Seaver Institute Report November 2012

Introduction/Executive Summary

We are pleased to report on the progress on the Seaver Institute grant for 2011/12. There are two major parts to the 2011/12 work: Research and Publication. While we have made major progress and hit significant milestones on the Research and results analysis, the Publication, while well under way, remains to be completed. The Research took two forms: 1) continuation of our annual review of all LAUSD partner schools using math over time, looking at publicly available grade-averages (longitudinal) and 2) executing a research proposal with LAUSD to get individual student-level data, matched to MIND's ST Math usage data. Both of these have been completed. The major findings are:

a) A continuation of two to three times the math growth for LAUSD grades using the ST Math program, as compared to similar grades not using.
b) Individual student level analysis has shown:
    a. A very strong correlation of math scores with usage (dose) of the program
        i. 73.3% of students with over 50% Progress are Proficient or Advanced, as compared to just 36.5% of students with less than 50% Progress
    b. Non-standard implementation of the program at LAUSD sites, causing lower progress
        i. Average use is 1x/week, as opposed to 2x/week
        ii. Many students had no usage of ST Math for 10 or more weeks of the school year
    c. Higher progress for Male students. Note: this is a first finding for MIND.
    d. Lower progress for ELL and Special Needs students
    e. No effect of Economic Disadvantage to progress

Note that the implementation variables are stronger determinants of student progress through the program than the student variables are.

The Publication of the research is underway, with a $20,000 project proposal by WestEd to replicate, validate, and draw independent conclusions from our 2010/11 grade-level analysis.

Big Picture Background

This project is in context of a strategic imperative to help students and teachers in LAUSD achieve math literacy. It provides the vital information on the value of disciplined usage of the ST Math program, which discipline has always been lacking at LAUSD schools for ours or any other instructional software. And it provides the vital information on the applicability of the program to every student group. And finally it provides the vital information on the correlation of program usage to higher California Standards Test math scores. Even with all of the above, additional

components are required in order to get a program, including ST Math, deployed to the majority students in LAUSD.

Those additional components include getting visibility and setting up multiple, strong relationships with the district, in preparation for a major district commitment to math success using this tool. During the course of this study and, indeed, because of some of its findings already, major progress in visibility and relationships has been gained.

Visibility: A number of press conferences on the data coming out of LAUSD analyses have been held. In each case, the analysis of the Los Angeles Math Initiative schools, funded by the Seaver Institute, was referenced. These press conferences include:

a) 99th Street elementary, with L.A. Mayor Antonio Villaraigosa, HP CEO (to be) Meg Whitman, and LAUSD Superintendent John Deasy
b) Markham Middle School, with L.A. Mayor Antonio Villaraigosa, the LA Partnership, and CityYear
c) Western Elementary, with LAUSD local West superintendent Cheryl Hildreth and funder Verizon
d) Belvedere Elementary, with LAUSD School Board Chair Monica Garcia and funder Hyundai

The relationships at the district are key to district use and further deployment of the program. Because of the deep and wide data that we have funded via the Seaver Institute grant, we have had multiple private meetings with LAUSD Superintendent John Deasy. We have had meetings at the next levels down of his staff including particularly with math head Jaime Aquino. Additional LAUSD champions include:

- Tommy Chang, local superintendent for the Improvement Schools initiative,
- Roberto Martinez, local superintendent East, and
- Bob Bravo, local superintendent South.

All of this networking is aimed towards two objectives:

1) turning on the district level to helping ensure faithful implementation in the schools using ST Math. and
2) a major expansion within LAUSD (see Next Steps at the end of this report).

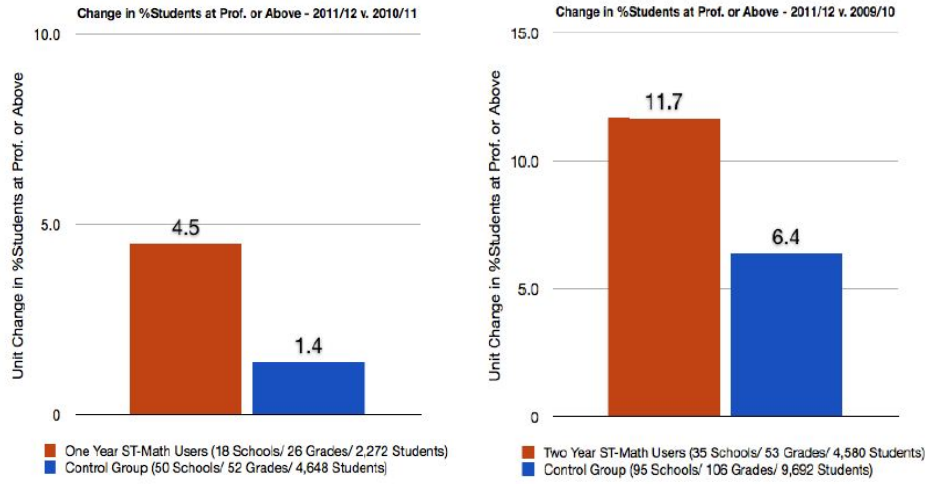
Progress Report

Research & Results

Grade Level

The analysis of the achievement growth in LAUSD schools/grades using ST Math over 1 year and over 2 years has been completed. As usual they are compared to similar schools, although, a new algorithm to ensure that an unbiased choice in comparison schools has been developed under the

Seaver Institute grant and has been incorporated. Here are the results for those grades in 2011/12 with 1 year of use and 2 years of use:



It is gratifying to see the pattern of outperformance continue through a second year of usage. This is now an expectation: increased growth of 2x to 3x what comparison schools without ST Math see.

Individual Student Level

All of our individual student level analysis is courtesy of an official research proposal presented to LAUSD and approved. I am told that getting a proposal approved is a major accomplishment; researchers from USC and UCLA are often declined. So, besides the actual research accomplished under the research proposal, this first proposal also serves as a "door-opener" into further partnership with LAUSD for additional research. This is the first, top-5 size U.S. district, for which we have gained this level of access and cooperation. It is our strategic intention to follow up on this initial research proposal, with full district backing and expectations, with additional proposals getting at many more facets of student math achievement and improving teacher practice.

The research proposal subjects are diverse. We asked for 2009/10 student data (de-identified) from every LAUSD school using ST Math in 2009/10. This covered some schools which had multiple years of use:

	02/03	03/04	05/06	06/07	07/08	08/09	09/10	Total
Number of Schools	2	1	4	4	4	3	14	32
Number of Students	547	223	823	858	1125	303	1713	5592

Table 3.3: ST Math Starting Year Frequency Table

As can be seen, there are 5592 total matched student in the sample, including some from schools which started as long ago as 2002/03.

The students are about equally distributed from grades 2 through 5. The student demographics include: 44.8% Limited English Proficiency, 75.2% Hispanic, 16% Black, 50.7% Female, and 58.3% Economically Disadvantaged.

Math Performance

The analysis showed that there was a very strong relationship between % Progress through the ST Math program and CST Math scores:

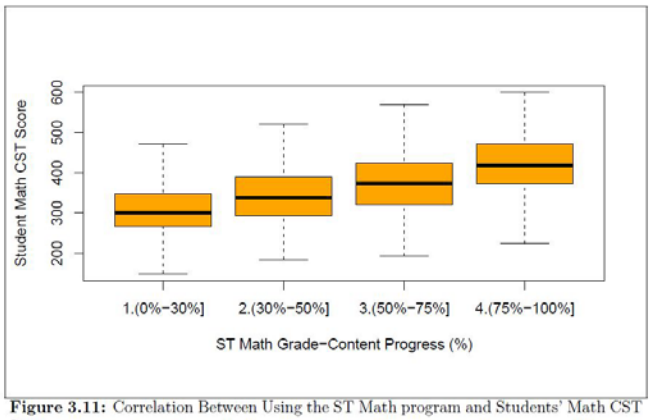


Figure 3.11: Correlation Between Using the ST Math program and Students' Math CST Scores

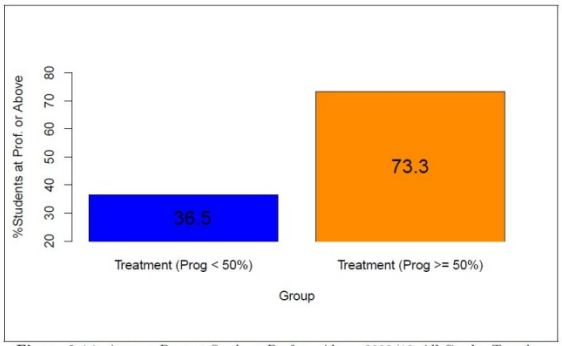


Figure 3.14: Average Percent Stud. at Prof. or Above 2009/10–All Grades Together

The above left Fig 3.11 shows that as the % Progress increases, so does CST scale score: from 0-30% in the leftmost bar averaging near 300 CST Scale score, to 75-100% Progress at the right averaging over 400 scale score. The above right Fig 3.14 shows a comparison in terms of % of students Proficient or better on the CST Math: for those students with over 50% Progress in ST Math in 2009/10, 73.3% were Proficient or better. For the remainder of students with <50% Progress, only 36.5% were Proficient or better.

Implementation Issues

A number of cuts at what could be affecting Progress percentages were analyzed. Of course getting started early in the school year was important. And it turns out that the number of years of school experience with ST Math was a positive effect, as was the case when the main contact for the school was the Principal. For the summary purposes of this report, here is a subset of the most interesting or significant:

We looked at the frequency (computer sessions per week) of use of the program. It is designed, and we train, for use of 2 times per week. This analysis showed that in LAUSD the normal usage was only 1x per week, see Fig. 3.9 below.

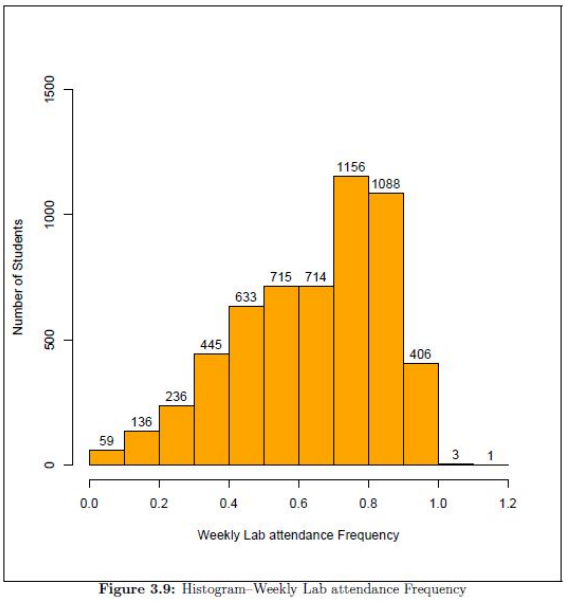


Figure 3.9: Histogram–Weekly Lab attendance Frequency

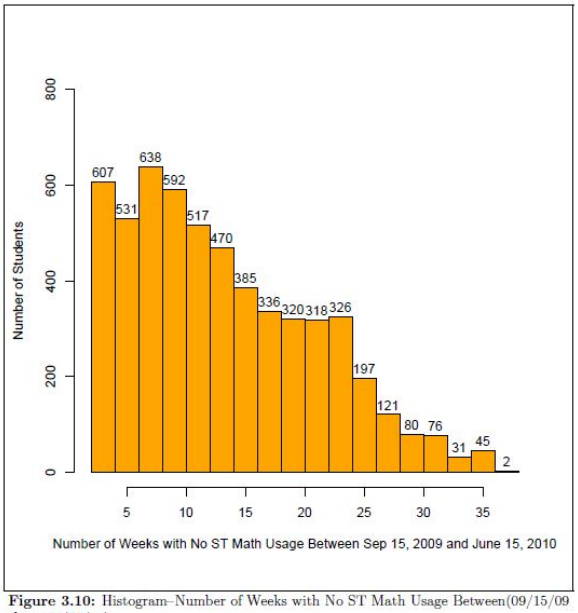


Figure 3.10: Histogram–Number of Weeks with No ST Math Usage Between(09/15/09 thru. 06/15/10)

Analysis also showed that a significant number of weeks were being entirely skipped with no ST Math usage at all, see figure 3.10 above with many students skipping 15 or more weeks of use of ST Math.

Student Attributes

The above implementation variables, as well as student attributes, were put into a regression model in order to find the significance and effect of each variable. Here are the results of that modeling:

Regression Results	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	37.0	0.7	51.1	<0.001
Start Date	7.7	0.7	10.8	<0.001
Freq of Weekly Attendance	27.2	0.7	38.5	<0.001
Consistency	11.6	1.0	11.4	<0.001
Gender (Male)	6.1	0.6	10.4	<0.001
Limited English Proficiency (ELL)	-4.9	0.6	-8.3	<0.001
Special Ed Students	-9.9	1.0	-9.5	<0.001
Economically Disadvantaged Students	-0.3	0.6	-0.5	0.58

This shows a (surprising vs. MIND experience) positive effect on program completion of being male, though at a size of 6.1 this is dwarfed by the effect of weekly attendance at 27.2. In addition it shows that an ELL attribute was correlated with somewhat lower Progress (-4.9) and a Special Needs attribute was also correlated with lower Progress (-9.9). All of these correlational findings merit further investigation as well as likely insertion into training on how to implement with different student subgroups.

Publication

Most of the Publication is to be found under next steps, below, as near term actions. Up to this date, the overall Los Angeles Math Initiative multi-year findings have been published via MIND's website and press conferences.

Conclusions & Next Steps

These studies strongly confirm that ST Math usage is correlated with math success, and that multi-year usage helps improve progress, and that 2-year results exceed 1-year results. They also show via data that some obvious implementation factors, such as start-date, frequency and consistency of use are highly impactful on eventual Progress %, which, again, has a huge correlation to math scores.

The Next Steps for this project are primarily in the area of Publication. The individual student LAUSD Research Proposal report is ready for submission to LAUSD and MIND President Andrew Coulson is preparing to present it to LAUSD math head Jaime Aquino sometime in the month of November. Our objective, again, is to inform the district of the import but also variability of implementation, and to enlist the district's cognizance and support in ensuring that schools and teachers achieve satisfactory implementation. We will also ask that the information be cleared for outside publication. (Note that in a huge district like LAUSD, this is stunningly rare.) The grade-level information, from 2011/12, is about to be vetted by renowned education research institution WestEd. The express deliverable of this evaluation is to be published online and serve as the basis for a What Works Clearinghouse (U.S. Education Department) submission.

Finally, though beyond the scope of this project, all of this work is coming together to help with an expansion proposal, working with LAUSD and funding partners, for an additional 116 school sites in East L.A.