and "customize the learning experience" so that each student "learned at his/her own pace"; 2) "build a better relationship with students" ; 3) "move at a faster pace" because there were "less distractions" and students were not "working at different paces"; and 4) create a space where "kid feels special, valued and safe to be themselves" and "weren't afraid to ask questions" and "weren't afraid of being wrong." Several tutors highlighted these themes in their comments:

> "In the group of three 8th graders, it could be tough to keep them all engaged and being vulnerable enough to try their best. When one or two of them were absent, I was able to make so much more progress with the kid(s)."

> "1-1 allowed me to move at a faster pace. With my group of three, they were varied in levels so while one student quickly would get the material, others we would wait for. 1-1 student interactions were also more personal and I felt better connected to those students."

Small-group tutoring added "another layer of complexity" because "students who are shy and struggling may have an even harder time learning and participating" and because "it was more difficult to build relationships of trust with multiple students." One tutor explained:

> "Kids who are middle and high school ages often don't feel comfortable tutoring with other kids. Tutoring settings are 'intimate' and require a level of trust and vulnerability. Kids who attend a session with other kids; especially ones they aren't comfortable with, can interfere with them achieving their full potential."

Many tutors also commented on "behavior issues" that emerged in small-group tutoring with students "not paying attention, choosing not to participate, not staying focused." One tutor stated simply:

> "The more students in a session, the more time/energy a teacher will spend on classroom management."

At the same time, several tutors highlighted "peer explanations", "more discussion", and "competitions or team activities" that were "a good motivator" as important benefits of small group tutoring. They explained how in small groups "students can benefit from listening to peers' explanations" and that "sometimes the students would answer the questions differently which would lead to a discussion." A tutor described these benefits as a delicate balance:

> "Group tutoring, with two or three students offered them the opportunity to work with their peers and feed off those discussions and interactions. However, this also had

negative outcomes as where one student was not interested this lack of interest seemingly spread to the others."

Cost-Effectiveness

Although our research design does not allow us to estimate the effect of 3:1 online tutoring, we can draw on results from five other experimental studies of small-group online tutoring. Three studies examine the effect of tutoring online with pairs of students and find large effects on students' secondary math achievement (0.26 SD; Gortazar et al. 2024), medium, insignificant effects on middle school math achievement (0.09 SD; Carlana and Fererra 2024), and small, insignificant effects on early elementary students' literacy skills (0.00-0.10 SD; Robinson et al. 2024). Fesler et al. (2023) evaluate 3:1 online tutoring in math among upper elementary school students and find medium but insignificant effects of (0.13 SD), while Reddy et al. (2024) find smaller but significant effects for small-group elementary school reading (0.05 SD). Given these findings, it is plausible but not guaranteed that the effects of 3:1 tutoring in our context were at least 0.07 SD, the minimum effect size necessary for 3:1 tutoring to be at least a third as effective as 1:1 tutoring (assuming the effect of 1:1 is the estimated difference between 1:1 and 3:1 plus the effect of 3:1).

Conclusion

The results of our pilot study suggest that 1:1 online tutoring produces meaningfully larger gains in student achievement in math, relative to 3:1. While estimates are imprecise, they are economically meaningful and consistent with tutors' own perceptions of the advantages of tutoring individual students online versus small groups. Our study also reveals potential opportunities to increase the effectiveness of online tutoring in small groups with curriculum

specifically designed for this setting and on-the-ground support to help keep students engaged and on-task. These efforts will be critical for expanding access to tutoring at scale in a cost-effective way without diminishing its effectiveness.

References

Carlana, M., & La Ferrara, E. (2024). *Apart but Connected: Online Tutoring, Cognitive Outcomes, and Soft Skills* (No. w32272). National Bureau of Economic Research.

Clarke, B., Doabler, C., Smolkowski, K., Kurtz Nelson, E., Fien, H., Baker, S. K., & Kosty, D. (2016). Testing the immediate and long-term efficacy of a tier 2 kindergarten mathematics intervention. *Journal of Research on Educational Effectiveness*, *9*(4), 607-634.

Clarke, B., Doabler, C. T., Kosty, D., Kurtz Nelson, E., Smolkowski, K., Fien, H., & Turtura, J. (2017). Testing the efficacy of a kindergarten mathematics intervention by small group size. *AERA open*, *3*(2), 2332858417706899.

Clarke, B., Doabler, C. T., Turtura, J., Smolkowski, K., Kosty, D. B., Sutherland, M., ... & Baker, S. K. (2020). Examining the efficacy of a kindergarten mathematics intervention by group size and initial skill: Implications for practice and policy. *The Elementary School Journal*, *121*(1), 125-153.

Doabler, C. T., Clarke, B., Kosty, D., Kurtz-Nelson, E., Fien, H., Smolkowski, K., & Baker, S. K. (2019). Examining the impact of group size on the treatment intensity of a tier 2 mathematics intervention within a systematic framework of replication. *Journal of Learning Disabilities*, *52*(2), 168-180.

Clarke, B., Doabler, C. T., Sutherland, M., Kosty, D., Turtura, J., & Smolkowski, K. (2023). Examining the impact of a first grade whole number intervention by group size. *Journal of Research on Educational Effectiveness*, *16*(2), 326-349.

Dusseault, B., & Pillow, T. (2021, July). First look at ESSER priorities: Districts are placing their bets on what they know. Center on Reinventing Public Education. https://crpe.org/first-look-at-esser-priorities-districts-are-placing-their-bets-on-what-theyknow/

Fesler, L., Gu, A., & Chojnacki, G. (2023). Air Tutors' Online Tutoring: Math Knowledge Impacts and Participant Math Perceptions. Middle Years Math Grantee Report Series. *Mathematica*.

Fuchs, L. S., Geary, D. C., Compton, D. L., Fuchs, D., Schatschneider, C., Hamlett, C. L., ... & Changas, P. (2013). Effects of first-grade number knowledge tutoring with contrasting forms of practice. *Journal of educational psychology*, *105*(1), 58.

Gortazar, L., Hupkau, C., & Roldán-Monés, A. (2024). Online tutoring works: Experimental evidence from a program with vulnerable children. *Journal of Public Economics*, *232*, 105082.

Institute for Education Sciences. (2022). School Pulse Panel. https://ies.ed.gov/schoolsurvey/spp/

Kraft, M.A. & Falken, G.T. (2021). A blueprint for scaling tutoring and mentoring across public schools. *AERA Open*, *7*(1), 1-21.

Kraft, M. A., List, J. A., Livingston, J. A., & Sadoff, S. (2022). Online Tutoring by College Volunteers: Experimental Evidence from a Pilot Program. AEA Papers and Proceedings, 112, 614–618. https://doi.org/10.1257/pandp.20221038

Miles, K. P., McFadden, K. E., Colenbrander, D., & Ehri, L. C. (2022). Maximising access to reading intervention: comparing small group and one-to-one protocols of Reading Rescue. *Journal of Research in Reading*, *45*(3), 299-323.

Nickow, A., Oreopoulos, P., & Quan, V. (2024). The Promise of Tutoring for PreK–12 Learning: A Systematic Review and Meta-Analysis of the Experimental Evidence. *American Educational Research Journal*, *61*(1), 74-107.

Ready, D., McCormick, S., and Shmoys, R. (2024). The Effects of In-School Virtual Tutoring on Student Reading Development: Evidence from a Short-Cycle Randomized Controlled Trial. (EdWorkingPaper: 24-942). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/569p-wz78

Robinson, C. D., Pollard, C., Novicoff, S., White, S., and Loeb S. (2024). The Effects of Virtual Tutoring on Young Readers: Results from a Randomized Controlled Trial. (EdWorkingPaper: 24-955).

Roschelle, J., Cheng, B. H., Hodkowski, N., Neisler, J., & Haldar, L. (2020). Evaluation of an Online Tutoring Program in Elementary Mathematics. *Online Submission*.

Schwartz, R. M., Schmitt, M. C., & Lose, M. K. (2012). Effects of teacher-student ratio in response to intervention approaches. *The Elementary School Journal*, *112*(4), 547-567.

Torgerson, C., Ainsworth, H., Buckley, H., Hampden-Thompson, G., Hewitt, C., Humphry, D., ... & Torgerson, D. (2016). Affordable Online Maths Tuition: Evaluation Report and Executive Summary. *Education Endowment Foundation*.

Vadasy, P. F., & Sanders, E. A. (2008). Code-oriented instruction for kindergarten students at risk for reading difficulties: A replication and comparison of instructional groupings. *Reading and Writing*, *21*, 929-963.

Vaughn, S., Cirino, P. T., Wanzek, J., Wexler, J., Fletcher, J. M., Denton, C. D., ... & Francis, D. J. (2010). Response to intervention for middle school students with reading difficulties: Effects of a primary and secondary intervention. *School psychology review*, *39*(1), 3-21.

Tables and Figures

Table 1. Sample Characteristics and Covariate Balance Across Treatment Conditions

	All Students (1)	1 to 1 Tutoring (2)	3 to 1 Tutoring (3)	p-value (4)
Asian	0.03	0.03	0.02	0.51
American Indian	0.09	0.10	0.09	0.86
Black	0.16	0.17	0.15	0.95
Hispanic	0.15	0.14	0.16	0.48
Multi-race	0.02	0.02	0.02	0.80
White	0.54	0.54	0.55	0.66
Age	12.98	12.90	13.00	0.84
Extra Time	0.23	0.23	0.24	0.85
Pre-test score	1014.84	1010.90	1019.10	0.55
Grade 6	0.33	0.34	0.31	0.74
Grade 7	0.33	0.34	0.32	0.83
Grade 8	0.34	0.31	0.37	0.83
Joint F-Test (F-Stat = 0.39)				0.91
Students	180	93	87	

Notes. Columns 1-3 report sample means for all student in the study (Column 1), students assigned to 1:1 tutoring (Column 2), and students assigned to 3:1 tutoring (Column 3). Column 4 reports the results of separate regressions of each characteristic on a treatment indicator equal to 1 for 1:1 tutoring, and 0 for 3:1 tutoring and a randomization block fixed effect. We also test whether the full set of observable characteristics jointly predicts treatment assignment. The bottom row of the table presents the F-stat and associated p-value in parentheses for the omnibus F test.

Table 2. Experimental results of the effect of 1:1 tutoring relative to 3:1 tutoring

	Standardized post-test score		Student Growth Percentile	
	(1)	(2)	(3)	(4)
1:1 Tutoring	0.10	0.14	7.44*	8.10*
	(0.12)	(0.10)	(4.35)	(4.30)
Baseline test score		x		
Student characteristics		x		x
Observations	179	179	179	179

*** p<0.01, ** p<0.05, * p<0.1

Notes. Each column reports the results of a separate regression. Robust standard errors are reported in parentheses. All regressions include a randomization block fixed effect. Scores were standardized according to the national mean for each grade. Baseline covariates included student baseline STAR Math score, age, race, and an indicator for whether the student was granted additional time on the assessment. We impute baseline scores using the sample average for students with missing data.

Table 3. Tutor survey results

	1:1	3:1	Effect of 1:1 relative to 3:1	
	(1)	(2)	(3)	(4)
% of tutors who are confident that students improved their math skills	0.72	0.36	0.35***	0.34***
			(0.08)	(0.10)
% of tutors who say their students put in a lot of effort to learn the material during session	0.76	0.39	0.37***	0.36***
			(0.08)	(0.10)
% of tutors who say their students were excited during tutoring sessions	0.36	0.20	0.16**	0.14
			(0.08)	(0.09)
% of tutors who say their students were focused during tutoring sessions	0.76	0.31	0.45***	0.49***
			(0.08)	(0.08)
% of tutors who think their students learned a lot during tutoring sessions	0.69	0.33	0.37***	0.34***
			(0.08)	(0.09)
% of tutors who are confident in their ability to tutor students	0.97	0.66	0.32***	0.32***
			(0.06)	(0.08)
Student Engagement Factor (Standard Deviations)	0.42	-0.51	0.93***	0.92***
			(0.16)	(0.19)
Tutor fixed effects				x
Number of observations	75	61	135	135
Number of tutors	75	61	68	68

*** p<0.01, ** p<0.05, * p<0.1

Notes. Columns (1) and (2) report the percent of responses that are the two most positive on our construct specific 5-point Likert-scales. For example, for the first survey item in the table, 1= Not confident at all; 2= Slightly confident; 3= Somewhat confident; 4 = Quite confident; 5= Extremely confident. The student engagement factor is an aggregate measure of tutor perceptions constructed by extracting the first factor of a principal component analysis and standardizing this factor to be mean zero and unit variance. Each cell in columns (2) and (3) represent the results from a separate regression where we regress a given individual binary survey measure or our factor score on an indicator for whether the question asked about 1:1 tutoring. Robust standard errors reported in parentheses.

Online Appendix A

Table 1. District Characteristics

	Grand Forks	Charles County	Monterey Peninsula Unified
Number of schools	18	39	21
Number of students	7,604	27,598	9,257
Locale	small city	midsize suburb	midsize suburb
Students			
% American Indian/Alaska Native	3	0	0
% Asian	3	3	10
% Black of African American	4	47	5
% Hispanic or Latino	5	6	30
% Native Hawaiian and Other Pacific Islander	1	0	1
% Other race	0	0	1
% Two or more races	3	5	6
% White	81	37	46
Households			
Median household income ($)	87,351	119,758	82,841
% of families with income below the poverty line	15	6	15
% of families with Food Stamps/ SNAP benefits	17	12	16
% of families who speak only English at home	94	91	55

Data source: CCD Public school district data for the 2022-2023 school year

Which best describes your Nearpod math tutoring sessions?
- I was only assigned to tutor 1 student at a time (1:1 tutoring) (1)
- I was only assigned to tutor groups of 2 or 3 students at a time (2:1 or 3:1 tutoring) (2)
- I did a mix of individual and group tutoring sessions (3)

What student:tutor ratio do you think is most effective at raising student achievement (regardless of costs)?
- 1:1 (1)
- 2:1 (2)
- 3:1 (3)
- 4:1 (4)

Open-ended questions
- In what ways, if any, was tutoring students in groups of 2 or 3 different from tutoring students one-on-one?
- Were there any specific advantages or disadvantages of tutoring students one-on-one? If so, please describe them.
- open3 Were there any specific advantages or disadvantages of tutoring students in small groups of 2 or 3? If so, please describe them.
- What tutoring strategies did you find worked best with your tutees?
- What were the primary challenges you faced as a tutor?

Please answer the following questions about your individual (1:1) tutoring sessions only.

On most days, how much effort did your student(s) assigned to **1:1 tutoring** put into learning the material during the session?
- Almost no effort (1)
- A little bit of effort (2)
- Some effort (3)
- Quite a bit of effort (4)
- A great deal of effort (5)

On most days, how focused were your student(s) assigned to **1:1 tutoring** during the sessions?
- Not at all focused (1)
- Slightly focused (2)
- Somewhat focused (3)
- Quite focused (4)
- Extremely focused (5)

On most days, how excited were your student(s) assigned to **1:1 tutoring** in your tutoring sessions?
- Not at all excited (1)
- Slightly excited (2)
- Somewhat excited (3)
- Quite excited (4)
- Extremely excited (5)

How confident are you that your student(s) assigned to **1:1 tutoring i**mproved their math skills?
- Not confident at all (1)
- Slightly confident (2)
- Somewhat confident (3)
- Quite confident (4)
- Extremely confident (5)

Overall, how much do you think your student(s) assigned to **1:1 tutoring** learned during tutoring sessions?
- Almost nothing (1)
- A little bit (2)
- Some (3)
- Quite a bit (4)
- A great deal (5)

How confident are you tutoring students in an **individual setting (1:1)**?
- Not confident at all (1)
- Slightly confident (2)
- Somewhat confident (3)
- Quite confident (4)
- Extremely confident (5)

How confident are you that you can engage a student who is typically not motivated in an **individual setting (1:1)**?
- Not confident at all (1)
- Slightly confident (2)
- Somewhat confident (3)
- Quite confident (4)
- Extremely confident (5)

Now please answer the same set of questions about your group tutoring sessions only.

On most days, how much effort did your student(s) assigned to tutoring in **groups of 2 or 3** put into learning the material during the session?
- Almost no effort (1)
- A little bit of effort (2)
- Some effort (3)
- Quite a bit of effort (4)
- A great deal of effort (5)

On most days, how focused were your student(s) assigned to tutoring in **groups of 2 or 3** during the sessions?
- Not at all focused (1)
- Slightly focused (2)
- Somewhat focused (3)
- Quite focused (4)
- Extremely focused (5)

On most days, how excited were your student(s) assigned to tutoring in **groups of 2 or 3** in your tutoring sessions?
- Not at all excited (1)
- Slightly excited (2)
- Somewhat excited (3)
- Quite excited (4)
- Extremely excited (5)

How confident are you that your student(s) assigned to tutoring in **groups of 2 or 3** improved their math skills?
- Not confident at all (1)
- Slightly confident (2)
- Somewhat confident (3)
- Quite confident (4)
- Extremely confident (5)

Overall, how much do you think your student(s) assigned to tutoring in **groups of 2 or 3** learned during tutoring sessions?
- Almost nothing (1)
- A little bit (2)
- Some (3)
- Quite a bit (4)
- A great deal (5)

How confident are you tutoring students in **groups of 2 or 3?**
- Not confident at all (1)
- Slightly confident (2)
- Somewhat confident (3)
- Quite confident (4)
- Extremely confident (5)

t_confidence_2_3 How confident are you that you can engage a student who is typically not motivated in a **small group tutoring** session of 2 or 3 students.
- Not confident at all (1)
- Slightly confident (2)
- Somewhat confident (3)
- Quite confident (4)
- Extremely confident (5)

Tutor Background Questions

Prior to January 2023 how much experience did you have tutoring students?
- No tutoring experience (1)
- Less than 1 year of tutoring experience (2)
- 1-2 years of tutoring experience (3)
- 3-4 years of tutoring experience (4)
- 5 or more years of tutoring experience (5)

Prior to January 2023 how much K-12 classroom teaching experience did you have?
- No teaching experience (1)
- Less than 1 year of teaching experience (2)
- 1-2 years of teaching experience (3)
- 3-4 years of teaching experience (4)
- 5 or more years of teaching experience (5)

How would you describe yourself? (Check all that apply)

- American Indian or Alaska Native (1)
- Asian (2)
- Black or African American (3)
- Hispanic/Latino (4)
- Native Hawaiian or Pacific Islander (5)
- White (6)
- Prefer not to say (7)

How would you describe your gender?
- Male (1)
- Female (2)
- Gender nonconforming (3)
- Prefer not to say (4)

What is your highest level of education completed?
- Graduated from high school (1)
- Associate's degree or other postsecondary certificate (2)
- Bachelor's degree (3)
- Master's degree (4)
- Doctorate or higher (5)

What was your college major? [open response]

Do you currently hold another job or form of employment?
- Yes (1)
- No (2)

Please describe your other job(s) here [open response]