SuccessMaker Reading and Mathematics 2014-15 Efficacy Study

Final Report

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EXECUTIVE SUMMARY

Gatti Evaluation conducted a study during the 2014-15 school year to examine whether students using the SuccessMaker reading and mathematics program for the first time would experience significant growth in achievement. The findings were analyzed for the entire sample of students, and then disaggregated for English Language Learners (ELL) and students eligible for Free/Reduced Priced Lunch. The researchers also documented program usage and implementation to explore trends in student performance as related to SuccessMaker usage.

The final analytic sample was comprised of 719 students from six schools across four districts and four states. More than half of the students identified as Hispanic and were eligible for free or reduced priced lunch. Also, half of the study sample were designated English Language Learners. All of these students made regular use of the SuccessMaker program 60 minutes a week for up to 6 months (i.e., December through April into early May). The average user logged 15 hours on the program and gained 6.5 months in course level.

The results of the study indicate that SuccessMaker students across both grade levels and each outcome measure experienced very large and statistically significant gains in reading and mathematics as evidenced by performance on the aimswebPlus assessment. The achievement gains for the kindergarten students ranged from 0.74 to 1.34 standard deviations for reading scales and from 0.91 to 1.31 standard deviations for math scales. The achievement gains for first grade students ranged from 0.70 to 1.11 standard deviations for reading scales and from 0.44 to 1.27 standard deviations for math scales.

Students who were classified as ELL or eligible for Free/Reduced Priced Lunch also experienced very large and statistically significant gains for both grades on all the aimswebPlus reading and mathematics scales (i.e., 0.57 to 1.68 standard deviations).

I. INTRODUCTION

Literature Review

Many districts are faced with pressure to improve student achievement for an increasingly diverse group of learners. Districts are exploring the use instructional technology to support their teachers and students based on research that indicates it is effective. For example, Tamin, et al (2011) conducted a second-order meta-analysis of studies of a variety of types of learning technologies, including 25 meta-analyses that encompassed 1,055 primary studies, and found a strong overall positive effect (ES = 0.33) for classrooms that used technology compared to their face-to-face counterparts.

As a result, educators are leaning more heavily on instructional technology in the classroom to help provide assistance to their students. SuccessMaker is an adaptive, computer-based learning program that offers an instructional management system, ongoing assessment, individualized curriculum resources, and a reporting system to inform administrators and teachers as to student progress.

This study sought to examine the performance of students using the SuccessMaker program, for both reading and math.

Study Goals and Research Questions

Traditionally, the first year of implementation of any new program is the most challenging and is often associated with a decrease in student achievement known as the "implementation dip". Michael Fullan (2001) defines the implementation dip as "literally a dip in performance and confidence as one encounters an innovation that requires new skills and new understandings."

The primary goal of this study was to examine whether students using the *SuccessMaker* reading and mathematics programs achieved significant gains over the course of half a school year in reading and mathematics achievement. The students in the study were using SuccessMaker for the first time.

A secondary goal of the study was to examine the implementation fidelity of SuccessMaker usage. Yap et al. (2000) have argued that, "no program – no matter how sound it is – can have an impact if its essential elements are not used." Although SuccessMaker is a computer-based program, there are best practices for both the teacher and student that have been associated with higher student performance. This study monitored and documented student program usage and implementation to examine the growth patterns of student achievement with the associated implementation fidelity.

II. METHODOLOGY

The SuccessMaker program was evaluated using a one-group pretest-posttest design. Students in kindergarten and first grade received SuccessMaker reading and mathematics as a supplement to their core instruction. Classroom teachers were instructed to continue using the district-provided curricula for core and intervention instruction (if assigned) and to supplement with SuccessMaker for 60 minutes per week.

Gatti Evaluation provided participating schools all data collection materials, maintained communication with study schools, and followed data collection procedures that were pre-established with the schools throughout the study period. A complete description of each study school is included in Appendix 1.

The following sections provide information on study procedures, including; student and teacher level data collection, site recruitment and selection, the nature of core and intervention instruction at each school, program training and implementation, demographic information for study participants, and the statistical methodologies used to analyze outcomes.

Student Outcome Measures

The aimswebPlus assessment battery was used to measure student learning during the study period. aimswebPlus is a standardized, norm-referenced assessment that can be used to screen students and monitor progress, identify students at risk of failing, and continuously monitor struggling students. The aimswebPlus is comprised of developmentally appropriate scales designed to measure several English language and mathematics skills. See Appendix 2 for a list and description of these scales along with their recommended administration periods.

For developmental reasons, all scales are not available during each benchmark session (i.e., Fall, Winter, Spring). For example, Oral Reading Fluency is not administered until the Fall of 1st grade. Other scales may be discontinued during kindergarten (ex., Print Concepts, Initial Sounds) or first grade (ex., Phoneme Segmentation).

It should be noted that since baseline testing using the Fall scales was administered from the third week of November into December, only newly introduced Winter measures were administered in January for the middle-of-school-year testing. For example, Initial Sounds was administered to the kindergarten students in the Fall but not administered again for the Winter testing period, so soon after the baseline administration. Phoneme Segmentation, however, was administered to the Kindergarten students in the Winter session and again for the Fall testing period in May. The assessments were individually administered. Students viewed tasks presented from a stimulus book while the administrator scored students' performance during testing in a record book.

aimswebPlus Test of Early Literacy (TEL) and Test of Early Numeracy (TEN)

The National Reading Panel (Panel 2000) identified the following to be the best predictors of how well children will learn to read in kindergarten and first grade: (1) phonemic awareness, and (2) elements of phonics including letter names, letter sounds, and the ability to read nonsense words. The TEL measures each of these constructs, with the addition of Oral fluency.

The TEN is based on research examining students' development of informal mathematical knowledge. Students are asked to orally count, identify numbers, compare numbers, apply basic concepts, and perform mental computations. Each task is designed to represent a critical early numeracy skill for kindergarten and first grade students.

Teacher Measures

Classroom and SuccessMaker Observations

Teacher classrooms from each study school were observed in the Spring of 2015. Due to school schedules and time constraints, not every classroom was observed. The teachers and students were observed in their classrooms receiving either mathematics or reading instruction and using the SuccessMaker program.

Observers used a classroom observation rubric to record information on each classroom lesson observed, along with a debriefing interview. This rubric included: a description of the physical classroom environment (i.e., available technology, desks/tables, instructional materials), summary of the lesson taught, student comments, pacing, use of differentiated instruction, classroom control, student engagement, and basic interview questions.

The observations also allowed researchers to observe SuccessMaker students using the program, verify the ability and willingness of teachers and students to properly implement the program. A second rubric was used to record information from these observations. This rubric included a description of the adequacy of the computer lab and rated the engagement of the students, as well as, the implementation from the teachers.

It should be noted that some teachers had to adjust their teaching schedule to accommodate the observers' visits. The observations provided only a snapshot of day-to-day instruction and program implementation. Despite this, the observations are still considered worthwhile because they are the only opportunity the research team has to directly observe the study's students and teachers.

Site Recruitment and Selection

Prior to the 2014-15 school year, potential research schools were identified by Savvas sales representatives and via email blasts sent to districts that had specific demographics. Ensuring ethnic and socio-economic diversity in the study sample were two important criteria that the research team considered when recruiting study sites.

Schools that indicated interest were sent a study description that included responsibilities and incentives. If the school indicated interest after reviewing the study description, they were asked to complete a detailed questionnaire with follow-up phone interviews. The intent of the questionnaire and interview process was for Gatti Evaluation to gather information to determine if each school would be an appropriate candidate for the study.

When sites were deemed eligible for participation and approved by the principal investigator, the school was invited to be a study participant. The principal investigator completed any research applications required by each school. Both a district level administrator (i.e., curriculum director, superintendent) and a school level administrator (i.e., principal) signed a memorandum of understanding outlining the responsibilities of each stakeholder. All students were eligible to participate in the study unless their parent or guardian elected for them to not participate.

Ultimately, six schools from four districts in four states (CA, CO, OH, and OR) participated in the study. Appendix 1 provides details about the community, educational environment and demographic breakdown for each study site. This information is important for understanding how results from this study may be applicable to consumers of this report.

SuccessMaker Teacher Training

To initiate the study, Gatti Evaluation conducted study orientations for all teachers. The study orientation introduced the teachers to the research team, explained the requirements and benefits of participation in the study, and addressed questions or concerns about the study. All teachers were required to read and sign informed consent forms. Savvas ensured that schools had full access to the SuccessMaker program and provided training and funding to cover the costs of substitute teachers (if needed) for the training sessions.

Two SuccessMaker training sessions were provided to each school (see Table 1 for timeline). The first training session focused on the fundamentals of using SuccessMaker such as student login, classroom/lab management, and program reporting systems. In addition, trainers provided information on best practices associated with SuccessMaker implementation. The second training session focused on a deeper understanding of reporting capabilities and report data uses, as well as addressing questions or challenges that arose during the previous months of SuccessMaker implementation.

Table 1		SuccessMaker Training by School		
State	School	No. of Teachers	Initial Training	Second Training
CA	1	6 (3 K, 3 1st)	Dec 2014	March 2015
CA	2	3 (2 K, 1 1st)	Dec 2014	March 2015
CA	3	3 (3 K)	Dec 2014	May 2015
CO	1	4 (2 K, 2 1st)	Jan 2015	March 2015
OH	1	4 (2 K, 2 1st)	Nov 2014	March 2015
OR	1	2 (2 1st)	Nov 2014	April 2015

Participants

The final analytic sample is comprised of 719 students from six schools across four districts and four states. The sample included 205 kindergarten reading students and 203 kindergarten math students. There were 155 first grade reading students and 156 first grade math students. Half of the student sample (i.e., 51%) was designated English Language Learner or not English proficient and a majority of the students (1.e., 65%) were eligible for free or reduced priced lunch. Close to half (i.e., 44%) of the study sample was Hispanic, a majority (i.e., 60%) if the students from the 3rd California school are included. A description of the study sample demographics broken out by school can be found in Table 2.

Table 2			School Demographic Information				
Grade	Student Count	Not English Proficient	Free/Reduced Lunch	Percent Caucasian	Percent Hispanic	Percent African American	Other or No Information
			Whole Sample				
K-Reading	205	54%	59%	28%	39%	0%	33%
1-Reading	155	47%	73%	37%	49%	3%	11%
K-Math	203	54%	61%	29%	39%	0%	32%
1-Math	156	48%	69%	38%	50%	0%	12%
			California District-School One				
K-Reading	50	78%	98%	0%	92%	0%	8%
1-Reading	67	81%	96%	0%	76%	0%	24%
K-Math	50	78%	98%	0%	92%	0%	8%
1-Math	68	81%	96%	0%	76%	0%	24%
			California District-School Two				
K-Reading	34	76%	9%	6%	88%	0%	6%
1-Reading	22	82%	86%	0%	100%	0%	0%
K-Math	30	76%	9%	6%	88%	0%	6%
1-Math	22	82%	86%	0%	100%	0%	0%
			California District-School Three				
K-Reading	60	77%	100%	0%	0%	0%	100%
K-Math	60	77%	100%	0%	0%	0%	100%
			Colorado District				
K-Reading	41	0%	12%	6%	88%	10%	2%
1-Reading	34	0%	12%	0%	88%	6%	6%
K-Math	42	0%	12%	6%	88%	10%	2%
1-Math	33	0%	13%	0%	88%	6%	6%

Ohio District							
K-Reading	20	0%	20%	100%	0%	0%	0%
1-Reading	18	0%	67%	94%	0%	6%	0%
K-Math	21	0%	38%	100%	0%	0%	0%
1-Math	17	0%	18%	94%	0%	0%	6%
Oregon District							
1-Reading	14	7%	100%	71%	7%	23%	0%
1-Math	16	6%	100%	94%	6%	0%	0%

Data Analysis Procedures

Statistical analyses were performed on the aimswebPlus raw gain scores. Gain scores are calculated by subtracting the beginning of year raw score from the end of year raw score. The results were calculated for the entire sample of students, and then disaggregated for English language learners and students eligible for free or reduced priced lunch. An ordinary least squares linear fixed-effects intercept-only model (i.e., H0: gain $\neq 0$) was employed to statistically test mean gain scores from zero. Specifically, SPSS's Generalized Estimating Equations procedure was used with a robust sandwich estimator for all standard errors with districts set as the independent level of nesting, and a naïve independent working covariance structure

While students were the unit of analysis, the districts were the independent units. The hierarchical nature of the data (i.e., students nested within classrooms, classrooms nested within schools, schools nested within districts) has the effect of reducing the amount of independent information available in the sample, therefore decreasing the precision of estimates and the power of hypothesis tests to find these estimates statistically significant (Donnar & Klar, 2000). A naïve covariance structure within a robust empirical standard error formulation was used to calculate confidence intervals for estimated effects. This procedure results in estimates that are unbiased and statistical hypothesis tests that are consistent (Liang & Zeger, 1986) despite the nested nature of the data.

All statistical significance tests are two-tailed (i.e., gain $\neq 0$) with a Type I error rate of 0.05. Each mean gain score has no better than a 1 in 20 chance of being found statistically significant when it is in fact equal to zero. Statistical significance thus implies that the sample was likely drawn from a population that saw a true increase in achievement. Coupled with the rigorous study design and program implementation we may then hold these statistically significant gains as possible evidence for the effectiveness of the intervention.

Standardized effect size estimates (i.e., effect size = mean gain / gain score standard deviation) along with a percentile rank based effect size measure were computed for statistically significant differences (Hedges & Olkin, 1985). The latter effect size measure indicates the percentile rank for the average student's gain in relation to the baseline distribution. If the students outperformed their baseline score by 0.20 standard deviations the average score for the subsequent testing was larger than 58% of the baseline scores, thus students outperformed their first attempt by 8 percentile points.

III. RESULTS

This section first describes the implementation of SuccessMaker followed by the impact of the SuccessMaker program on student learning as evidenced by gains on the aimswebPlus assessment battery.

SuccessMaker Implementation

The implementation of SuccessMaker was documented by the research team to provide context to the student performance data. The research schools were advised to implement the program for one hour per week, for both reading and math, with their students. In addition, the study teachers were trained to examine the SuccessMaker Cumulative Performance reports to ensure students were making progress in the program and trying their best. For example, the SuccessMaker 6 Teacher Reports Guide states that acceptable progress is achieved when students master 90% of presented skills in mathematics and 75% mastery of skills in reading. If a student is not able to maintain consistency in their mastery of skills, then the teacher may meet with them to discuss their challenges with the program and provide additional intervening instruction.

Each school attempted to maintain a consistent implementation schedule for the duration of the study, although there were some variances due to school events, testing schedules and other normal school activities. Table 3 provides a summary of SuccessMaker implementation across the school sites.

Table 3	Average SuccessMaker Usage Statistics			
	Kindergarten Reading	Kindergarten Mathematics	First Grade Reading	First Grade Mathematics
Sample Size	205	207	155	156
Hours (Standard Deviation)	16.3 (3.7)	14.6 (3.6)	14.7 (4.8)	14.5 (4.5)
Minimum Hours	8.0	7.1	5.3	6.3
Maximum Hours	26.4	24.7	25.3	28.4
Initial Placement Level	0.12	0.57	1.00	1.30
Final Course Level	0.69	1.30	1.60	2.00
No. of Sessions	58	55	45	47
% Exercises Correct	71.6%	63.3%	80.7%	67.5%
% Skills Mastered	72.1%	94.4%	87.4%	96.0%

The majority of research schools began their SuccessMaker implementation in December, 2014 and the aimswebPlus post-testing occurred in May, 2015. Taking into consideration the holiday breaks, most schools were able to achieve one hour of implementation per week as evidenced by

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a mean usage of 15 (first) or 16 (kindergarten) hours for reading and almost 15 hours (both kindergarten and first) for mathematics.

Students had very high mastery of mathematics skills, averaging 94% mastery of skills kindergarten and 96% in first grade.   Both of these averages exceed the recommendations from the Teacher Reports Guide. The percentage of skills mastered in reading was 72% at kindergarten and 87% in first grade. It is not unusual to see lower reading skills mastery in kindergarten as students develop their literacy skills.   At first grade, students were again exceeding the recommendations from the Teacher Reports Guide.

It is recommended that students consistently complete 60% to 80% exercises correctly as they move through the program's content and are constantly challenged with new and more difficult skills. The study students met this recommendation well. The students in this study used SuccessMaker for approximately six months of the 2014-15 school year. The average course level growth of 6.5 months was consistent with this time frame across the grade levels and content areas.

Student Achievement

Tables 4 through 7 present, on each aimswebPlus achievement scale, the number of final participating study students, mean scores with standard deviations for each assessment period, mean score gains and their standard deviations, and effect sizes for the gains. The gains experienced by SuccessMaker students across both grade levels and each outcome measure are large and statistically significant. The achievement gains for the kindergarten students were very large, ranging from 0.63 to 0.89 standard deviations for the reading scales and from 0.91 to 1.31 standard deviations on the math scales. The achievement gains for the first grade students were also very large, ranging from 0.70 to 1.11 standard deviations for reading scales and from 0.44 to 1.27 standard deviations on the math scales.

Table 4	Kindergarten Reading aimswebPlus TEL Results					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Initial Sounds	205	9.65 (3.13)	NA	NA	NA	NA
Letter Naming Fluency	205	36.64 (20.43)	NA	48.62 (19.94)	11.98 (16.13)	0.74 (27)*
Auditory Vocabulary	205	18.93 (5.33)	NA	21.72 (3.56)	2.79 (3.51)	0.79 (29)*
Letter Word Sounds	205	NA	29.80 (14.87)	37.69 (14.66)	7.89 (8.87)	0.89 (31)*
Phoneme Segmentation	205	NA	30.32 (17.52)	37.94 (15.30)	7.62 (12.16)	0.63 (23)*
High Frequency Words	205	NA	NA	18.27 (16.38)	NA	NA
Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores						
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile						
An * and Green highlight indicates statistically significant gain in scores						

Kindergarten students achieved statistically significant gains on the reading scales from beginning-of-year to end-of-year (i.e., Letter Naming Fluency and Auditory Vocabulary) or middle-of-year to end-of-year (i.e., Phoneme Segmentation and Letter Word Sounds). These gains are depicted in Figure 1. Students on average were able to correctly say 8 more phonemes and 8 more letter word sounds from Winter to Spring which equated to a gains of 23 and 31 percentile points respectively. These students were also able to name 12 more letters and point out 3 new vocabulary words over the course of 6 months which equated to gains of 27 and 29 percentile points respectively.

Figure 1   Kindergarten aimswebPlus TEL Results Graphs
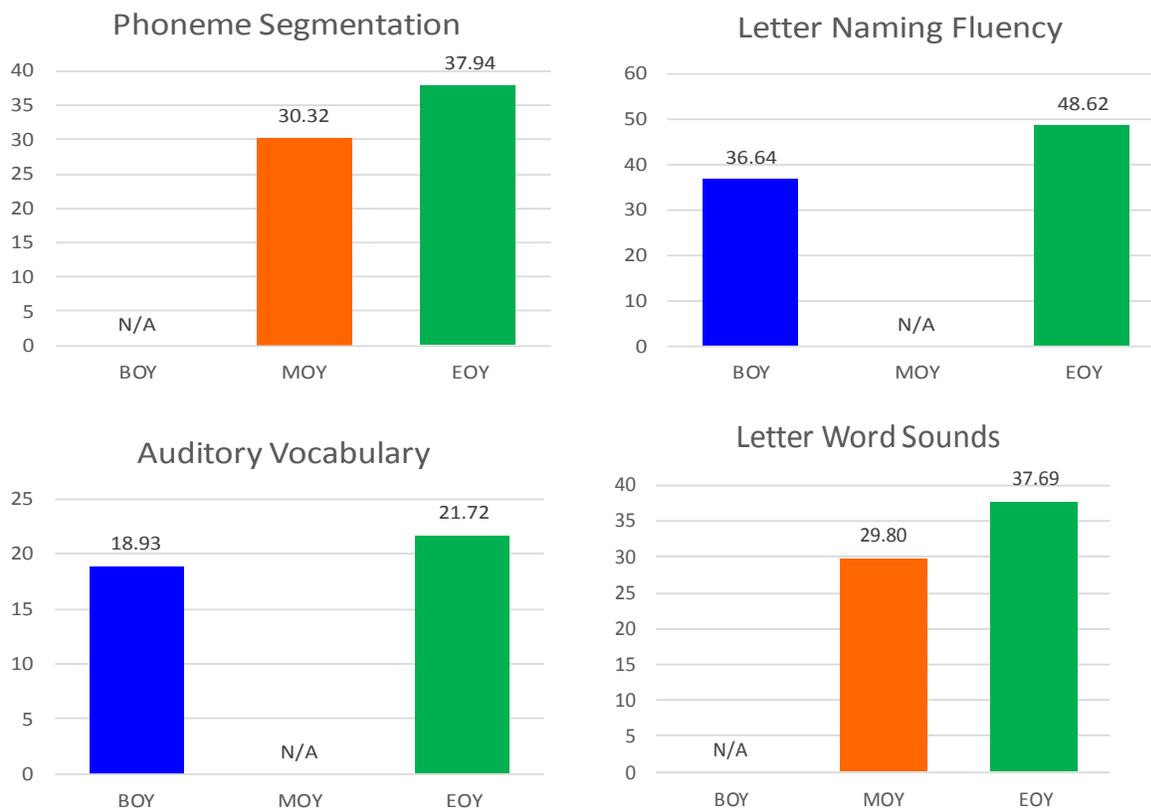
We will next examine the performance of kindergarten students on the aimswebPlus TEN. Kindergarten students achieved statistically significant gains in mathematics from beginning-of-year to end-of-year (i.e., Number Identification, Quantity Total, and Concepts and Applications) and middle-of-year to end-of-year (i.e., Quantity Match). These gains are depicted in Figure 2. Students on average were able to identify 10 more numbers, 4 more quantities of dots, and increase 5 more correct mental math problems (i.e., of 25 total) over the course of 6 months. These performances equated to gains of 32, 34 and 41 percentile points respectively.

Table 5	Kindergarten Math aimswebPlus TEN Results					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Number Identification	202	35.38 (15.38)	NA	45.86 (12.62)	10.48 (11.48)	0.91 (32)*
Quantity Total	206	12.31 (4.53)	NA	16.23 (3.98)	3.92 (3.93)	1.00 (34)*
Concepts and Applications	206	12.87 (5.41)	NA	18.04 (4.84)	5.17 (3.94)	1.31 (41)*
Quantity Match	206	NA	7.34 (4.52)	11.42 (5.89)	4.07 (4.04)	1.01 (34)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores

Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile

An * and Green highlight indicates statistically significant gain in scores

Figure 2   Kindergarten aimswebPlus TEN Results Graphs

First grade students achieved statistically significant gains on the reading scales from beginning-of-year to end-of-year (i.e., Oral Reading, High Frequency Words, and Auditory Vocabulary). Students on average were able to correctly read 42 more words in 60 seconds, correctly read 15 more high frequency words, and point out 2 new vocabulary words over the course of six months. This equated to a gain of 37, 35 and 26 percentile points respectively. See Figure 3 for a graphic representations of the gains experienced by 1st grade students on the aimswebPlus TEL.

Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Table 6			First Grade Reading aimswebPlus TEL Results			
Oral Reading	155	77.03 (63.17)	NA	119.10 (80.26)	42.07 (37.92)	1.11 (37)*
Letter Word Sounds	155	45.10 (12.92)	NA	NA	NA	NA
Phoneme Segmentation	155	41.37 (10.56)	NA	NA	NA	NA
High Frequency Words	155	29.57 (22.32)	NA	44.30 (26.12)	14.74 (14.51)	1.02 (35)*
Auditory Vocabulary	155	21.66 (3.46)	NA	23.21 (3.08)	1.55 (2.22)	0.70 (26)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores

Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile

An * and Green highlight indicates statistically significant gain in scores

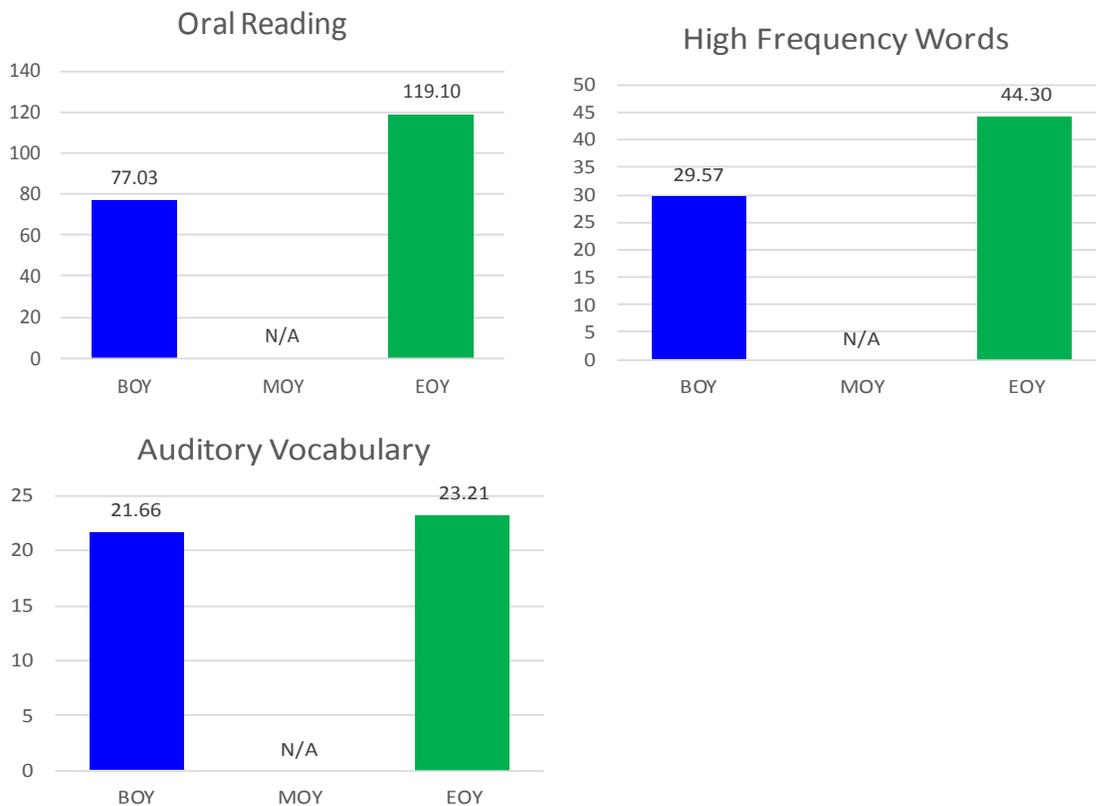Figure 3   First Grade aimswebPlus TEL Results Graphs

First grade students also achieved statistically significant gains on the mathematics scales from beginning-of-year to end-of-year (i.e., Number Comparison, Concepts and Applications, and Math Facts) and middle-of-year to end-of-year (i.e., Mental Computation). These gains are depicted in Figure 4. Students on average able to correctly identify the larger 2-digit numeral 4 more times, complete 2 additional math facts (i.e., addition and subtraction 0-10), complete 4 more

computation (i.e., addition and subtraction of 2-digit numbers), and increase 5 more correct mental math problems (i.e., of 25 total) over the course of 5-6 months. This equated to performance gains of 25, 17, 31, and 40 percentile points correspondingly.

| Table 7	First Grade Math aimswebPlus TEN Results					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Number Comparison	156	23.24 (8.16)	NA	27.17 (7.51)	3.92 (5.85)	0.67 (25)*
Concepts and Applications	156	12.92 (6.28)	NA	17.43 (6.29)	4.51 (3.56)	1.27 (40)*
Math Facts	156	14.96 (7.22)	NA	17.43 (7.50)	2.47 (5.67)	0.44 (17)*
Mental Computation	82	NA	4.60 (4.56)	8.48 (6.32)	3.88 (4.43)	0.87 (31)*
Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores						
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile						
An * and Green highlight indicates statistically significant gain in scores						

Figure 4   First Grade aimswebPlus TEN Results Graphs
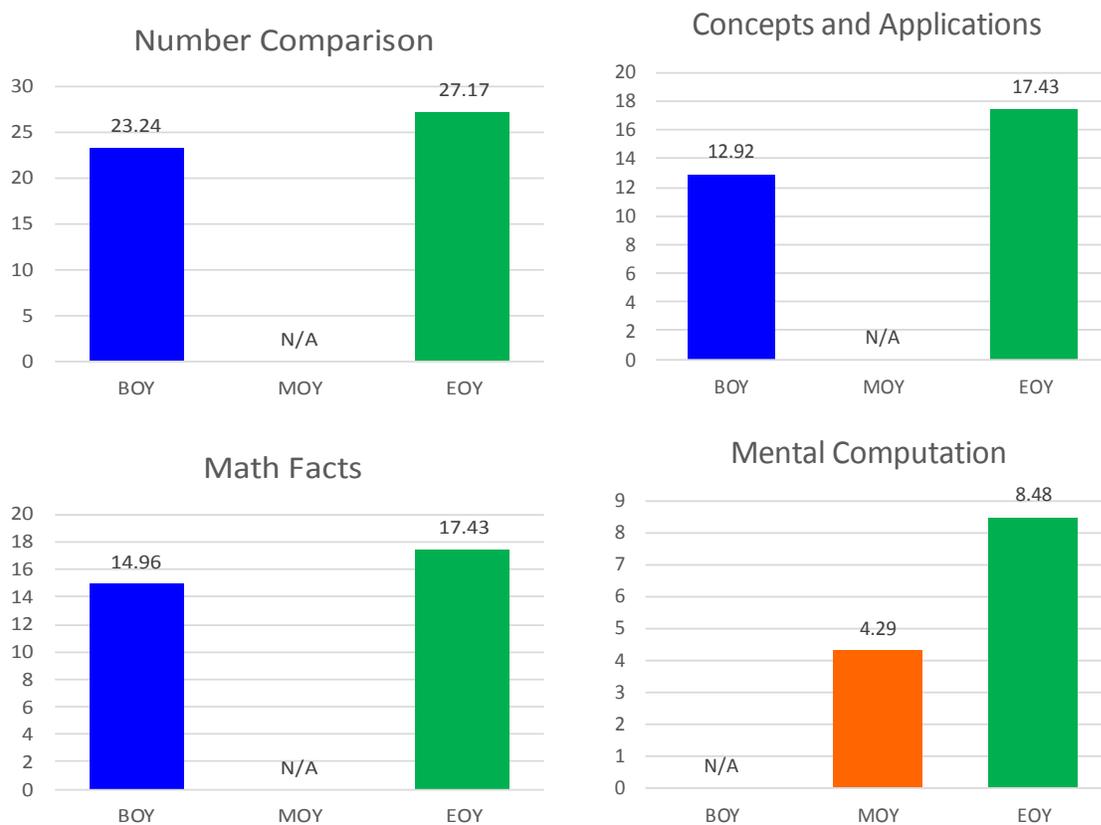
Student Achievement for Subgroups

Students designated as English Language Learners (ELL) or eligible for Free or Reduced Priced Lunch are often considered "at-risk" for being left behind academically. This study further examined the impact of the SuccessMaker program specifically on these two groups of students. Tables 8 through 15 provide the aimswebPlus results for these students.

The achievement gains on the aimswebPlus for the kindergarten at-risk students were very large, ranging from 0.57 to 1.23 standard deviations for the reading scales (i.e., 22 to 39 percentile points) and from 0.91 to 1.68 standard deviations (i.e., 32 to 45 percentile points) for the math scales. Likewise, the achievement gains for first grade at-risk students were also very large, ranging from 0.79 to 1.04 standard deviations for the reading scales (i.e., 28 to 35 percentile points) and from 0.57 to 1.46 standard deviations (i.e., 22 to 43 percentile points) for the math scales.

Table 8	Kindergarten Reading aimswebPlus TEL Results for Free/Reduced Lunch Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Initial Sounds	121	8.89 (3.56)	NA	NA	NA	NA
Letter Naming Fluency	121	34.05 (22.60)	NA	43.81 (19.68)	9.76 (16.42)	0.60 (23)*
Auditory Vocabulary	121	17.36 (5.46)	NA	20.90 (3.91)	3.55 (3.54)	1.00 (34)*
Letter Word Sounds	121	NA	24.83 (14.52)	33.68 (15.13)	8.85 (9.77)	0.91 (32)*
Phoneme Segmentation	121	NA	24.95 (18.90)	32.49 (17.67)	7.54 (13.24)	0.57 (22)*
High Frequency Words	121	NA	NA	15.39 (15.45)	NA	NA

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile
An * and Green highlight indicates statistically significant gain in scores

Table 9	Kindergarten Reading aimswebPlus TEL Results for ELL Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Initial Sounds	111	8.81 (3.33)	NA	NA	NA	NA
Letter Naming Fluency	111	34.21 (20.97)	NA	46.22 (19.84)	12.01 (15.41)	0.78 (28)*
Auditory Vocabulary	111	16.09 (4.97)	NA	20.26 (3.91)	4.17 (3.39)	1.23 (39)*
Letter Word Sounds	111	NA	26.01 (14.38)	34.99 (14.38)	8.98 (9.42)	0.95 (33)*
Phoneme Segmentation	111	NA	25.01 (18.17)	34.09 (17.24)	9.08 (13.44)	0.68 (25)*
High Frequency Words	111	NA	NA	16.96 (16.55)	NA	NA

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile
An * and Green highlight indicates statistically significant gain in scores

Table 10	Kindergarten Math aimswebPlus TEN Results for Free/Reduced Lunch Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Number Identification	125	34.82 (15.41)	NA	44.94 (13.05)	10.12 (10.42)	0.97 (33)*
Quantity Total	125	11.30 (4.66)	NA	15.82 (4.35)	4.51 (3.89)	1.16 (38)*
Concepts and Applications	125	11.46 (5.35)	NA	17.54 (5.27)	6.09 (3.66)	1.66 (45)*
Quantity Match	125	NA	6.38 (4.12)	10.41 (6.17)	4.03 (4.44)	.91 (32)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile
An * and Green highlight indicates statistically significant gain in scores

Table 11	Kindergarten Math aimswebPlus TEN Results for ELL Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Number Identification	108	33.05 (14.46)	NA	45.16 (12.62)	10.48 (12.93)	1.19 (38)*
Quantity Total	111	11.11 (4.47)	NA	15.59 (4.32)	4.48 (3.93)	1.14 (37)*
Concepts and Applications	111	11.17 (5.23)	NA	17.34 (5.17)	6.17 (3.67)	1.68 (45)*
Quantity Match	111	NA	6.07 (4.13)	10.19 (5.72)	4.12 (4.03)	1.02 (35)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile
An * and Green highlight indicates statistically significant gain in scores

Table 12	First Grade Reading aimswebPlus TEL Results for Free/Reduced Lunch Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Oral Reading	113	67.17 (53.38)	NA	108.32 (76.88)	41.15 (39.60)	1.04 (35)*
Letter Word Sounds	113	43.35 (12.42)	NA	NA	NA	NA
Phoneme Segmentation	113	40.39 (11.93)	NA	NA	NA	NA
High Frequency Words	113	27.58 (21.29)	NA	41.12 (26.17)	13.53 (13.65)	0.99 (34)*
Auditory Vocabulary	113	21.03 (3.60)	NA	22.80 (3.47)	1.77 (2.25)	0.79 (28)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores
Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile
An * and Green highlight indicates statistically significant gain in scores

Table 13	First Grade Reading aimswebPlus TEL Results for ELL Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Oral Reading	73	60.05 (54.02)	NA	91.45 (72.65)	31.40 (36.59)	0.86 (31)*
Letter Word Sounds	73	41.25 (13.55)	NA	NA	NA	N
Phoneme Segmentation	73	38.81 (13.85)	NA	NA	NA	NA
High Frequency Words	73	25.93 (21.60)	NA	34.90 (24.97)	8.97 (10.88)	0.82 (30)*
Auditory Vocabulary	73	19.68 (3.67)	NA	22.05 (3.93)	2.37 (2.53)	0.94 (33)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores

Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile

An * and Green highlight indicates statistically significant gain in scores

Table 14	First Grade Math aimswebPlus TEN Results for Free/Reduced Lunch Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Number Comparison	107	21.70 (7.75)	NA	26.05 (7.77)	4.35 (5.68)	0.77 (28)*
Concepts and Applications	107	11.21 (5.93)	NA	16.36 (6.84)	5.15 (3.53)	1.46 (43)*
Math Facts	107	14.42 (7.38)	NA	17.26 (8.01)	2.84 (5.00)	0.57 (21)*
Mental Computation	28	NA	3.53 (3.30)	6.45 (5.29)	2.92 (3.53)	0.83 (30)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores

Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile

An * and Green highlight indicates statistically significant gain in scores

Table 15	First Grade Math aimswebPlus TEN Results for ELL Students					
Scale	Sample Size	BOY Mean Score (SD)	MOY Mean Score (SD)	EOY Mean Score (SD)	Mean Gain (SD)	Gain Effect Size
Number Comparison	74	21.03 (7.94)	NA	25.00 (7.91)	3.97 (5.09)	0.78 (28)*
Concepts and Applications	74	10.58 (6.30)	NA	15.24 (7.14)	4.66 (3.57)	1.31 (40)*
Math Facts	74	14.36 (8.22)	NA	16.96 (8.51)	2.59 (4.45)	0.58 (22)*
Mental Computation	28	NA	2.39 (2.90)	5.00 (5.08)	2.61 (3.35)	0.78 (28)*

Mean gain indicates the gain (posttest minus baseline score) and (SD) indicates the sample standard deviation of gain scores

Gain Effect Size includes a Standardized Mean Gain = Mean Gain / SD and a Percentile Gain (-) indicating the increase in percentile rank for the mean posttest score when the baseline score is set to median/50th percentile

An * and Green highlight indicates statistically significant gain in scores

IV. DISCUSSION

A large sample of 719 kindergarten and first grade students from 22 classrooms participated in the 2014-15 SuccessMaker Math and Reading Efficacy Study. The student sample was quite diverse, with more than half of the students identifying as Hispanic and eligible for free or reduced lunch. Half of the study sample were designated English Language Learners.

The results indicate that students who consistently use the program (i.e., 15 hours over 6 months) are able to have large achievement gains in reading and mathematics (i.e., ranging from .44 to 1.31 standard deviations). The gains are statistically significant, and are evident across a variety of reading and mathematics constructs as measured by the aimswebPlus assessment.

An examination of performance for at-risk students, those classified as English Language Learners or eligible for free or reduced priced lunch, indicates similar significant growth for these subgroups as well. Once again, the growth was statistically significant and evident across both grades, as well as, across all reading and mathematics scales.

A.1 SuccessMaker Study Site Descriptions

This appendix summarizes the educational environment for each study site as well as a demographic breakdown. This information is important for determining how applicable results from this study may be to the consumers of this report.

California District-School One

This school resides in a large suburb and students are expected to follow a strict dress code. This school promotes student success by ensuring professional collaboration and communication among staff, goal setting with both parents and students and making a strong effort to academically use all time allotted for the school-day. In the 2010-11 school year, the district served a community of over 43,000. The median household income is approximately $42,000, indicating a middle-class community.

This is a medium size school serving close to 500 students in grades kindergarten through six. The Kindergarten level is made up of approximately 80 students and first grade is made up of approximately 70 students. This school is primarily Hispanic, which represents 82% of the school's population. Asian/Pacific Islanders make up the remaining 18%. This school falls into the high range for participation in the nation's lunch program with 93% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 27 to 1.

Three kindergarten and three first grade teachers agreed to be in the study. The district adopted a widely published elementary basal reading and math curriculum. Daily English Language Arts blocks for both kindergarten and first grade were anywhere up to 120 minutes in length, while daily math blocks were anywhere up to 75 minutes in length.

All participating teachers used both the reading and mathematics portions of the program. During the study period, kindergarten students received an average of 14 hours of SuccessMaker reading instruction (standard deviation = 1.31 hours) and an average of 14 hours of SuccessMaker math instruction (standard deviation = 1.40 hours). First grade students received an average of 16 hours of SuccessMaker reading instruction (standard deviation = 1.44 hours) and an average of 15 hours of SuccessMaker math instruction (standard deviation = 1.65 hours).

Teachers were trained on December 3rd, approximately three months after school began. They received an additional training on March 4, 2015. The baseline testing for reading was administered to kindergarten during the second week of December, 2014 and the math test was administered to kindergarten the first week of January 2015. The baseline testing for reading and math was administered to 1st grade during the third week of December, 2014. One first grade classroom baseline tested for math during the first week of January, 2015. The middle of year testing was administered to kindergarten during the third week of January, 2015. The middle of school year testing for math was administered to 1st grade during the third week of January, 2015. There was no middle of school year reading test administered to 1st grade. End of school year testing was administered to Kindergarten during the second week of May, while first grade completed end of school year testing for reading in math during the third week of May.

California District-School Two

This school resides in a large suburb. This is an economically disadvantaged site where most students come from low-income families. In addition, teachers are challenged with large classes and not enough staff. In the 2010-11 school year, the district served a community of over 29,000. The median household income is approximately $39,000, indicating a middle-class community.

This is a medium size school serving approximately 550 students in grades kindergarten through five. The Kindergarten level is made up of approximately 85 students and first grade is made up of approximately 95 students. This school is primarily Hispanic, which represents 95% of the school's population. Asian/Pacific Islanders make up the remaining 5%. This school falls into the high range for participation in the nation's lunch program with 96% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 27 to 1

Two kindergarten and one first grade teacher agreed to be in the study. This district adopted a widely published elementary basal reading and math curriculum. Daily English Language Arts blocks for kindergarten were 80 minutes and for 1st grade were 100 minutes. Daily math blocks for both kindergarten and first grade were 60 minutes.

All participating teachers used both the reading and mathematics portions of the program. During the study period, kindergarten students received an average of 19 hours of SuccessMaker reading instruction (standard deviation = 1.84 hours) and an average of 14 hours of SuccessMaker math instruction (standard deviation = 1.70 hours). First grade students received an average of 12 hours of SuccessMaker reading instruction (standard deviation = 2.55 hours) and an average of 11.50 hours of SuccessMaker math instruction (standard deviation = 2.69 hours).

Teachers were trained on December 3rd, approximately three months after school began. They received an additional training on March 2nd, 2014. The baseline testing was administered to Kindergarten during the second and third weeks of December 2014 and to first grade during the second week of December 2014. The middle of school year testing was administered to Kindergarten and first grade during the last week of January 2015. End of school year testing was administered to both Kindergarten and 1st grade during the last week of May and first week of June 2015.

California District-School Three

This school resides in a large suburb. This site values strong leadership, as evidenced by a high level of involvement and support by the principal. Students at this school come from lower socio-economic backgrounds and tend to struggle academically. In the 2010-11 school year, the district served a community of over 43,000. The median household income is approximately $42,000, indicating a middle-class community.

This is a medium size school serving just fewer than 600 students in grades kindergarten through six. Kindergarten and first grade are both made up of approximately 80 students. This school is primarily Hispanic, which represents 86% of the school's population. Asian/Pacific Islanders make up 13%, while Caucasian students make up the remaining 1%. This school falls into the high range for participation in the nation's lunch program with 96% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 28 to 1

Three kindergarten teachers agreed to be in the study. This site adopted a widely published elementary basal reading and math curriculum. Daily English Language Arts blocks for kindergarten were 150 minutes. Teachers used both the reading and mathematics portions of the program with their students. Daily math blocks for kindergarten were 60 minutes. Students received an average of approximately 20 hours of SuccessMaker reading (standard deviation = 2.31 hours) and an average of 19 hours of SuccessMaker math instruction (standard deviation = 2.05 hours) during the study period.

Teachers were trained on December 3rd, approximately three months after school began. They received an additional training on March 3rd, 2014. Baseline testing was administered during the third week of December 2014, middle of school year testing during the last two weeks of January 2015, and end of school year testing during the second week of May 2015.

Colorado District

This school resides in a rural area and students are expected to follow a dress code. This school prides itself in being technologically advanced. This school strives to use the technology resources available to them to help students realize their ultimate potential. In the 2010-11 school year, the district served a community of approximately 11,400. The median household income is nearly $83,000, indicating a middle-class community.

This is a small to medium size school serving approximately 450 students in grades kindergarten through eight. Kindergarten and first grade are both made up of approximately 55 students. This school is primarily Caucasian, which represents approximately 88% of the school population. Hispanic students comprise 8% of the school's population, with multi-ethnic and Asian/Pacific Islander making up the remaining 4%. This school falls into the low range for participation in the nation's free or reduced-price lunch program with only 8% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 20 to 1.

Two kindergarten and two first grade teachers agreed to be in the study. This school recently adopted an experimental system of curricula that includes math and reading instructional materials and techniques. The school supplements these programs largely with digital programs. Daily English Language Arts blocks ranged from 60-90 minutes, while daily math blocks were 60 minutes in length.

All participating teachers used the program for both reading and mathematics. During the study period, kindergarten students received an average of 11 hours of SuccessMaker reading instruction (standard deviation = 1.20 hours) and an average of 11 hours of SuccessMaker math instruction (standard deviation = 1.25 hours). First grade students received an average of 8 hours of SuccessMaker reading instruction (standard deviation = 1.52 hours) and an average of approximately 9 hours of SuccessMaker math instruction (standard deviation = 1.49 hours). Teachers were trained on January 20th, approximately five months after school began. They received an additional training on March 10th 2015.

Kindergarten and first grade received baseline testing during the first week of December 2015. Middle of school year testing was administered during the first two weeks of February 2015 to both grades. The end of school year test was administered to both grades during the first two weeks of May 2015.

Ohio District

This school resides in a midsize suburb. This school encourages collaboration with the community to help their students succeed in the 21st century. In the 2010-11 school year, the district served a community of approximately 11,000. The median household income is approximately $45,000, indicating a middle-class community.

This is a small to medium sized school serving approximately 450 students in grades kindergarten through two. Kindergarten and first grade are both made up of approximately 140 students. This school is primarily Caucasian, which represents 94% of the school population. Hispanic and multi-ethnic students make up the remaining 6% of the population. This school falls into the mid-range for participation in the nation's free or reduced-price lunch program with 64% of students eligible to receive free or reduced price lunch. The student/teacher ratio is approximately 15 to 1.

Two kindergarten and two first grade teachers agreed to be in the study. The district adopted a widely published elementary basal reading and mathematics curriculum. Daily English Language Arts and math blocks were 180-240 minutes in length. One teacher from each grade level used the program for reading and the other teacher from each grade level used the math portion. Teachers were trained on November 17th, approximately three months after school started. They received an additional training on March 11th, 2015.

During the study period, kindergarten students received an average of approximately 18 hours of SuccessMaker reading instruction (standard deviation = 1.04 hours) and an average of 13 hours of SuccessMaker math instruction (standard deviation = 0.76 hours). 1st grade students received an average of 18 hours of SuccessMaker reading instruction (standard deviation = 1.24 hours) and an average of 18 hours of SuccessMaker math instruction (standard deviation = 1.70 hours).

The baseline testing was administered to Kindergarten during the last week of November and the first week of December 2015 and to first grade during the first week of December. The middle of school year testing was administered during the first week of February. End of school year testing was given to Kindergarten during the last week of April 2015. The end of school year reading test was given to first grade during the first week of May and the math test was given during the last week of April 2015.

Oregon District

This school is located approximately 25 miles outside of a large metropolitan area. This site is small, but teachers and administration view their size as a strength to provide an individualized educational experience for each student. Building strong relationships with families, community and students promotes a collective responsibility for student success. In the 2010-11 school year, the district served a community of approximately 28,000. The median household income is approximately $59,000, indicating a middle-class community.

This is a small sized school serving fewer than 400 students in grades kindergarten through five. Kindergarten and first grade are both made up of approximately 55 students. This school is comprised of two primary ethnic groups, Caucasian and Hispanic, which represent a total of 70% and 19% of the school population respectively. Asian/Pacific Islander, African American, American Indian/Alaska Native, and multi-ethnic students make up the remaining 11% of the student population. This school falls into the low range for participation in the nation's free or

reduced-price lunch program with only 6% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 19 to 1.

Two first grade teachers agreed to be in the study, with one teacher using the program for reading and the other math. This site adopted a widely published elementary basal reading and mathematics curriculum. Daily English Language Arts blocks for 1st grade were 90 minutes in length and math blocks were 80 minutes in length. During the study period, 1st grade students received an average of 24 hours of SuccessMaker reading instruction (standard deviation = 0.97 hours) and an average of 25 hours of SuccessMaker math instruction (standard deviation = 2.15 hours). Teachers were trained on November 20th, approximately two months after school began. They received an additional training on April 1, 2015.

The baseline testing was administered during the third week of November 2014, the middle of school year testing during the last week of January 2015, and the end of school year testing during the second week of May 2015.

A.2 aimswebPlus TEL and TEN Descriptions

aimswebPlus Test of Early Literacy (TEL) Description				
Period(s) Given	Measure	What the Student Will Do	What is Recorded	Time Limit
Kindergarten Fall	Print Concepts	Show understanding of purpose, use, and contents (letters, pictures) of a book	Correct and incorrect responses	No time limit
Kindergarten Fall, Winter	Initial Sounds	Look at 4 pictures and either point to the one that begins with a given letter sound (receptive) or make the sound that begins the word (expressive)	Receptive: picture selected Expressive: correct/incorrect	No time limit
Kindergarten Fall, Winter, Spring	Letter Naming Fluency	Name letters	Any errors made, and how many letters are named in 1 minute	1 min.
Kindergarten Fall, Winter, Spring First Grade Fall, Winter, Spring	Auditory Vocabulary	Point to the picture that matches the word said by the examiner	Picture selected	No time limit
Kindergarten Winter, Spring First Grade Fall	Letter Word Sounds	Say the sounds of letters, syllables, and words for 1 minute	Any errors made, and how far the student reaches in 1 minute	1 min.
Kindergarten Winter, Spring First Grade Fall	Phoneme Segmentation	Say the phonemes in orally presented words	Correct and incorrect phonemes	No time limit
Kindergarten Spring First Grade Fall, Winter, Spring	High Frequency Words	Read a list of words aloud for 1 minute	Any errors made, and how far the student reads in 1 minute	1 min.
First Grade Fall, Winter, Spring	Oral Reading Fluency	Read two stories aloud, each for 1 minute	Number of words read correctly	1 min. each

aimswebPlus Test of Early Numeracy (TEN) Description				
Period(s) Given	Measure	What the Student Will Do	What is Recorded	Time Limit
Kindergarten Fall, Winter, Spring	Number Identification (NID)	Verbally name numbers up to 20.	Put a slash through items answered incorrectly or skipped, and circle the last item attempted.	1 minute
Kindergarten Fall, Winter, Spring	Quantity Total (QT)	Boxes containing blue dots are presented. The student states the total number of dots within each box or each pair of boxes.	Put a slash through items answered incorrectly or skipped, and circle the last item attempted.	1 minute
Kindergarten Fall, Winter Spring First Grade Fall, Winter, Spring	Concepts and Applications (CA)	Mentally solve various types of math problems and state the correct answers.	Circle 1 for correct answers, circle 0 for incorrect answers.	No time limit
Kindergarten Winter, Spring	Quantity Match (QM)	Pairs of boxes containing dots (one with blue dots, one with red dots) are presented. The student states how many more blue dots are needed to match the number of red dots.	Put a slash through items answered incorrectly or skipped, and circle the last item attempted.	1 minute
First Grade Fall, Winter, Spring	Number Comparison	Student identifies which of the two numbers is larger.		1 minute
First Grade Fall, Winter, Spring	Math Facts	Student mentally solves simple addition and subtraction problems involving numbers 1 through 10 and states the correct answer.		1 minute
First Grade Fall, Winter, Spring	Mental Computation	Student mentally solves problems involving the addition and subtraction of 10 and state the correct answer.		1 minute

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