Quasi-Experiment on Savvas *SuccessMaker® Math*: Evaluation Brief on Results from State Assessments

Introduction

The significant and widespread unfinished learning that resulted from the COVID pandemic has been well-documented and will be felt by students for years to come. While high and low performers were diverging prior to the pandemic, that gap grew even wider for students of color[1]. As districts look to close that gap, they are increasingly turning to adaptive personalized learning software to support more individualized learning. Adaptive learning programs provide students with a personalized instructional experience tailored to their individual strengths and specific learning needs. Key to selecting the right educational program and aiding the learning recovery efforts is to select research-based programs that have proven results.

To determine the effectiveness of *SuccessMaker® Math* in helping students gain valuable mathematics skills, a quasi-experimental study was conducted by JEM & R[2], an independent research and evaluation firm. The study uses Florida, Illinois, North Carolina and Ohio state assessment data from Spring 2021 and 2022 to determine the relationship between *SuccessMaker® Math* and student math performance at grades 3-6.

About *SuccessMaker® Math*

Students in any elementary mathematics classroom typically differ in prerequisite skill mastery, ability, and learning style. However, effectively differentiating instruction for each student's unique learning needs can be challenging. Educators often turn to digital, adaptive learning programs as one way to ensure every student in the elementary mathematics classroom receives effective personalized instruction that addresses each student's specific learning needs. For educators to have tools that help them to personalize instruction for each student, it is critical to evaluate digital adaptive learning systems to determine their potential to create effective learning experiences for all types of learners.

One such adaptive personalized learning system for elementary mathematics is *SuccessMaker® Math*. *SuccessMaker® Math* automatically adjusts instruction in real time according to student learning

[1] National Center for Education Statistics. (2022). Nation's report card. National Assessment of Educational Progress.

[2] Prepared by Miriam Resendez, M.A., Senior Researcher and President of JEM & R, LLC. A full comprehensive report with technical details will soon be available.

needs and provides their teacher with real-time performance data. Students can work at their individual level following the instructional model, and teachers also have the option to select and assign specific skills or standards for students to practice.

Study Design and Methodology

To examine whether or not *SuccessMaker® Math* is associated with more enhanced mathematics performance, schools that began using *SuccessMaker® Math* during the 2020-21 or 2021-22 school year were compared to closely matched control schools[3]. Specifically, school level state assessment data was obtained, and analyses were performed to address the impact of *SuccessMaker® Math* among elementary and middle schools in Florida (FL), Illinois (IL), North Carolina (NC) and Ohio (OH). These states were chosen given their usage of *SuccessMaker® Math*; the top usage states were selected as focus for the study. Researchers were provided with usage data of districts that purchased the program for use during the years of interest in Spring and Fall of 2022.

Schools not included in the purchase list supplied by Savvas were matched (via propensity scoring methods and nearest neighbor algorithms[4]) to *SuccessMaker® Math* schools in Winter 2022. Variables for matching included: gender, race/ethnicity, special education status, free/reduced lunch status, English language learner status, and historical test performance (e.g., Spring 2021 or Spring 2022).

Measures

Proficiency results from each state's annual assessment of academic achievement at grades 3-6 were collected.

The Florida Standards Assessments (FSA) had been in use since Spring 2015 to assess English Language Arts Reading in grades 3-10 and mathematics in grades 3-8. Mathematics assessments contained 56–66 items and measured student achievement on Florida state standards. This test has been discontinued as of the 2022-23 school year.

The Illinois Assessment of Readiness (IAR) is the Illinois state achievement test in reading and math grades 3-8. The assessment has been in use since 2019. The test consists of 28 to 31 items and consists of tasks assessing concepts, skills and procedures, mathematical reasoning, and modeling/ applications.

The North Carolina End-of-Grade (EOG) tests are standards-based achievement tests in the areas of reading and mathematics at grades 3–8 and science at grades 5 and 8. Consisting of 46 to 53 items at grades 3-6, these measure students' proficiency on the NC Standard Course of Study for Mathematics, adopted by the North Carolina State Board of Education in June 2017.

[3] It is also important to note study limitations including but not limited to: pre-existing differences between the two groups that cannot be observed or controlled for (quasi-experiment), and implementation information was only available from the *SuccessMaker®* platform.

[4] Details on the matching process and baseline equivalency results are provided in the full report.

Ohio's State Tests (OST) in English Language Arts, Mathematics, Science and Social Studies have been in use since the 2015-16 school year to measure state learning standards in grades 3-8. Tests take approximately 75 minutes to complete.

Sample

The study's sample includes schools with 3-6th graders in FL, IL, NC and OH schools. In order to be included in the study, schools had to have used *SuccessMaker® Math* for 15 or more hours during the years of interest. Because of the variation in the year of initial program usage, two cohorts are included in the full sample as outlined in Table 1. Cohort A consists of schools that began using *SuccessMaker® Math* in the 2021-22 school year while Cohort B consists of schools that began using *SuccessMaker® Math* in the 2020-21 school year. In order to maximize the sample size and increase the sensitivity of the main effects analyses, Spring 2021 and 2022 data was combined across both cohorts to determine the overall effect of *SuccessMaker® Math* on student math growth from 2021 to 2022 (i.e., "full sample"). This means that for some schools change is measured from baseline to Post Year 1 and for others it is from Post Year 1 to Post Year 2.

Table 1. Study Cohorts

Academic Year	Cohort A (250 schools)	Cohort B (89 schools)
2019-20	——	Baseline*
2020-21	Baseline	Post Year 1
2021-22	Post Year 1	Post Year 2

**No state testing occurred.*

A total of 339 unique schools were included in the study (115 *SuccessMaker®* and 224 control schools): 64 schools were from FL, 51 from IL, 128 from NC, and 96 from OH. On average, *SuccessMaker®* schools had 70 to 101 students use the program per grade level (range of 10-358), and students used the program for an average of 29 hours during the 2021-22 school year (range of 15 to 76 hours). The percentage of students that used *SuccessMaker®* out of the total enrollment for each grade level was, on average, 62%.

Table 2 displays the sample sizes for each group and student subpopulation. Of note, because main effect analyses occurred across all grade levels and cohorts, the full analytical sample consists of 263 *SuccessMaker® Math* and 263 control groups (total of 526 unique grade/school combinations). Given that schools were matched on key demographic variables, it is not surprising that *SuccessMaker® Math* schools were very similar (and not significantly different) to matched schools. Of note, state education departments block access to test scores for students within subpopulations (and combinations thereof) when there are less than 5-10 students. As a result, the percentages of students within subpopulations are smaller than the actual data that is available for each school.

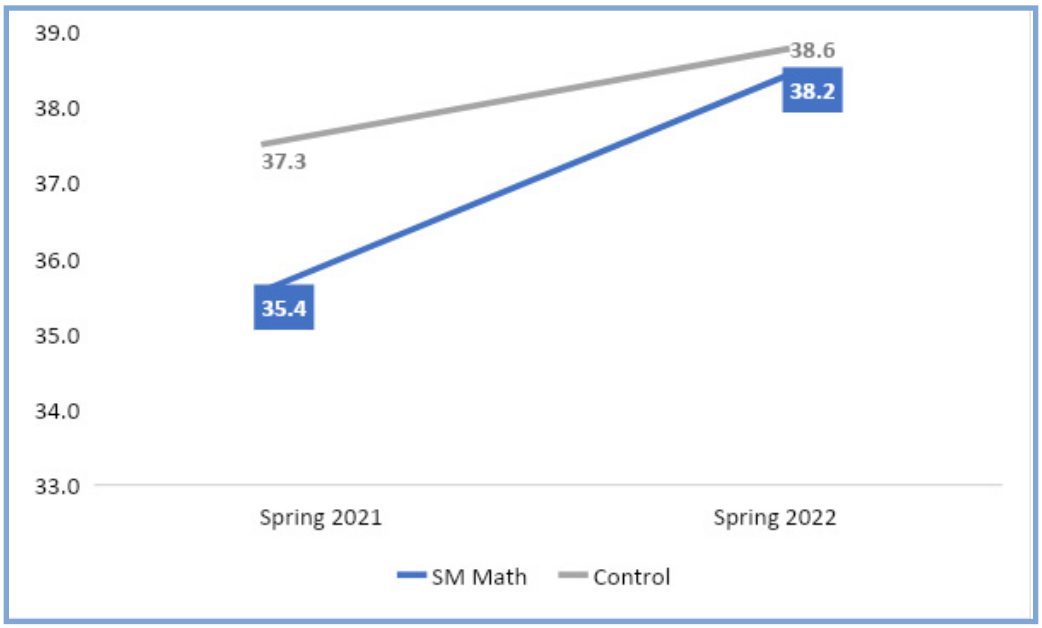
Table 2. Study Sample Characteristics

Group	Category	SuccessMaker Math (N=263)	Control (N=263)
Grade (# of Schools within Grade)	3	79	79
	4	76	76
	5	75	75
	6	33	33
# of Grade Level Data within States (Analytical Sample)	Florida	39	39
	Illinois	37	37
	North Carolina	109	109
	Ohio	78	78
Enrollment	Average Schoolwide Enrollment	493	454
Gender (%)	Male	51%	52%
	Gender (%)	48%	48%
Race/ Ethnicity (%)	African American	41%	40%
	Race/ Ethnicity (%)	18%	19%
	White	26%	27%
	Asian	2%	3%
	American Indian or Alaska Native	1%	0%
	Two or More Races	5%	4%
Subpopulations (%)	Students with Disabilities	13%	13%
	Economically Disadvantaged	56%	56%
	Limited English Proficient	9%	9%

Results

Repeated measures ANOVA were run in order to determine whether growth rates from Spring 2021 to Spring 2022 differed among schools using *SuccessMaker® Math* relative to schools that did not use *SuccessMaker® Math*. Results from the combined sample of both Cohort A and B are presented in Figure 1. As shown, significant gains were observed from Spring 2021 to Spring 2022 among schools that used *SuccessMaker® Math* over schools that did not ($p<.05$, effect size ([d]=.19). Specifically, the average percent of students proficient in math grew 2.8% among *SuccessMaker®* schools as compared to 1.3% among comparison schools.

Figure 1. Comparing Performance on State Math Assessments in *SuccessMaker®* and Control Schools



* Statistically significant, $p < .05$

Similar to the analysis across combined grades, we conducted the same analysis within each grade level. The results by grade levels showed a positive trend for *SuccessMaker®* schools showing a higher rate of growth than controls. *SuccessMaker® Math* schools started with lower Spring 2021 proficiency rates across all grade levels as compared to control schools, and *SuccessMaker® Math* schools had accelerated learning gains from 2021 to 2022 (i.e., higher growth rates), $p > .05$[5]. At grades 3 and 4, *SuccessMaker® Math* students demonstrated average gains of 3.5 and 3.9 points while control schools gained an average of 1.9 and 2.1 points respectively. For grades 5 and 6, average gains were 1.9 and 1.2 points respectively among *SuccessMaker® Math* schools, while gains for control schools were minimal in grade 5 (0.4 points) and decreased by 0.2 points in grade 6. Taken together, the pattern of results for combined grades and at individual grade levels suggests that *SuccessMaker® Math* has a positive impact on students' math performance as measured by state math assessments.

[5] Decreased power for analysis due to smaller sample sizes in grade level analysis likely led to results not reaching statistical significance.

Figure 2. Comparing Performance on State Math Assessments in *SuccessMaker® Math* and Control Schools – 3rd Grade

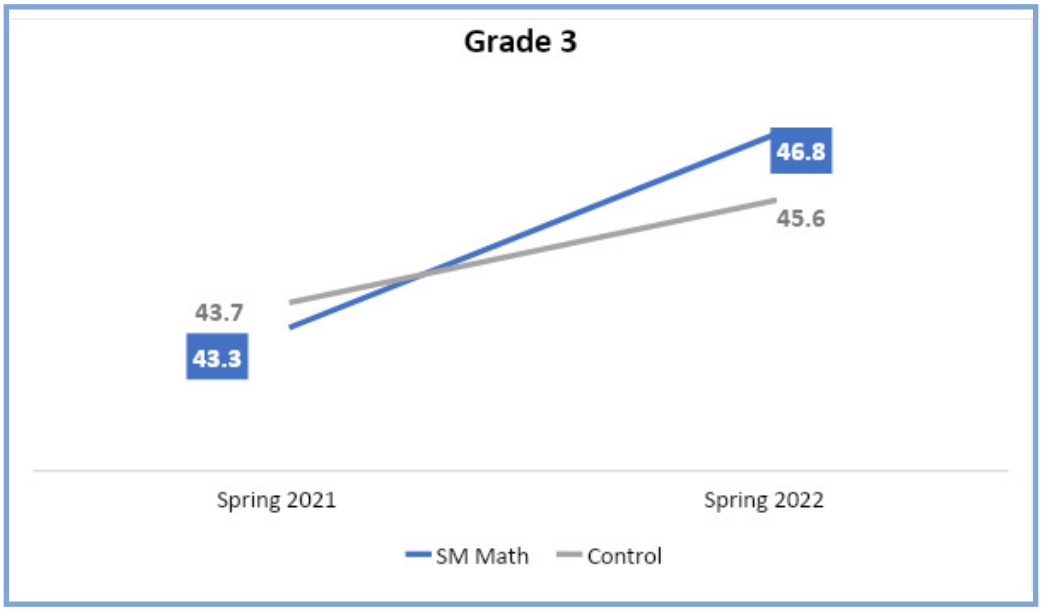


Figure 3. Comparing Performance on State Math Assessments in *SuccessMaker® Math* and Control Schools – 4th Grade

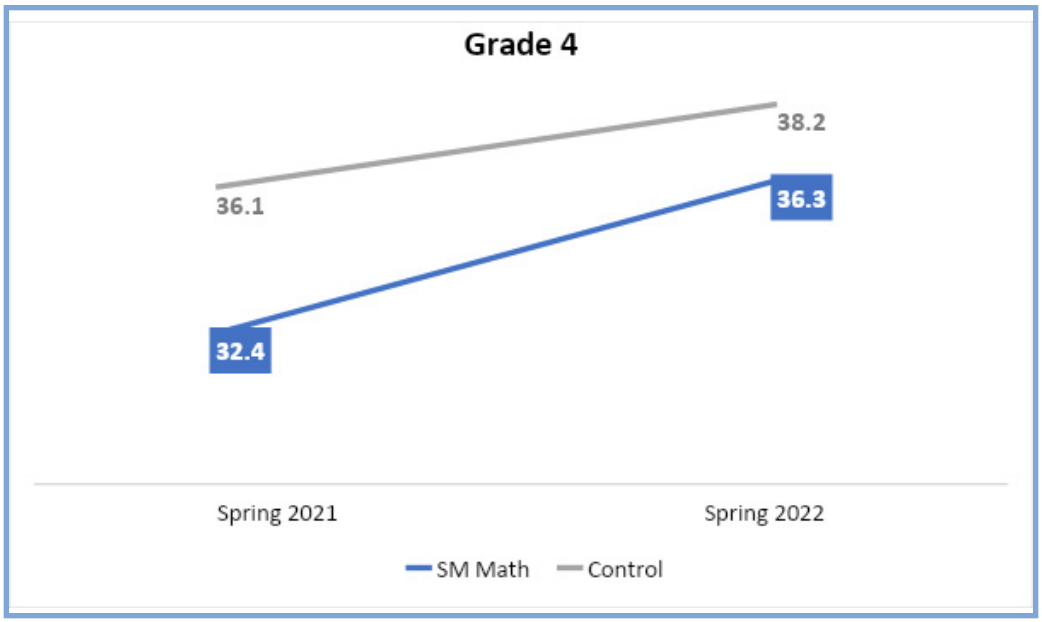


Figure 4. Comparing Performance on State Math Assessments in *SuccessMaker® Math* and Control – 5th Grade

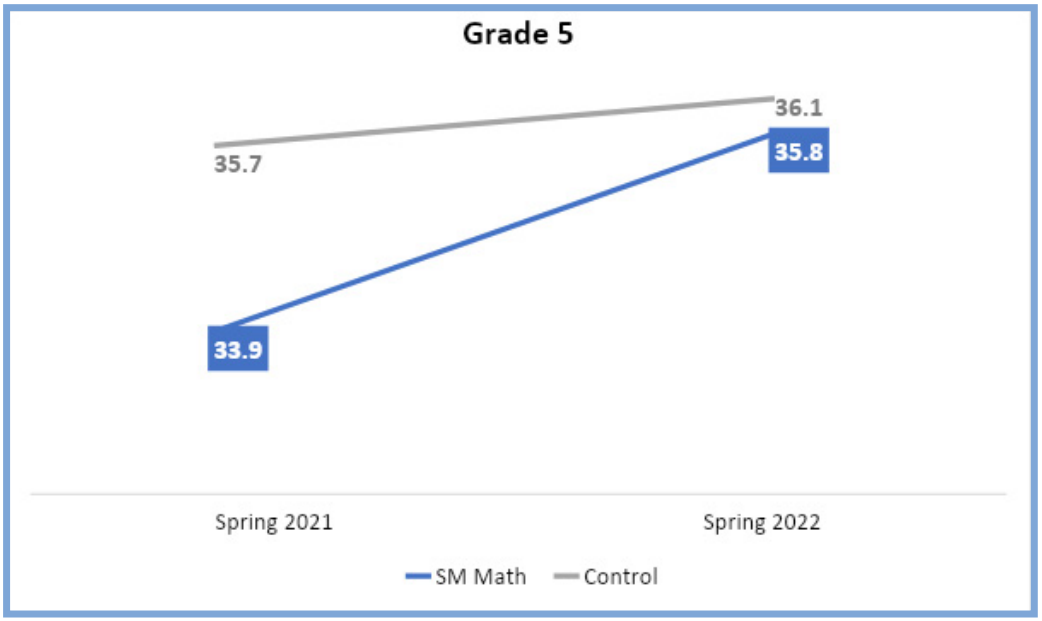
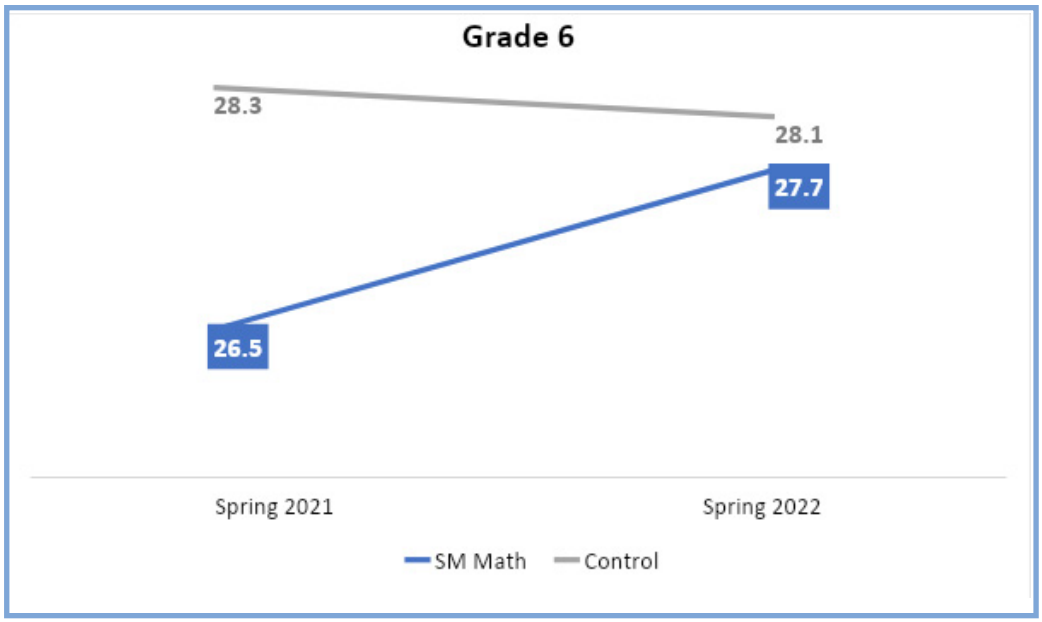


Figure 5. Comparing Performance on State Math Assessments in *SuccessMaker® Math* and Control Schools – 6th Grade



Overall across both cohorts, *SuccessMaker® Math* schools demonstrated a significantly greater gain from Spring 2021 to Spring 2022 over comparison schools as measured by state math assessments.

Conclusions

A retrospective, quasi-experimental study within four states was conducted to determine the relationship between *SuccessMaker® Math* and student math performance at grades 3-6. Results among this sample of elementary and middle school schools in Florida, Illinois, North Carolina, and Ohio showed that *SuccessMaker® Math* has a positive impact on student math knowledge, and can help students gain essential math skills at an accelerated rate. *SuccessMaker® Math* students across all grade levels demonstrated greater significant gains as compared to control students. A trend toward accelerated gains was also seen for *SuccessMaker® Math* students at each individual grade level. The results from this quasi-experimental study using state assessment data adds to the research base and provides additional support for a positive relationship between *SuccessMaker® Math* and elementary and middle school mathematics performance.

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