we teach science
FOUNDATION

Remote Tutoring and Mentoring Program Analysis

October 21, 2011

About the Program

We Teach Science is an organization that connects public middle school students with Science, Technology, Engineering and Math professionals for Remote Tutoring and Mentoring sessions (RTM). The goal of the RTM program is to help students identified as being at risk of failing Algebra I to succeed through increased exposure to Algebra and individual-level attention. RTM is highly flexible in that it allows students and their mentors to connect from separate locations through the use of technology; both audio connections and a digital writing tablet allow real-time virtual communication and shared exploration of mathematical concepts.

About the Data

The RTM program, the second in a series of three pilots, was implemented in the 2010/11 academic year with three 8th grade Algebra classes in three schools within a small school district in northern California. In the participating schools, there were 156 students in 8th grade Algebra in the 2010-11 school year. All the students were given the option to participate in RTM, and the teachers supported the program by offering extra credit to participants and reminding students to attend mentoring sessions. Of the 156 students, 57 opted to participate and all of those received mentors as they were recruited.

In total, we collected standardized test data for all 156 students. 86% (49 out of 57) of participating families agreed to share their demographic data with the pilot study. No demographic data was collected for non-RTM participants.

The dataset consists of student-level demographic information, math course grades from the 2009-10 and 2010-11 school years and scaled scores from the California STAR math test for the 7th grade and Algebra tests. The demographic data for each student included gender, race/ethnicity, special education status, English learner status, eligibility for free or reduced-priced lunch, participation in gifted and talented education (GATE) and the parents' education level.

Student Participation

On average, students attended 12 RTM sessions. However, due to the varying schedules amongst mentors and students, some students received more sessions than others; the minimum was one session and the maximum was 23 sessions. The total time spent in tutoring sessions varied widely, from a minimum of about one hour to a maximum of about 22 hours. Students on average attended 80% of the number of sessions that were available to them and experienced an average of 10 hours of program time. To get a better picture of the students who participated in RTM in comparison to the non-participants, we examined both groups on key indicators. Due to the small sample size and the voluntary nature of the pilot program, it is reasonable to expect that the two groups of students might differ. We found that students who participated in RTM on average had slightly higher starting test scores before participating in the program, with an average scaled score of 401.5 for RTM students and an average of 388.7 for non-participants on the 7th grade math test in 2009-10.

We found that 42% of RTM participants were white. RTM participants were also more likely to be female than non-participants (60% versus 44% of the comparison group). Only about 49% of RTM participants' parents had graduated from college. 9% of program participants participated in the Free and Reduced Price Lunch program and 12% participated in GATE.

Analytic Approach

To isolate the effect of the RTM program, we generated a growth score based on the STAR test results after converting the scaled scores to a standardized score. Converting to standardized scores allows us to run statistical analysis on populations with different Means and Variance. Growth was calculated by subtracting the standardized 7th grade math score from the standardized 8th grade Algebra score. We were then able to compare the difference in Algebra scores of RTM participants to non-RTM participants.
We used a two sample T-Test to determine the effect of RTM on the difference in Algebra scores for RTM participants versus Non-RTM participants. We report the results below, which have been converted back to scale score points[1].

It is worth noting that California students almost always see a drop in 8th grade Algebra scores when compared to 7th grade math scores. Thus, it was necessary to take the students' 2009 math scores into account when measuring the effect of RTM. Because of the small number of students, our ability to control for multiple variables was limited.

[1] The analysis of the RTM program for the 2010/11 academic year follows the analytic process that CREDO developed the prior year with the exception of adding the two sample T-Test. The prior year analysis was re-run incorporating this to ensure results were comparable year-over-year.

Results

Preliminary regression results indicate that RTM students had much higher growth scores. On average, RTM participants improved by 11.5 scale score points more than their peers who did not participate (Table 1). This is similar to the prior year's result of 11.1 points.

When the results are disaggregated by school, we noticed that School #2 experienced almost zero growth whilst the other two schools experienced similar growth to the prior year. Closer inspection (Table 1) revealed that the RTM peers in School #2 had an unusually wide range of scores that were statistically very different from the other two schools. To work with this, we replaced RTM peer data in School #2 with RTM peer data from Schools #1 and #3.

Populations for RTM and Peer populations are shown in Table 2.

Table 1: Difference in 2009 Math and 2010 Algebra Scores

	RTM Students	Non RTM Students	Difference
RTM 2.0			
All Schools	**-21.3**	**-27.6**	**11.5**
School #1	-20.3	-30.5	10.2
School #2	-21.7	-19.2	-2.5[2]
School #3	-21.7	-33.7	12.0
RTM 1.0			
School #3	**-5.9**	**-17.0**	**11.1**

Table 2: RTM and Peer Student Populations

	RTM Students	Non RTM Students	Total
All Schools	**53**	**52**	**105[3]**
School #1	14	14	28
School #2	22	0[4]	55
School #3	17	38	55

[2] School #2 experienced near zero growth due to the wide variance in peer data. When adjusted to use School #1 and #3 peer data, the growth more closely approximates the other two schools.
[3] 105 student analysis population is less than the 157 in the study because not all students had paired test data for analysis.
[4] School #2 peers were removed from the analysis

Figure 1 below compares the growth of RTM (red) versus non-RTM (black) students in the 2010-11 academic year. The best-fit lines for the two data sets show that there is measurable positive impact on growth for the RTM students versus the control group. It is worthwhile noting that most students, RTM or not, experience a drop in their scores from 7th grade to 8th grade - we suspect this is due to the fact that Algebra is inherently different from mathematics they have been learning in the prior year.

Figure 1: CST scores of RTM versus non RTM students for 7th and 8th Grade

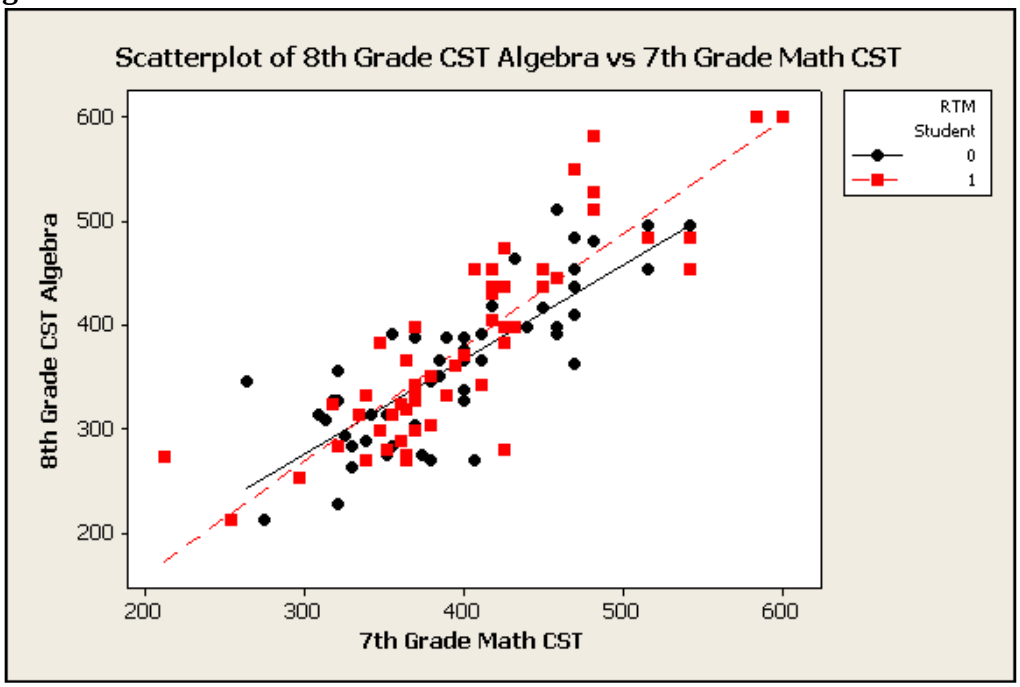
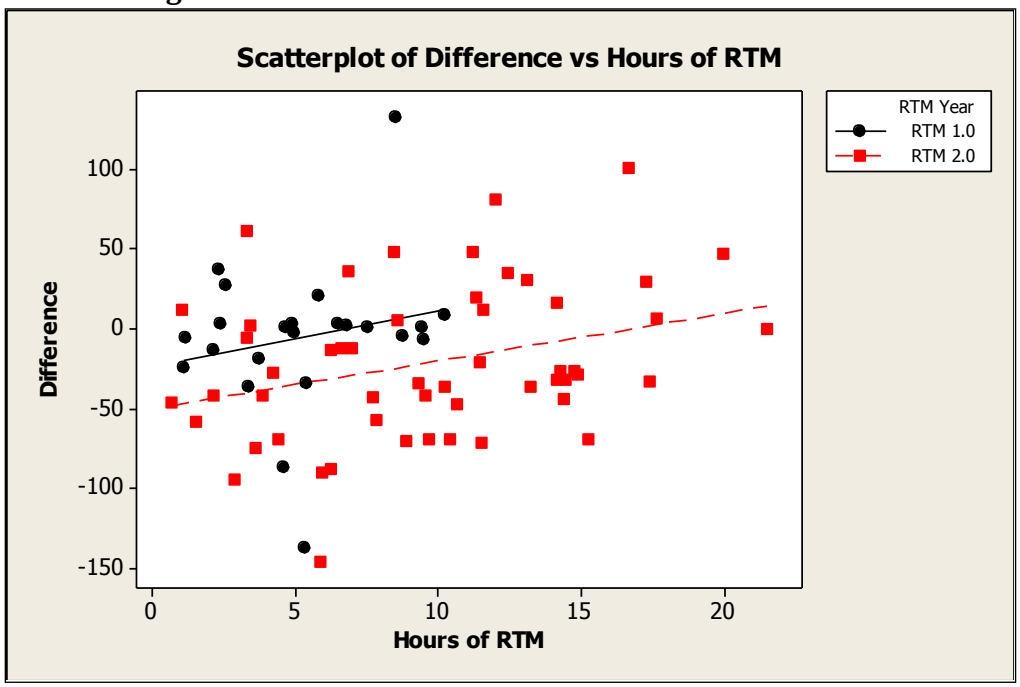


Figure 2 below shows the growth of RTM students in the 2010-11 (red) versus the 2009-10 (black) academic years. The almost parallel lines indicate similar growth for each hour of mentoring over the past two years of the program. RTM students experienced an average 1.6 points per hour of mentoring in the program. This compares favorably with our first year results of 1.7 points.

Figure 2: Student Growth Score versus Hours of RTM



Conclusion

In conclusion, the RTM program engages participating students that are relatively similar to their peers in previous academic performance. After a year of participating in the program, RTM students exhibited a higher degree of growth in math learning as measured by the California STAR test than did their peers who did not participate. The number of sessions and especially the number of hours of mentoring continue to contribute positively towards this enhanced growth.

Overall summary of results:

- RTM participants averaged 11.5 points more growth than their peers from 7th grade Math to 8th grade Algebra
- RTM students experienced an average growth of 1.6 points per hour of mentoring during the course of the program as measured by 8th grade CST Algebra scores.

It is encouraging that the findings are consistent with the prior year's results which only had 22 RTM students. These robust results indicate that RTM has a positive and significant impact on student academic performance for each additional hour of the program. We will be following up with a report on the longitudinal study of the RTM program that follows RTM graduates through high school.