The **Research Alliance** for
New York City Schools

Assessing the Early Impact of School of One: Evidence from Three School-Wide Pilots

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EXECUTIVE SUMMARY

Across the country, students are performing poorly in mathematics, particularly in middle schools. According to the U.S. Department of Education, achievement in the U.S. lags below that of other developed nations, with about two thirds of 8th graders scoring below proficiency on standardized math tests. Efforts to boost achievement are complicated by the diversity of the student population and the wide range of prior math knowledge and skills that they bring to their classrooms. Teachers, principals, and curriculum developers often face extraordinary challenges in meeting this array of needs efficiently and effectively. Technological innovations combined with better tools for the systematic diagnosis of learning challenges are coalescing around the country to spur innovative approaches that individualize teaching and learning strategies.

School of One (SO1) is an individualized, technology-enhanced math instructional program that responds to the challenges of diverse learners. The program was piloted in three New York City middle schools in the 2010-11 school year. In this report, we evaluate the impact of SO1 in its first year of school-wide implementation by addressing the following questions:

- What is the impact of the initial whole-school version of SO1 on students' math achievement, as measured by the New York State math test?
- Do the effects of SO1 on math achievement differ across subgroups of students?
- Is exposure to more SO1 material, and/or mastery of SO1 skills, associated with improved math performance?

It is important to note that, given the early stage of SO1's development and implementation and the limited number of schools that have piloted the program, this evaluation cannot reach definitive conclusions about SO1's effectiveness. The findings presented in this report provide a preliminary assessment of SO1's initial impact on students' math achievement and offer insights into achievement trends that may assist with the program's ongoing development. Future studies of SO1 should combine the rigorous assessment of impacts with analyses of its implementation and of teachers' and students' experiences with the program.

About SO1

SO1's theory of action is based on the premise that students cannot learn grade-level content when they are missing precursor skills from earlier grades. Similarly, more advanced students should be able to move on to higher-level skills when they are ready. SO1 seeks to meet each student wherever he or she is on the continuum of math knowledge and skills, while acknowledging that it may take several years to see the results of this strategy. The SO1 instructional approach begins with an in-depth diagnostic assessment of each student's math skills. Results from this assessment are used to create an individualized learning plan that specifies the skills on which the student should work. Students are then grouped to receive instruction in large or small clusters, or to do independent work. At the end of each class period, students take a short assessment of the skill that was the focus of their lesson. The results of this assessment are used to

develop a new learning plan for the next lesson. Both teachers and SO1 staff monitor students' progress and adapt the learning plans to meet their evolving needs on a daily basis.

SO1 represents some important adjustments from "business as usual" for both students and teachers. From a student's perspective, SO1 begins when she walks into the classroom and looks to a large screen to find out where she will be working that day. She then checks into the SO1 web portal to learn what skill she will be working on during the session. For teachers, SO1's set progression of skills allows them to predict generally what lessons they will teach, days in advance. Every school-day afternoon, however, they learn which particular students will receive the lesson and how those students have recently performed on that and other related skills.

The 2010-2011 school year marked the first attempt to implement SO1 as the school-wide math curriculum (following pilot tests of the program held during the summer and as an afterschool option). Three schools were chosen to pilot the school-wide program, after applying and demonstrating that they could support the technical infrastructure required. These schools are diverse, situated in three different boroughs of New York City, and serve populations of varying ethnic composition and socioeconomic status. All three schools implemented SO1 for their students in grade six. Two of the schools also implemented SO1 with students in grades seven and eight.

SO1 staff reported that both teachers and students needed some time to adjust to the program structure and its new teaching and learning modalities. SO1 staff reported that they made a number of midcourse modifications to the program during this initial year as part of their effort to continuously improve its functionality and learn from implementation challenges. Many of these adjustments aimed to help teachers adapt to new roles and ensure that the program was aligned with expectations for student performance on state assessments.

Impact Findings

The evaluation uses a rigorous methodology, known as comparative interrupted time series (CITS) analysis, to isolate the unique effect of SO1. The method accounts for a wide range of potential external influences on student achievement, including ongoing conditions and initiatives in the participating schools and the potential effects of other system-level initiatives. The CITS design compares the achievement of SO1 students with that of previous cohorts of students in the same schools prior to the arrival of the program. It also draws comparisons with similar students in comparable New York City schools that did not implement SO1. Finally, the method controls for the influence of students' prior math achievement and demographic characteristics. Math achievement for all students was measured with the same New York State tests from 2007-2008 through 2010-2011. Key findings from the analyses include the following.

- SO1 produced a mix of positive, negative and neutral results across schools and grade levels.

Because all three SO1 schools served students in grade six, these results are the most robust. Table ES-1 shows that, on average across the three pilot schools, SO1 did not affect 6th grade students' math achievement, either positively or negatively. Overall, 6th graders in SO1 schools and comparison schools had virtually identical achievement and trends. The table also shows, however, that this overall neutral result is an artifact of positive and statistically significant impacts for School A, neutral results at School B, and negative and statistically significant impacts for School C. The difference in impacts across the three schools is statistically significant.

Table ES-1
First-Year Impacts of SO1, by School and Grade Level
(New York State Math Test, Scaled Scores)

Sample	SO1 Schools	Comparison	Estimated Difference	
6th grade				†
School A	682.0	672.6	9.5	***
School B	679.1	680.2	-1.1	
School C	652.8	660.8	-7.9	***
6th grade average	671.4	671.3	0.1	
7th grade				
School A	686.0	682.2	3.8	*
School B	679.9	684.1	-4.2	**
7th grade average	683.0	683.2	-0.2	
8th grade				
School A	686.2	692.8	-6.6	***
School B	685.0	686.6	-1.6	
8th grade average	685.6	689.7	-4.1	***

Source: Research Alliance analysis of New York State math test scores.
Notes: Statistical significance of estimated differences is indicated by: * = p < .10; ** = p < .05; *** = p<.01.
Statistical significance of variation in estimated differences across schools is indicated by † = p< .01.

Table ES-1 also shows that results for grades six, seven and eight are not consistent across schools. This raises questions about whether the variation in impacts are due to implementation challenges, the program's fit by grade level, or a variety of other school characteristics and contextual factors. For this reason, it is impossible to draw definitive conclusions about the overall effectiveness of the program or the conditions under which it might be more effective.

- Differences in SO1 impacts across subgroups of students do not follow a discernible pattern that would suggest SO1 is reliably more effective for some students and not for others.

Table ES-2 presents the impact of SO1 for subgroups of 6th grade students defined by gender, race and prior achievement levels, as well as the results for the special education students and English Language Learners (ELL) students who participated in SO1. (ELL students receiving bilingual instruction were not enrolled in SO1 nor were special education students who required instruction in self-contained classrooms).The table shows a mix of positive and negative differences, none of which are statistically significant. The lack of a discernible pattern of impacts

across subgroups was similar for students in grades seven and eight. (See Appendix B in the full report for more information.)

Table ES-2
First-Year Impacts of SO1, by Student Subgroup
6th-Grade Students
(New York State Math Test, Scaled Scores)

Sample	SO1 Schools	Comparison	Estimated Difference
All 6th graders	671.4	671.3	0.1
Level on New York State math test in 5th grade			
Level 1	645.3	638.7	6.7
Level 2	652.2	655.3	-3.1
Level 3	678.5	676.9	1.6
Level 4	696.7	695.5	1.2
Race/ethnicity			
Asian	680.7	679.6	1.1
Black	656.0	656.1	-0.1
Hispanic	663.6	660.6	3.0
White	684.7	679.5	5.1
Gender			
Female	670.9	671.8	-0.9
Male	671.5	671.1	0.4
English as a Second Language	661.1	657.2	3.8
Mainstream special education	656.3	661.1	-4.8

Source: Research Alliance analysis of New York State math test scores.
Note: None of the differences are statistically significant.

The results in Table ES-2 suggest that it will be worthwhile to learn more about program mechanisms and strategies that could be helping students who entered SO1 with the lowest prior achievement levels (Level 1). Although not statistically significant, the positive difference for Level 1 students is noteworthy, because the SO1 theory of action suggests that these lowest performing students should have been the least likely to experience short-term gains on the New York State math test. SO1 program staff hypothesized that the test would be less sensitive to improvements among very low-performing students, since it focuses most heavily on grade-level-appropriate material. It will be important to follow these initially low-performing students over time to determine if the suggestive patterns of positive, yet statistically insignificant, gains translate into stronger long-term impacts.

Exploratory Analysis

In addition to assessing the first-year impacts of SO1, the study included an exploratory analysis of the relationship between students' exposure to and mastery of SO1 skills and their rate of improvement on the New York State math test. The analysis drew on internal data available

through SO1, and provides insights into how the program's "meet students where they are" approach may be working.

- Student improvement on the New York State math test was associated with exposure to on-grade-level skills through SO1, even though the students may not have mastered these skills. This relationship was strongest for students who entered SO1 at the lowest levels of prior achievement.

Students who came to SO1 with low prior performance were exposed to approximately twice as many below-grade-level skills, compared to those who came with higher performance levels from prior grades. This is consistent with SO1's focus on filling gaps in students' understanding. However, these students mastered less than 15 percent of the skills to which they were exposed (as measured by SO1's daily assessments), compared to approximately 85 percent mastery for students who entered with higher prior performance. This finding may be counter to SO1's theory of action, which suggests that all students should achieve a high level of mastery if they are exposed to instructional material whose difficulty aligns with their current knowledge and skills.

When we looked within groups of similarly performing students, we found that those who were exposed to more on-grade-level skills experienced higher rates of growth on the New York State math test. This is consistent with the test's focus on grade-level-appropriate material. While there was a relationship between SO1 skill exposures and year-to-year growth on state test scores for all groups of students, it was particularly strong for the students who entered the program with lowest levels of prior performance. This suggests that a marginal increase in exposure to on-grade-level skills for students who start off at low performance levels may have a positive effect on their state test scores, even if they do not master a high proportion of these skills in SO1's daily assessments. This insight may need to be balanced against SO1's goal of "meeting students where they are" and ensuring that students master lower-level skills before moving on to more advanced material.

Implications and Next Steps

Evaluating this program involved a number of challenges that lead us to recommend caution in interpreting the findings—and to suggest several important refinements to SO1's learning agenda. Like any first-year pilot of an innovative and complex intervention, SO1 changed and evolved continuously during its initial implementation year. In fact, SO1 program staff hypothesized that schools might experience a variety of implementation and outcome "dips," in which instructional quality and student achievement might initially decline, as teachers adjusted to the new organization and delivery of the math curriculum. SO1 staff also hypothesized that students' math test scores might actually lag behind the scores for students in traditional classrooms, because of the program's focus on addressing gaps before moving on to grade-level content. While some assessment of SO1's implementation in these schools was conducted by another research group, the results of that work have not been integrated with the impact study. A

systematic and coordinated process study would provide useful insights into of SO1's implementation and may help shed light on the mixed results we found across schools and grades.

A second caution arises from the fact that the outcome measure used in this study—the New York State math test—focuses mostly on grade-level material. Thus, it is possible that some students made progress on lower-level math skills that were not detected by the state test.

Finally, in general, educational innovation is exceedingly challenging: Program impact is often incremental, rather that abrupt and dramatic; the process of development and evidence building is iterative and dynamic, rather than linear and uni-directional; and it often takes years, rather than months, to establish program efficacy and a credible track record for expansion and scale. With this in mind, we offer the following suggestions for the ongoing development and study of SO1.

- Continue to measure the impact of SO1 on test scores as the program expands to other schools, and build in the capacity to follow students as they transition from their SO1 middle schools into and through high school. Establishing the program's impact for a wider range of schools and its effect on longer-term outcomes will be important to determine its efficacy.

- Track the progress of the lower-achieving students in light of the trends we found for this group—positive but not statistically significant impacts, combined with steeper improvements among those exposed to a higher proportion of on-grade-level skills. Despite the program's hypothesized pattern of effects, these students do not appear to have lagged behind their peers in traditional classrooms, as SO1 hypothesized. In future studies of SO1, it may be useful to assess students' learning progression in a more fine-grained and more frequent manner than is possible with the state assessments.

- Ensure that future research examines the implementation of the program as well as its impact. The current study points to a web of different effects across the three pilot schools and across grade levels. It would be useful to know whether some of the schools have been more effective in their implementation than others and whether these differences are associated with an evolving pattern of impacts.

- Provide SO1 with formative feedback on implementation challenges through systematic, observations and interviews with teachers and SO1 program staff. Such field research should focus on the challenges teachers face as they adapt to the program and how they are supported with professional development opportunities and collaboration. It will be useful to document how teachers are trained to use this innovative model, and to identify supports that help teachers address issues that emerge throughout the school year. Toward this end, future researchers may want to observe SO1's professional development activities and conduct focus groups with teachers to gain their perspective on the challenges of implementing the program.

Just as SO1 challenges its teachers and students to continually assess their progress and make adjustments in response to those assessments, the program's developers are committed to a learning process that allows them to refine and improve the model. SO1 continues to evolve, and its developers are seeking opportunities to expand its use in selected New York City middle schools. The program was recently awarded a coveted "development grant" from the U.S. Department of Education's Investing in Innovation (I3) Fund, which will support improvements to the program and further research on its impact and implementation. The grant provides a unique opportunity to execute some of the recommendations presented above.

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