SAVVAS SUCCESSMAKER MATH EFFICACY STUDY

2009-10 FINAL REPORT

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SAVVAS

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EXECUTIVE SUMMARY

Savvas partnered with Gatti Evaluation to conduct rigorous research to support the assertion that the SuccessMaker Math computer based learning program effectively increases student mathematics achievement and attitudes. The program was evaluated in sixty-three diverse elementary and middle grade classrooms from ten schools in seven different states (i.e., AZ, AR, CA, IN, KS, NY, PA) during the 2009-10 school year. Students in classrooms randomly assigned to use SuccessMaker made regular use of the program while students in comparison classrooms received supplemental instruction from non-computerized supplemental mathematics programs. Four widely-used classroom mathematics programs were utilized by the sites at 3rd and 5th grade, and three different programs were utilized at 7th grade.

The study schools come from public school districts located in large cities or suburbs of large cities. The study schools show considerable variation in ethnicity, students eligible for reduced priced lunch, as well as a wide range of ability with respect to mathematics and reading achievement. The evaluation team sought out diversity in the study sample to ensure the program would be used by learners of all abilities and backgrounds, thus reflecting the reality that is today's elementary classrooms. Five schools began the study in the first month, three began in the third month, one in the fourth and the last in the fifth month of the school year. The final study sample was large, consisting of 505 3rd grade (i.e., SuccessMaker = 282, comparison = 223), 408 5th grade (i.e., SuccessMaker = 224, comparison = 184) and 273 7th grade (i.e., SuccessMaker = 136, comparison = 137) students.

A challenging assessment battery was group administered to students at baseline and again at the end of the school year. The assessment battery consisted of the *Group Mathematics Assessment and Diagnostic Evaluation* (GMADE), and the mathematics attitude survey developed by the principal investigator where students respond to self-report questions regarding general math attitude, confidence, motivation, and self-perceived aptitude. Comparisons on assessment outcomes were made between study groups using model adjusted end-of-year raw score group mean differences. Adjusted group mean differences are calculated holding the effects of confounding variables constant for both groups. The equating of confounding variables and the maintaining of consistent implementation ensures the outcomes may more confidently be attributed to the study conditions randomly assigned to these groups.

Results were broken out and analyzed separately for each GMADE subtest (i.e., Concepts and Communication, Operations and Computation, and Process and Applications). Results were also broken out and analyzed for separate levels of five key student populations (i.e., English proficiency, ethnicity, gender, meal status, math ability). Further, the performance for the comparison group was compared to four blocks of program usage (i.e., block 1 = 1 to 9 hours, block 2 = 10 to 19 hours, block 3 = 20 to 29 hours, block 4 = 30 or more hours).

RQ: How did teachers and students react to the SuccessMaker Math program?

Focus groups were conducted at each school during site visits between April and early June. These sessions provided the evaluators with insights into teacher and student experiences with the program. Teachers and students became quickly comfortable with the SuccessMaker program, and felt the program was a good educational investment. The teacher response to the

program was overwhelmingly positive, with 80% of the 646 recorded comments coded as positive in nature. Teachers appreciated the reporting system for informing classroom instruction, identifying students for remediation, monitoring student progress, and as a tool to share student progress with curriculum specialists and parents. A majority of teachers felt the initial placement and the adaptive motion of sequencing students through the program was effective. In addition, the learning activities were rated as well-differentiated and aligned to current curricula and state educational objectives, and the program challenged both lower and higher achieving student populations. Teachers reported rare minor technical issues (ex., logging in, activities loading), primarily the result of district and school infrastructure.

Teachers firmly believed that their students enjoyed using the math version of SuccessMaker, and felt that the program made the learning process more fun. When formally interviewed, teachers were overwhelmingly positive about their students' interactions with the program. Of the 170 recorded comments, 79% were positive in nature. When students were surveyed, 93% of 3rd grade, 79% of 5th grade, and 88% of 7th grade students indicated they liked using the SuccessMaker program. Third grade students responded most positively to the characters and animation, and found the learning activities engaging. Fifth and 7th grade students more often perceived the characters as immature and the animation sometimes excessive and distracting (i.e., only 9% of 3rd grade versus 28% of 5th grade and 35% of 7th grade students indicated they disliked the animation).

RQ: How was the SuccessMaker Math program utilized?

The majority of study teachers implemented SuccessMaker Math in a computer laboratory environment, typically implementing the program 2-3 days per week for an average of 24 minutes per session. Ten teachers implemented SuccessMaker in the lab more than three times a week. Three teachers utilized a joint-usage model, implementing SuccessMaker in the classroom for 30% to 40% of the total usage, and the remainder in the computer lab. One 3rd grade teacher chose not to utilize the computer laboratory after a couple months of implementation, and implemented SuccessMaker the remainder of the year in the classroom with laptop stations (accounting for 75% of total usage minutes in the classroom). SuccessMaker students in 3rd and 5th grade generally used the program in addition to their regular math block, while 7th grade students used SuccessMaker during their daily math block.

The three grade levels were similar in their usage time with medians (i.e., 50th percentile or those students with usage in the center of the distribution) of 19, 18, and 17 hours logged on the program for 3rd, 5th, and 7th grade respectively. The three grade levels also demonstrated similarly good productivity and success rates with their assigned tasks. Students at the center of the distribution completed well over one exercise per minute indicating, as a group, that student were on-task. All three grade levels also had median success rates in the 60% to 80% range indicating that students as a group were continuously and appropriately challenged as they progressed through the program. Students in the 3rd grade SuccessMaker classrooms attempted 43 exercises every thirty minutes with a success rate of 68%, while students in 5th grade classrooms attempted 44 exercises every thirty minutes with a success rate of 68%. Seventh grade SuccessMaker students attempted 38 exercises every thirty minutes with a success rate of 63%.

The program's reporting feature was well-received by the teachers. Individual preference and teacher expectations dictated how teachers utilized information gained from the reports. The average teacher reported utilizing the program's reporting system in an educationally significant way during 57% of the usage weeks (P_{25} = 22%, P_{75}=92%). A majority of the SuccessMaker teachers used the reporting system at least once to check students' progress, determine which students needed help while using the program, and/or to inform additional classroom instruction or practice on specific topics. To a lesser extent several teachers used information from the reporting system to evaluate students on state testing goals, to ability group students during classroom instruction, or to provide data to parents.

RQ: Do 3rd, 5th, and 7th grade students making regular use of the SuccessMaker Math program demonstrate higher mathematics achievement as compared to students that did not utilize SuccessMaker Math?

SuccessMaker students in 3rd, 5th, and 7th grades statistically significantly outperformed their comparison group counterparts on the GMADE Total score. The magnitude of the difference in performance observed at all three grades was remarkable, with standard deviations of 1.00, 0.53, and 0.61 for 3rd, 5th, and 7th grade respectively. These effects were consistently large across usage levels with only ten to nineteen hours on the program enough to see large differences over the comparison group. SuccessMaker students in 3rd, 5th, and 7th grade statistically significantly outperformed their comparison group counterparts on the Process and Applications subtest. The magnitude of the difference in performance observed at all three grades was again very large, with standard deviations of 1.32, 0.59, and 1.01 for 3rd, 5th, and 7th grade respectively. These effects were also consistently large across usage levels.

SuccessMaker students in 3rd and 5th grade statistically significantly outperformed their comparison group counterparts on the Operations and Computation subtest. The magnitude of the differences in performance observed at both grades were equivalently very large, 0.75 standard deviations. And yet again, these effects were consistently large across usage levels. The 7th grade SuccessMaker students outperformed their comparison group peers though not statistically so. Though the SuccessMaker students in 3rd and 7th grade performed statistically similar to the comparison group on the Concepts and Communications subtest, the 5th grade comparison group statistically significantly outperformed the SuccessMaker group on this subtest.

When the data was broken out for student subpopulations, 3rd grade Hispanic, low SES, non-English proficient, female, and lower-achieving SuccessMaker students all statistically significantly outperformed their comparison group peers on GMADE Total score (i.e., 0.50 to 1.31 standard deviations), as well as the Process and Applications (i.e., 0.91 to 1.65 standard deviations) and the Operations and Computation subtests (i.e., 0.49 to 1.19 standard deviations). Low SES, non-English proficient and female 5th grade SuccessMaker students statistically significantly outperformed their comparison group peers on GMADE Total score (i.e., 0.48 to 0.53 standard deviations), as well as, both the Process and Applications (i.e., 0.49 to 0.63 standard deviations) and Operations and Computation subtests (i.e., 0.55 to 0.73 standard deviations).

Seventh grade low SES, non-English proficient, and female students all dramatically outperformed their comparison group counterparts on GMADE Total score (i.e., 0.57 to 0.66

standard deviations) and the Process and Applications subtest (i.e., 1.06 to 1.39 standard deviations). Further, lower-achieving and Hispanic 7th grade SuccessMaker students statistically outperformed their comparison group peers on the Process and Applications subtest (i.e., 0.58 and 1.19 standard deviations).

RQ: Do 3rd, 5th, and 7th grade students using the SuccessMaker Math program demonstrate more positive attitudes toward mathematics and mathematics instruction as their comparison group counterparts?

The 3rd and 7th grade SuccessMaker students both had statistically significantly higher math academic attitudes than the comparison group (i.e., 3rd 0.99 standard deviations, 7th 0.62 standard deviations). The very large statistically significant effects seen at 3rd grade were also seen for Hispanic, low SES, non-English proficient, female, and lower-achieving students (i.e., 0.29 to 1.13 standard deviations). Several 7th grade at- risk populations (i.e., female, low SES, non-English proficient) also had statistically higher math attitudes than the comparison group (i.e., 0.61 to 0.69 standard deviations).

I. INTRODUCTION

As elementary and middle schools strive to meet the adequate yearly progress goals set for them in reading and mathematics achievement, many are attempting to maximize their efforts by turning to instructional technology like the SuccessMaker©[1] program. Gatti Evaluation partnered with Savvas to evaluate the effectiveness of the SuccessMaker program. Information gathered during this study will inform future revisions of the program and provide evidence of program efficacy.

Savvas partnered with Gatti Evaluation to study the efficacy of the SuccessMaker Math program in achieving positive educational attitudes and achievement outcomes.

This report provides methods and results from the first phase of the efficacy research conducted during the 2009-10 school year on the SuccessMaker Math program; including the study methodology, nuanced program usage information, teacher and administrator attitudes, as well as student attitudinal and achievement gains. This efficacy study evaluated the Math program in sixty-three diverse 3rd, 5th and 7th grade classrooms from ten schools in seven different states (i.e., AZ, AR, CA, IN, KS, NY, PA).

Instructional Technology Literature

SuccessMaker is an adaptive computer based learning environment that offers an instructional management system, placement and formative assessment, individualized elementary and middle grade reading and mathematics curriculum resources, and a student progress reporting system.

SuccessMaker is an adaptive computer-based learning environment that offers an instructional management system, placement and formative assessment, individualized elementary and middle grade reading and mathematics curriculum resources, and a reporting system to inform administrators and teachers as to student progress. It is widely believed that making formative assessment an integral part of instructional practice is one of the best ways to improve student learning.[2] The National Council of Teachers of Mathematics also emphasizes that technology can enhance mathematics learning and supports effective mathematics teaching and skills practice. Mathematics education and instruction may be aided by technology in various ways, with the technology assuming the role of enhancing, amplifying, and organizing curricula.[3] It is also well documented that both the scope of ways and effectiveness of technology in aiding instruction is increasing with each passing decade.[4] What remains unclear are the best ways to

[1] http://www.savvas.com/
[2] National Council of Teaching of Mathematics (2000). Principles and Standards for School Mathematics. Reston, Va.: National Council of Teachers of Mathematics.
[3] Heid, M. K. (1997). The technological revolution and the reform of school mathematics. *American Journal of Education, 106*(*1*), p5-61.
[4] Jenks, M. S., & Springer, J. M. (2001). A view of the research on the efficacy of CAI. *Electronic Journal for the Integration of Technology in Education, 1*(*2*).

utilize technology to find significant improvement in student achievement over non-technology methods that make use of the same pedagogy.

Theoretically, well-designed mathematics interventions can increase student achievement, specifically in the acquisition and practice of basic skills, especially when integrated with classroom instruction.[5] Although an intervention may be skillfully applied to create an educational environment that significantly increases achievement, poorly designed and implemented interventions will provide little or no benefit, and may even be detrimental. Poorly designed and implemented curricula can confuse and frustrate students and teachers, proving to be a waste of money and valuable learning time. For these reasons, state adoption committees and the federal government (i.e., No Child Left Behind Act[6]) require publishers to conduct rigorous efficacy research to support their educational materials.

Study Goals And Research Questions

The primary goal of this study is to conduct rigorous research to support the assertion that the SuccessMaker Math program effectively increases students' mathematics achievement and attitudes. This study is testing the SuccessMaker program during the first year of implementation as it is typically the most challenging year for any new program to impact student achievement. The SuccessMaker program was tested against comparison classrooms that did not utilize a computerized intervention program, which were randomly selected within each school .

The second goal of the study was to collect information on teacher and student attitudes toward specific features and aspects of the SuccessMaker program. These research questions are classified into two categories; how do teachers and students respond to the program, and how is the program being used?

The research questions for this study are outlined in the following four parts:

RQ1: Do 3rd, 5th, and 7th grade students making regular use of the SuccessMaker Math program demonstrate higher mathematics achievement as compared to students that did not utilize SuccessMaker Math?

RQ2: Do 3rd, 5th, and 7th grade students using the SuccessMaker Math program demonstrate more positive attitudes toward mathematics and mathematics instruction as their comparison group counterparts?

RQ3: How did teachers and students react to the SuccessMaker Math program?

RQ4: How was the SuccessMaker Math program utilized?

[5] Parr, J. M., & Fung, I. (2000). A review of the literature on computer-assisted learning, particularly integrated learning systems, and outcomes with respect to literacy and numeracy: Final Report. Report to New Zealand Ministry of Education.
[6] http://www.ed.gov/nclb/landing.jhtml

II. METHODOLOGY

The SuccessMaker Math program was evaluated in sixty-three diverse 3rd, 5th and 7th grade classrooms from eight urban and suburban school districts in seven different states (i.e., AZ, AR, CA, IN, KS, NY, PA) during the 2009-10 school year. The program was evaluated via a two-group, classroom level randomized, baseline to post observation assessment research design. Teachers or sections within each school were randomly assigned to one of two study groups (i.e., comparison v. SuccessMaker Math). Students in classrooms randomly assigned to implement SuccessMaker Math made regular use of the program for one hour a week in two or three sessions while students in comparison classrooms generally received supplemental instruction from non-computerized mathematics programs currently in use at their school.

Gatti Evaluation provided research schools all data collection materials, maintained communication with the study sites, and followed clear data collection procedures throughout the study to ensure that both study and program implementation ran smoothly and effectively. The following sections provide information on study procedures, including; student and teacher level data collection, site recruitment and selection, the nature of math instruction at the study sites, program training and implementation, detail on educational settings at each study site, demographic information for study participants, and the statistical methodologies used to analyze outcomes.

Student Outcome Measures

A challenging assessment battery was group administered to students to measure achievement and academic attitude growth during the school year.

An assessment battery was group administered to students, proctored by their teachers, at the start of program use (i.e., baseline testing) and again in the last month of the school year (i.e., end-of-year testing). The assessment battery consisted of the *Group Mathematics Assessment and Diagnostic Evaluation* (GMADE) and a mathematics academic attitude survey. The assessment battery was intended to challenge the students; attempting to adequately assess incoming mathematics knowledge for a wide range of abilities while providing room for growth as knowledge was acquired during the school year.

The GMADE is a standardized, nationally norm-referenced mathematics achievement test published by Savvas Assessments. The GMADE was constructed with all fifty states' standards in mind, covering a wide range of content topics and skills. The GMADE includes 9 levels that span grades K-12, each with two parallel forms (i.e., level 3 for 3rd grade, level 5 for 5th grade, level M for 7th grade). Form A was administered at baseline and form B was administered at the end of the school year. The GMADE is not a timed test, but generally takes between 60 and 90 minutes to administer. Sites returned completed student tests to the site coordinators, who then shipped the tests to the research team for hand-scoring.

Both GMADE overall and subtest scores were reported. The subtest scores allowed the research team to evaluate the effectiveness of the curricula on three important dimensions. The subtests are *Concepts and Communication* (28 questions), *Operations and Computation* (24 questions), and *Process and Applications* (28 questions level 3, 30 questions levels 5 and M). These subtests address students' knowledge of mathematics representations and language, use of basic computational algorithms and operations, and the ability to solve problems presented in written form, respectively.

The math academic attitude survey was developed by the Gatti Evaluation principal investigator. Students responded to self-report questions (i.e., 13 questions at 3rd grade, 16 questions at 5th and 7th grade) regarding general math attitude, confidence, motivation, and self-perceived aptitude. Student responses were coded as 1 for a positive response, 0 for a neutral response, and -1 for a negative response. This scoring method anchors a completely neutral student at an overall score of zero with positive total scores indicating an overall positive attitude. Lastly, students in SuccessMaker classrooms were surveyed as to their opinions on several aspects of the program.

The estimated intraclass reliability for GMADE scores tended to be less reliable as grade level increased. However, all subtest scores were deemed reliable enough for the purposes of study analyses. The estimated intraclass reliability for the 3rd, 5th, and 7th grade mathematics attitude scores was 0.75, 0.77, and 0.78 respectively.

3rd Grade Scale	Reliability[1]
GMADE Total	0.96
Concepts and Communication	0.87
Operations and Computation	0.91
Process and Applications	0.92
Math Academic Attitude Survey	0.75
1. Sample estimated coefficient alpha intraclass reliability.	

5th Grade Scale	Reliability[1]
GMADE Total	0.94
Concepts and Communication	0.83
Operations and Computation	0.86
Process and Applications	0.88
Math Academic Attitude Survey	0.77
1. Sample estimated coefficient alpha intraclass reliability.	

7th Grade Scale	Reliability[1]
GMADE Total	0.91
Concepts and Communication	0.77

Operations and Computation	0.85
Process and Applications	0.77
Math Academic Attitude Survey	0.76

1. Sample estimated coefficient alpha intraclass reliability.

Teacher Measures

The research team also collected data through teacher logs and classroom observations, as well as teacher interviews and focus groups. The teacher and classroom data increased the validity of the research findings related to achievement outcomes by verifying results through multiple data collection methods, adding context for results through the perspectives of various participants, and by collecting data at various time points during the study.

The research team collected achievement, attitudinal, as well as, observational and self-report data making the study both quantitative and qualitative in nature.

In addition to the assessment battery, qualitative data collection methods were also employed. The sources of qualitative data included; program reports, teacher surveys, daily lesson logs, classroom observations, as well as, teacher notes from electronic correspondences. Teachers were routinely asked for their opinions throughout the school year. Weekly mathematics lesson notes were collected for both SuccessMaker and comparison classes (i.e., 10-15 minutes completion time per week). Cumulative usage reports and program implementation logs were regularly collected from SuccessMaker users. All study classrooms were observed twice during the school year teaching routine mathematics lessons and SuccessMaker teachers were further interviewed as to their opinions regarding the program. All this data was compiled and content analyzed to determine teacher attitudes and performance, as well as to illuminate the various ways teachers and students interact with the program.

Weekly Teacher Logs

All study teachers were required to complete weekly logs in which they describe their mathematics lessons. Information from the weekly logs was important for two reasons. The first is to guarantee SuccessMaker teachers fully and regularly utilized all key components of SuccessMaker Math to provide adequate opportunity for the program to positively influence student achievement. The second reason was to document the instructional model for all study teachers, including; classroom environment, teaching style, pacing and mathematics content and methods.

Teachers were asked not to spend more than 15 minutes per week completing the logs. It is clear several teachers spent more time, however, as many of the logs were returned with detailed comments. Teachers often shared candid weekly experiences with the Gatti Evaluation project manager and were typically happy to provide documentation describing weekly instruction and learning experiences related to the program. SuccessMaker and comparison group teachers summarized daily classroom mathematics instruction time, topics, and methods. Daily summaries also included the amount of time spent on these activities. In addition, SuccessMaker

teachers summarized program usage and details of how information from the program was integrated into classroom instruction.

Teacher Observations

Classroom observations took place between mid-November and mid-March and again between April and early June. Classroom observations were conducted by the research team. All study classrooms from each site were observed at least once during routine mathematics lessons. Portions of the observation forms include a description of the classroom environment, summary of the lesson taught, teacher interviews, student comments, observed teaching strengths and weaknesses, pacing, and supplemental instruction information.

Students were also observed using the SuccessMaker Math program in both the classroom and/or computer lab. These observations gave the research team an opportunity to witness the ability and willingness of teachers to properly use the program in the laboratory and/or classroom, verify teacher reported information, identify adherence to the program usage schedule, as well as observe general classroom environment and teaching styles.

It should be noted that two classroom observations provide just a snapshot of the classroom environment and instructional competence. Some teachers were required to change their normal class time due to scheduling conflicts, which occasionally resulted in the observer having less than optimal time to spend in the classroom. The observations are, however, worthwhile because they are the only opportunity the research team has to directly observe the study teachers in action and verify teacher reported information.

Teacher Surveys

All participating teachers were administered two surveys about their teaching background: a baseline survey, and an end-of-year survey. The purpose of the baseline teacher survey was to collect information on teaching experience, math curricula, and prior research study experience. Teachers were asked to indicate their highest level of education and the number of years teaching total, as well as years they had spent at their district, school, and grade level.

The end-of-year teacher survey was focused more on gathering details about school context, teaching philosophy, and math curriculum implementation. Teachers were asked about their curriculum materials, technology usage, and teaching strategies. Teachers were also asked to describe ways in which their school and students are unique. All of this information allowed researchers to gain additional insight into the overall experience at each research site.

SuccessMaker Teacher Focus Group

A focus group style interview process was chosen by the research team to collect teacher attitudes towards the SuccessMaker program. The face-to-face nature of a focus group, though more labor intensive, can be superior to simple questionnaires in collecting detailed attitudinal information from participants. When properly conducted, the focus group discussion gravitates to those topics most important to the participants, and can provide more nuanced information. Collecting attitudinal data in person allows for a better understanding of participant tone and gravity of responses, and provides opportunity to delve deeper into topics.

The focus group results describe what teachers and students liked about the SuccessMaker program, how the program could be improved, and how teachers are using specific features of the system.

Focus group sessions were conducted at each school during site observations between April and early June. Representatives from the research team facilitated each session. The sessions lasted approximately 60 minutes. Twenty-nine of the 32 SuccessMaker teachers participated in the focus group sessions. One teacher who could not participate in the focus group session sent in responses to the focus group questions electronically. The focus group sessions provided a forum for teachers and administrators to answer specific questions, as well as express their professional and personal opinions regarding the SuccessMaker Math program. Each session held the teachers' comfort level as a high priority. The teachers were encouraged to speak without hesitation or inhibition and to be as honest and candid as possible. Though the facilitator followed a structured interview format, the teachers were allowed to direct the discussion and provide their reactions to- and comment on- any and all aspects of the program.

Teachers were asked about their general opinions of the SuccessMaker Math program, as well as their reactions to specific features. In order to uncover how teachers were integrating report information from the program with their classroom instruction and goals, questions were asked pertaining to the reporting system and how teachers were utilizing that system. Teachers were also asked to describe student reactions to the program and how the program impacted their students' learning experience. Efforts were made to minimize response bias by avoiding leading questions and asking for the program's strengths and weaknesses alike.

Extensive notes were taken at each session allowing the research team to compile a large master file of participant responses. Following an exhaustive review of the teacher responses, a two-dimensional coding system was developed to organize those responses. Responses were categorized by *Topic Area* and *Attitude*. The topic areas describe the aspect of the program a response is directed towards. Topic area codes have a two-digit numeric format with the first digit on the left indicating general topic category (ex., teacher opinion, student response to program, program content, specific features) and the second digit indicating a specific topic within a general category. The topic codes are further categorized by grade level, study site, and paired with either a + or - to indicate the general attitude toward an aspect of the program or the tone of the response.

Site Recruitment and Selection

Gatti Evaluation and Savvas Digital Learning account executives identified potential research partners that met certain characteristics important to the study, such as no previous exposure to any version of SuccessMaker, at least 2 teachers per study grade level, and geographic diversity. Potential research schools were contacted by e-mail and given details about the study. Probable sites were further vetted through their Savvas Digital Learning account executive, than invited to participate in the study. As schools responded to the invitation, they were further screened with a detailed questionnaire and an infrastructure checklist. The intent of the questionnaire was to ensure participants understood all the requirements and benefits associated with participation. It was required that schools did not currently use the SuccessMaker program, all participating

teachers abide by the random assignment, and all randomly selected SuccessMaker classroom students use the program for a minimum of one hour per week. The purpose of the infrastructure checklist was to ensure that the SuccessMaker program could be installed and successfully run at each site.

Table 1 Gatti Evaluation SuccessMaker Math Study Site State Assessment Information

					School Results		State Wide Results	
School Year	Grade	State	District	School	Meets Math Standards	Meets Reading Standards	Meets Math Standards	Meets Reading Standards
2008-09	3	AZ	1	1	37%	46%	72%	72%
2008-09	5	AZ	1	1	50%	41%	72%	73%
2008-09	7	AZ	1	1	62%	65%	73%	73%
2008-09	3	AZ	2	2	53%	58%	72%	72%
2008-09	5	AZ	2	2	52%	63%	72%	73%
2008-09	7	AZ	2	2	66%	62%	73%	73%
2008-09	7	AZ	2	3	77%	56%	73%	73%
2008-09	3	AR	3	4	94%	91%	80%	66%
2008-09	5	AR	3	4	94%	90%	70%	68%
2008-09	3	CA	4	5	50%	31%	64%	44%
2008-09	5	CA	4	5	26%	39%	57%	54%
2008-09	3	IN	5	6	56%	67%	69%	74%
2008-09	5	IN	5	6	69%	74%	77%	74%
2008-09	3	KS	6	7	81%	72%	86%	84%
2008-09	5	KS	6	7	84%	75%	87%	84%
2008-09	7	KS	6	8	60%	65%	78%	86%
2008-09	3	NY	7	9	98%	85%	93%	76%
2008-09	5	NY	7	9	98%	100%	88%	82%
NA	3	PA	8	10	NA	NA	NA	NA
NA	5	PA	8	10	NA	NA	NA	NA

School Year designates latest school year state assessment information was available. The PA school was new in the 2009-10 school year.

When sites were deemed eligible for participation and demonstrated strong interest, the Principal Investigator completed the research application process with each site. Final acceptance to the study required a district level administrator (ex., curriculum director, superintendent) and a school level administrator (ex., principal) to sign a memorandum of understanding outlining the responsibilities of each stakeholder. No available students of any socio-economic level, English

proficiency level, or ethnic background, who opted to participate in the study, were excluded from the study. Passive informed consent of both students and parents/guardians was required by the research team and secured by the schools.

The study schools come from urban or suburban public school districts. A single school represented each of Arkansas, California, Indiana, New York, and Pennsylvania. Two school districts came from Arizona. One school from each of these districts served kindergarten through 8th grade students and the second school from the second Arizona district was a middle school. Lastly, both an elementary and middle school represented the Kansas school district.

Ethnic and socio-economic diversity among the student population were two criteria the evaluation team considered when recruiting study sites. A third criterion was that students exhibit a wide range of ability with respect to mathematics and reading achievement. Table 1 shows, according to recent state achievement testing data, the percent of each school's students meeting state math standards range between 35% below to 24% above statewide results and students meeting state reading standards range between 32% below to 25% above statewide results. The evaluation team sought out diversity in the study sample to ensure the program would be used by learners of all abilities and backgrounds, thus reflecting the reality that is today's elementary classrooms.

Math Instruction

Teachers were expected to implement their current adopted core mathematics curricula as required by their district. Four widely-used classroom mathematics programs were utilized by the sites at 3rd and 5th grade, and three different programs were utilized at 7th grade. The study groups reported somewhat differing levels of adherence to their adopted math programs. Supplemental math instruction seen across sites included commonplace methods such as website exploration, math facts, daily math problems, and test preparation.

Adopted Math Program Adherence		
3rd Grade	SuccessMaker	comparison
strict	12.8%	18.8%
mostly	59.2%	61.9%
some	20.6%	19.3%
none	7.4%	0.0%
Percents are statistically significantly different		

Adopted Math Program Adherence		
5th Grade	SuccessMaker	comparison
strict	10.3%	25.0%
mostly	89.7%	75.0%

some	0.0%	0.0%
none	0.0%	0.0%
Percents are statistically significantly different		

Adopted Math Program Adherence		
7th Grade	SuccessMaker	comparison
strict	35.0%	26.3%
mostly	65.0%	73.7%
some	0.0%	0.0%
none	0.0%	0.0%
Percents are *NOT* statistically significantly different		

SuccessMaker and comparison groups where similar in teacher experience, both in years teaching and years teaching current grade. The study sample did have two years less teaching experience (i.e., 11.6 years) than the national average (i.e., 13.9 years). More of the 3rd grade comparison sample had a higher portion of students taught by a teacher with a Master's degree. Conversely, the 5th and 7th grade SuccessMaker samples had a higher portion of students taught by a teacher with a Master's degree. Average minutes of classroom math instruction were nearly equivalent for 3rd grade students across the treatment and comparison conditions, however, 5th and 7th grade SuccessMaker classrooms averaged fewer minutes of classroom math instruction as students at some sites used the program during their usual math blocks.

3rd Grade	SuccessMaker	comparison
years teaching	12.38	11.14
years at current grade	6.51	7.44
master's degree	54%	76%
years using adopted program	4.15	3.93
minutes math instruction	63.73	63.15
Difference in percent of teachers with master's degree was statistically significant.		

5th Grade	SuccessMaker	comparison
years teaching	11.61	8.87
years at current grade	4.85	5.45
master's degree	54%	30%
years using adopted program	6.09	3.33
minutes math instruction	69.07	78.72
Difference in years teaching was statistically significant. Difference in percent of teachers with master's degree was statistically significant.		

Difference in years using adopted math program was statistically significant.
Difference in minutes of math instruction was statistically significant.

7th Grade	SuccessMaker	comparison
years teaching	12.60	13.55
years at current grade	8.45	9.85
master's degree	100%	74%
years using adopted program	4.49	4.83
minutes math instruction	59.35	63.48

Difference in percent of teachers with master's degree was statistically significant.
Difference in minutes of math instruction was statistically significant.

SuccessMaker Implementation

Teachers received multiple training sessions by Savvas curriculum specialists. This well-received training allowed teachers to fully implement the SuccessMaker Math program and helped foster positive teacher and student attitudes.

SuccessMaker Teacher Training

To initiate the study, Gatti Evaluation conducted study orientations for all teachers at the start of the school year. The study orientation formally introduced the teachers to the research team, explained in detail the requirements and benefits of participation in the study, as well as, addressed any immediate questions or concerns about the research. All teachers were required to read and sign informed consent forms.

The publisher ensured that sites had full access to the program and that access was continual throughout the duration of the study. Savvas also provided free product training and funding to cover the cost of substitute teachers during training. All teachers with SuccessMaker classrooms were required to attend training sessions facilitated by a curriculum specialist. Initial training took place on-site over the course of one full school day. This training introduced administrators, teachers, and technicians to the key components of the SuccessMaker Math program, including; student login, learning environments, classroom management and reporting systems, as well as how to best implement these in practice. Initial product training sessions typically began with a group presentation. Then teachers moved to computers where they were given the opportunity to use the program as students would. Teachers had the responsibility of training their students to use the program.

The date of initial training varied, dependent on when a site was added to the study (i.e., see Table 2). Five schools began the study in the first month (i.e., AZ district 1 school, AZ district 2 k-12 school, KS elementary and middle schools, PA school), three began in the third month (AR school, CA school, IN school), one in the fourth (NY school) and the last in the fifth month (AZ district 2 middle school) of the school year.

Follow-up training was further provided to each site to support consistent usage of the program and to fully acquaint teachers with all aspects of the reporting system. The follow-up training sessions typically lasted three hours and began with a group presentation, then teachers moved to computers where they were shown how best to monitor their class and individual student progress. As needed, additional training sessions were also offered to provide a more detailed understanding of the program, identify and correct district or school level technical issues, address student's special needs, and to support consistent implementation of the program.

The trainings were well-received. The research team strongly believes that ongoing professional development can significantly affect the potential for a program such as SuccessMaker to foster positive teacher and student attitudes, meet students' needs, and ultimately increase student achievement.

Table 2 SuccessMaker Math RCT Training Dates

State	District	School	School Start Date	Initial Training Date	Follow-up Training Date	Additional Trainings
AZ	1	1	08/03/09	07/29/09	11/04/09	02/12/10
AZ	2	1	08/03/09	08/12/09	11/10/09	N/A
AZ	2	2	08/03/09	11/18/09	03/05/10	N/A
AR	1	1	08/19/09	10/28/09	01/21/10	02/18/10
CA	1	1	09/10/09	12/11/09	03/17/10	N/A
IN	1	1	08/24/09	11/13/09	01/28/10	N/A
KS	1	1	08/12/09	08/10/09	09/21/09	12/11/09
KS	1	2	08/12/09	08/10/09	09/21/09	12/11/09
NY	1	1	09/08/09	12/08/09	02/02/10	03/16/10
PA	1	1	08/03/09	08/26/09	10/12/09	03/31/10

SuccessMaker Program Usage

Classrooms randomly assigned to use SuccessMaker Math were expected to use the program for a minimum of one hour per week. The majority of study teachers implemented the program in a computer laboratory environment, typically implementing the program 2-3 days per week for an average of 24 minutes per session. Ten teachers implemented the program in the lab more than three times a week. Three teachers utilized a joint-usage model, implementing SuccessMaker in the classroom for 30% to 40% of the total usage, and the remainder in the computer lab. One 3rd grade teacher chose not to utilize the computer laboratory after a couple months of implementation, and implemented the program the remainder of the year in the classroom with laptop stations (accounting for 75% of total usage minutes in the classroom). SuccessMaker students in 3rd and 5th grade generally used the program in addition to their regular math block, while 7th grade students used SuccessMaker during their daily math block.

The three grade levels were similar in their usage time with medians (i.e., 50th percentile or those students with usage in the center of the distribution) of 19, 18, and 17 hours logged on the program for 3rd, 5th, and 7th grade respectively. The three grade levels also demonstrated similarly good productivity and success rates with their assigned SuccessMaker math tasks. Students at the center of the distribution completed well over one exercise per minute indicating, as a group, that students were on-task. All three grade levels also had median success rates in the 60% to 80% range indicating that students as a group were continuously and appropriately challenged as they progressed through the program. Students in the 3rd grade SuccessMaker classrooms attempted 43 exercises every thirty minutes with a success rate of 68%, while students in 5th grade classrooms attempted 44 exercises every thirty minutes with a success rate of 68%. Seventh grade SuccessMaker students attempted 38 exercises every thirty minutes with a success rate of 63%.

The research team required that each site coordinator regularly download last session reports to check for students that were struggling or exhibiting off-task behavior. The research team also required that cumulative reports were downloaded and sent at least once a month to monitor proper program usage. The research team flagged students that were not completing at last one task per minute or not correctly completing more than 50% of their assigned exercises. In these rare cases, flagged students were more rigorously monitored while using the program.

SuccessMaker Report Usage

The program's reporting feature was well-received by the teachers. Individual preference and teacher expectations dictated how teachers utilized information gained from the reports. SuccessMaker teachers recorded how and when they used the program's reporting feature in their weekly logs. The average teacher recorded utilizing the program's reporting system in an educationally significant way during 57% of the usage weeks (P_{25} = 22%, P_{75}=92%). For our purposes here, using the reporting system in an *educationally significant* way would include using report information to inform classroom instruction, ability grouping, state testing goals and other benchmarks, parent conferences, as well as, classroom, pull-out, and SuccessMaker intervention. Informing a teacher as to off-task behavior is an example of when report information is not used in an *educationally significant* way.

Teachers used the SuccessMaker reporting information most often to inform instruction, identify students for remediation as well as to monitor student progress. Teachers also used the reports to convey student progress information to parents.

A majority of the SuccessMaker teachers stated in their logs that they used the reporting system at least once to check students' progress (i.e., 72%), determine which students needed help while using the program (i.e., 75%), or to inform additional classroom instruction or practice on specific topics (i.e., 61%). Forty-two percent, 44%, and 32% of the teachers using the report information for these purposes respectively, recorded doing so on a regular basis or more than five times during the school year. To a lesser extent several teachers used information from the reporting system to evaluate students on state testing goals (i.e., 19%), to ability group students during classroom instruction (i.e., 25%), or to provide data to parents (i.e., 19%).

Settings

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

Arizona District One

The first participating Arizona school resides in a rural fringe area, has a high student turnover rate and frequent changes in staffing positions. Students are expected to follow a strict dress code. According to teachers, many students come from underprivileged backgrounds and do not generally receive a high degree of parental support. Teachers also describe a variety of learning abilities in the classrooms, as well as motivational and behavioral diversity.

In the 2008-09 school year, the district served a community of over 10,000. The median household income is approximately $50,000 indicating a middle-class community. It is a mid-size school serving over 500 students in grades kindergarten through seven. The primary ethnic group, Hispanic, makes up a total of 67% of the school population. Caucasian, African-American and Asian students make up the remaining 33% of the student population. This school falls into the high range for participation in the nation's free or reduced-price lunch program with 78% of students eligible to receive free or reduced-price lunch. Approximately 22% of the students are designated as not English proficient.

This school did not meet AYP in the 2008-09 school year. The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 37%, 35% lower than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 50%, 22% lower than the statewide results and the percentage of 7th grade students testing at standard was 62%, 11% lower than the statewide results. Likewise, the percentage of 3rd grade students testing at standard in reading was 46%, 26% lower than the statewide results. The percent of 5th grade students testing at standard in reading was 63%, 10% lower than the statewide results and the percentage of 7th grade students testing at standard was 65%, 8% lower than the statewide results. The student/teacher ratio is approximately 26 to 1.

One 3rd grade classroom was randomly assigned to use the SuccessMaker Math program and another was assigned to the comparison condition. Early in the school year, the teacher assigned to the comparison condition left the school. The comparison students were disbursed into the SuccessMaker classroom and a new 3rd grade classroom. Though they moved to new classrooms, these students maintained their random assignments and did not use the program. Of the three 5th grade teachers, two were randomly assigned to use SuccessMaker and one was assigned to the comparison condition. The comparison teacher used the program with students and thus they were dropped from the study. The 7th grade math teacher had four sections; two were assigned to use the program. The students in one of the two 7th grade sections assigned to use SuccessMaker did not complete the full assessment battery and were dropped from the study. As a result, a total of only three teachers from this school ultimately participated in the study, two 3rd grade teachers and a 7th grade math teacher with three participating sections.

The district adopted a widely published elementary basal mathematics curriculum with a late copyright date. One of the 3rd grade teachers adhered strictly to the district adopted curriculum and the other reported using some supplementation, as did the 7th grade teacher. The teachers incorporated district learning standards and AIMS (Arizona's Instrument to Measure Standards) test preparatory work into their daily mathematics lessons, as well as some speed drills. Teachers had used this same basal program for 2 years, however, one of the 3rd grade teachers had just begun her second year. Teachers in this school have daily math blocks of one hour. The study teachers prefer using a combination of skills- and activity-based teaching styles for math instruction and have no additional assistance in the classroom. They conduct their math lessons using whole group instruction 50% or more of the time. Also, the 3rd grade teachers like to explore educational websites on their interactive white boards.

The school has a large computer lab that is housed in the library. Stations are arranged in long rows, facing the same direction. This computer lab is where students used the SuccessMaker program. SuccessMaker students in 3rd and 5th grades used the program in addition to their regular math block, while 7th grade students used SuccessMaker during their daily math block. Those teachers randomly assigned to use the SuccessMaker Math program were trained the week prior to the start of the school year. These teachers also received additional trainings in November and February. Students completed baseline testing the last week of September and were tested again the week of April 30th. Students' last week using the program was the last week of April.

One 3rd grade teacher used the SuccessMaker program in 25 minute sessions three times per week, while the other used the program for 35 minute sessions, also three times per week. The median 3rd grade student used the math program approximately 18 hours, attempting 43 exercises every thirty minutes with a success rate of 66%. In 7th grade, SuccessMaker usage varied throughout the year. While the minimum usage time was not met during the first half of the year, the 7th grade teacher tried to get in at least 75 minutes per week in two separate sessions during the spring term. The median 7th grade student used the math program approximately 12 hours, attempting 34 exercises every thirty minutes with a success rate of 61%.

Arizona District Two

Two schools in the second Arizona district participated in the study. Both schools reside in a suburban area. In 2008-09 the district served a community of over 70,000. The median household income is approximately $65,000 indicating a high-middle class community. Despite this income statistic, many students at these Title 1 schools come from low-income areas, with a high population of Hispanic students and English language learners. Teachers report having a wide range of learning abilities in their classes, and that getting students interested in classroom material is a big challenge. Both schools enforce a strict dress code for their students. The district adopted two widely published elementary basal mathematics curricula with a late copyright date, one for elementary grades and another for middle grades.

The first school in Arizona is a large size school serving over 1,100 students in grades kindergarten through eight. The school has one primary ethnic group, Hispanic, making up a total of 83% of the school population. This school falls into the high range for participation in the nation's free or reduced-price lunch program with 87% of students eligible to receive free or reduced-price lunch. Approximately 41% of the students are designated as not English proficient. The student/teacher ratio is approximately 19 to 1.

This school did not meet AYP in the 2008-09 school year. The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 53%, 19% lower than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 52%, 20% lower than the statewide results. The percentage of 7th grade students testing at standard in mathematics in the 2008-09 school year was 66%, 7% lower than the statewide results. The percentage of 3rd grade students testing at standard in reading was 58%, coming in 14% lower than the statewide results. The percent of 5th grade students testing at standard in reading was 41%, 32% lower than the statewide results. The percentage of 7th grade students testing at standard in reading in the 2008-09 school year was 62%, 11% lower than the statewide results.

A total of nine teachers from the first school participated in the study, four 3rd grade, four 5th grade and one 7th grade with four math sections. Two 3rd and 5th grade classrooms were randomly assigned to use SuccessMaker Math. Likewise, two 7th grade sections were randomly assigned to use SuccessMaker Math. Daily math blocks last one hour, however, teachers reported average daily math instruction lasting from thirty to over one hundred minutes. Most teachers used the district adopted curriculum with some additional supplementation. One teacher reported using heavy supplementation. Six of the teachers reported having little to no training on this curriculum, two teachers reported having some training on the curriculum, and one teacher reported having 5-8 hours of professional development on the district adopted program. None of the teachers were new to the district for the 2009-2010 school year, although one teacher was new to her grade level.

Four of the nine teachers prefer using a combination of skills- and activity-based teaching styles for math instruction, four others expressed a preference for a skills-based, and one, activity-based teaching. They conduct their math lessons using whole group an average of 61% of the time and place heavy emphasis on test preparation for the AIMS. Teachers use several teaching strategies for math instruction. Four teachers reported using leveled instruction, six use cooperative learning strategies, four use center activities, and four use speed drills. In 3rd grade, teachers also employ an outreach program where the students complete a consumable parent/student booklet every month and the school is awarded $1.00 for each student who has completed every lesson. Six teachers reported using educational websites and computer games and two use their interactive white boards. The interactive white boards were later additions to those classrooms, the remainder had digital projectors. Two had student teachers during the year, but no additional classroom assistance was reported during math instruction.

Initially, this school's technological infrastructure was weak and teachers experienced significant problems logging on to the program and the program freezing. It was necessary to borrow teacher computers from this classroom for incorporation into the lab. By the end of the school year the lab was running flawlessly. Computers lined the walls of the room, with an island of stations in the center.

SuccessMaker students used the program three to four times per week in 15-30 minute sessions. Students in 3rd and 5th grade generally used the program in addition to their regular math block, while 7th grade students used SuccessMaker during their daily math block.

The teachers at the first elementary school who were randomly assigned to use SuccessMaker were trained on August 12th, a week-and-a-half into the school year. Theses teacher also received a follow-up training November 10th. Students completed baseline testing on September 26th and completed end-of-year testing the third week of May. Students' last week using the program was the week of May 10th. The median 3rd grade student used the math program approximately 26 hours, attempting 37 exercises every thirty minutes with a success rate of 69%. The median student in the 5th grade used of the math program approximately 31 hours, attempting 38 exercises every thirty minutes with a success rate of 67%.

The second school from this district is a mid-size school serving more than 500 students in grades kindergarten through eight. The school has one primary ethnic group, Hispanic, making up a total of 89% of the school population. This school falls into the high range for participation in the nation's free or reduced-price lunch program with 87% of students eligible to receive free or reduced-price lunch. Approximately 50% of the students are designated as not English proficient. The student/teacher ratio is approximately 16 to 1. The school did meet AYP in the 2008-09 school year.

Only 7th grade students participated at this school. The 7th grade teacher reported language as being one of the biggest challenges in the classroom for her students, she is fluent in Spanish. The percentage of 7th grade students testing at standard in mathematics in the 2008-09 school year was 77%, 4% higher than the statewide results. The percentage of 7th grade students testing at standard in reading in the 2008-09 school year was 56%, 17% lower than the statewide results.

This is the math teacher's second year implementing the district adopted curriculum. She reports that she mostly adheres to the curriculum but with some additional supplementation. The teacher draws on a number of resources to teach students math including a variety of 6th and 7th grade level workbooks and online programs and collaborates with other teachers in the district through meetings held every month. She has been teaching at this school and grade level for 6 years.

The daily math blocks last one-and-a-half hours. The teacher uses whole group instruction about 80% of the time. She sometimes includes cooperative learning and leveled instruction. This teacher also prefers to use a combination of skills-based and discovery-based method. This teacher uses a lot of technology in the classroom, including educational websites two to three times per week, interactive videos once per week, and rounds these out with some educational computer games.

Of the three math sections, two were randomly assigned to use the SuccessMaker math program. The teacher at the second school was trained on November 18th, two and a half months after school began. This teacher also received additional trainings in March. Students completed baseline testing on December 16th and completed end-of-year testing the second week of May. Students' last week using the program was the week of May 10th. The computer lab has two rows of computers directly across from each other, separated by an aisle, with over 30 stations. The set up allows the teacher to walk up and down the aisle to monitor students. The median student used the math program approximately 14 hours, attempting 33 exercises every thirty minutes with a success rate of 66%.

Arkansas District

The participating Arkansas elementary school is a Blue Ribbon School with very high degree of parental support and involvement. Teachers have indicated this also puts a lot of pressure on them to succeed. Students are high achieving and come from higher socioeconomic backgrounds. However, because so many of the students are high achieving, teachers can find it challenging to reach those who are below grade level. The school building is new with high quality facilities.

The school resides in a small city. In 2008-09 the school district served a community of 30,000. The median household income is over $40,000 indicating a middle class community. This elementary school is large, serving almost 700 students in grades kindergarten through five. The school has one primary ethnic group, Caucasian, making up a total of 91% of the school population. This school falls into the medium-low range for participation in the nation's free or reduced-price lunch program with 11% of students eligible to receive free or reduced-price lunch.

This school met AYP in the 2008-09 school year. The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 94%, 14% higher than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 94%, 24% higher than the statewide results. The percentage of 3rd grade students testing at standard in reading was 91%, coming in 25% higher than the statewide results. The percent of 5th grade students testing at standard in reading was 90%, 22% higher than the statewide results. The student/teacher ratio is approximately 17 to 1.

A total of 10 teachers participated in the study from the Arkansas school. None of these teachers were new to the school or district or receive additional support in their classrooms. Three 3rd and three 5th grade classrooms were randomly assigned to use the math program. Those teachers randomly assigned to use the SuccessMaker Math program were trained two months after school began on October 28th. These teachers also received additional trainings in January and February. Students completed baseline testing the second week in November and completed end-of-year testing the last week in May. Students' last week using the program was the week of May 24th.

The district adopted a widely published elementary basal mathematics curriculum with a late copyright date. Four teachers adhere strictly to this curriculum, the rest report primarily used the district adopted program, with some supplementation. Teachers have followed this program for a range of 2-13 years. While most teachers report attending two training modules on the district curriculum, or a couple of days worth of training, two teachers report receiving significantly more training.

Third grade teachers have a one-hour-and-fifteen-minute daily math block. Fifth grade teachers have daily math blocks of 55 minutes, and two had an additional 25 minutes of math in the afternoon. Most teachers prefer using a combination of skills-based and discover-based teaching methods for math, and one teacher prefers a skills-based philosophy. Teachers conduct math lessons using whole group approximately 71% of the time. Two teachers report frequently using centers, and two use centers sometimes for teaching math. Most teachers conduct some degree of math test prep with their classroom. Only one teacher reports using leveled math instruction,

and uses this method infrequently. Most teachers incorporate educational websites and computer games into their math instructions and some also use interactive whiteboards.

The Arkansas school has a nice computer lab with more than 30 terminals. The SuccessMaker teachers took their students to use the program in the computer lab two days a week for thirty minutes. SuccessMaker classrooms used the math portion of the program as part of their normal mathematics instruction. The median 3rd grade student used the math program approximately 18 hours, attempting 41 exercises every thirty minutes with a success rate of 70%. The median student in the 5th grade used the math program approximately 18 hours, attempting 49 exercises every thirty minutes with a success rate of 70%.

California District

The participating California elementary school resides in a suburb of a large city. In 2008-09 the school district served a community of more than 100,000. The median household income is approximately $60,000 indicating an upper-middle class community. The school is located in a mostly Hispanic, low socio-economic area and has a high number of students that are English language learners. Students are required to wear uniforms at this Title I school. Teachers are challenged by the fact that many of their students are below-grade level and receive limited support at home. Additionally, the district has recently undergone severe budget cuts and was forced to lay off many teachers.

The elementary school in California is a medium size school serving almost 600 students in grades kindergarten through five. The school has one primary ethnic group, Hispanic, making up a total of 97% of the school population. This school falls into the high range for participation in the nation's free or reduced-price lunch program with 85% of students eligible to receive free or reduced-price lunch. Approximately 55% of the students are designated as not English proficient.

The elementary school did not meet AYP in the 2008-09 school year. The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 50%, 14% lower than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 26%, 31% lower than the statewide results. The percentage of 3rd grade students testing at standard in English language arts was 31%, coming in 13% lower than the statewide results. The percent of 5th grade students testing at standard in English language arts was 39%, 15% lower than the statewide results. The student/teacher ratio is approximately 21 to 1.

A total of seven teachers participated in the SuccessMaker study from the California school, five at 3rd grade and two at 5th. None of these teachers were new to the school or district, but three were new to their grade level. Two 3rd grade classrooms and one 5th grade classroom were randomly assigned to use the SuccessMaker math program. Those teachers randomly assigned to use the SuccessMaker Math program were trained three months after school began on December 11th. These teachers also received an additional training in March. Students completed baseline testing the week of December 15th and tested again the week of June 9th. Students' last week using the program was the first week of June.

The district adopted a widely published elementary basal mathematics curriculum with a late copyright date. Most teachers at the California school heavily supplement the district adopted

program with other materials, and work hard to emphasize state standards in their instruction. Most teachers at this school have followed this curriculum for one year, though a few have used it for longer. None of the teachers have received professional development on this curriculum.

Daily math blocks range from 35 minutes to one hour and 25 minutes. Students are instructed in whole group for an average of 60% of the time (i.e., 20% to 75%). Three teachers choose a skills-based teaching philosophy when it comes to mathematics, the rest a combination of skills-based and discovery-based approaches. Many of the teachers use speed games as a daily warm-up for math instruction. Teachers place a heavy emphasis on assessing the progress of their class before moving on to new concepts. All but one of the teachers use some form of technology in their math instruction. The most popular form of technology was educational websites and computer games. There is also frequent use of interactive whiteboards by two teachers.

The school's computer lab is made up of about 35 new Mac computers, and is attached to the school library. Computer stations are in rows, facing the front of the room, with an aisle running down the middle. The set up allows a teacher to be at the back of the room and have a view of every student's computer monitor.

The SuccessMaker teachers took their students to use the program in the computer lab three days a week for twenty minutes. SuccessMaker is generally used in addition to the core block of mathematics instruction. The median 3rd grade student used the math program approximately 17 hours, attempting 49 exercises every thirty minutes with a success rate of 66%. The median students in 5th grade used of the math program approximately 23 hours, attempting 47 exercises every thirty minutes with a success rate of 67%.

Indiana District

The participating Indiana school resides in the fringe of a large city. In 2008-09 the school district served a community of 12,000. The median household income is approximately $43,000 indicating a middle class community. The majority of the students from this Title 1 school are from lower socioeconomic backgrounds. The surrounding area has few opportunities for jobs and economic growth and the school district was recently forced to lay off 40 teachers due to budget shortfalls. Teachers say many of their students face a lot of uncertainty at home, and yet make big efforts to do well in school. Math scores have been low in the past, so the teachers were excited to see what impact SuccessMaker would have on their state math assessments.

The elementary school in Indiana is a mid-size school serving approximately 420 students in grades pre-kindergarten through five. The school has one primary ethnic group, Caucasian, making up a total of 91% of the school population. This school falls into the medium-high range for participation in the nation's free or reduced-price lunch program with 59% of students eligible to receive free or reduced-price lunch. The elementary school did meet AYP in the 2008, but due to the change to spring testing in 2009; AYP was not calculated for 2009.

The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 56%, 13% lower than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 69%, 8% lower than the statewide results. The percentage of 3rd grade students testing at standard in English Language Arts was 67%, coming in 7% lower than the statewide results. The percent of 5th grade students testing at

standard in English Language Arts was 74%, which is the same percentage as the statewide results. The student/teacher ratio is approximately 17 to 1.

A total of six teachers participated in the SuccessMaker study with two 3rd and two 5th grade classrooms randomly assigned to use the program. None of these teachers were new to the school or district. The district adopted a widely published elementary basal mathematics curriculum with a late copyright date. Five out of the six teachers report receiving training on this curriculum, while one teacher has received no training. Teachers have followed this curriculum for an average of 6 years. All teachers primarily use the district adopted program with some supplementation. This supplementation includes a paper-based math facts program, which is used by all teachers at the school. Teachers use a variety of other materials (i.e., additional worksheets, teacher-created activities) to supplement the rest of their instruction.

Daily math blocks range from 45 minutes to one hour and 10 minutes. All of the teachers have additional support in their classroom during their math block. Five out of six teachers have help in the form of a teacher's aid, and two of these teachers also have a student teacher. The sixth teacher receives support from a paraprofessional. Most teachers adhere to a math teaching philosophy that combines skills-based and discovery-based methods, though one 3rd grade teacher prefers purely skills-based teaching methods. Teachers conduct math lessons using whole group instruction about 76% of the time.

Only one teacher frequently used leveled instruction for math lessons, while one other teacher used this strategy occasionally. All teachers used cooperative learning to some degree for math instruction, though infrequently for most. All but one teacher reported using centers. Teachers also incorporate some technology use into the classroom during math instruction. All teachers frequently use interactive white boards and occasionally use educational computer games. All but two use instructional websites weekly.

Those teachers randomly assigned to use the SuccessMaker Math program were trained approximately three months after school began on November 13th. These teachers also received an additional training in January. Students completed baseline testing the third week in November and completed end-of-year testing the week of May 10th. Students' last week using the program was the week of May 21st.

The SuccessMaker teachers took their students to use the program in the computer lab two days a week for 30 minutes with the exception of one 5th grade teacher that took their students to the lab four times a week for fifteen minute sessions. Teachers used the program in addition to their block of mathematics instruction. The median 3rd grade student used the math program approximately 18 hours, attempting 48 exercises every thirty minutes with a success rate of 67%. The median 5th grade student used the math program approximately 17 hours, attempting 50 exercises every thirty minutes with a success rate of 66%.

Kansas District

The participating Kansas schools reside in a large city, which in 2009 had a population of more than 100,000. The median household income is approximately $40,000 indicating a middle class community. Two schools, one elementary school and one middle school participated in the SuccessMaker study from this Kansas district.

The elementary school in Kansas is a mid- to large size school serving approximately 400 students in grades kindergarten through five. This school has English language learning and dual-language classrooms, as well as a hearing-impaired program. This elementary school also follows an inclusion model. Most of the population is bused in. The students demonstrate a wide diversity in achievement. Caucasian students make up a total of 62% of the school population. Hispanic students make up the next largest portion of the population at 22%, with African-Americans next at 11%, and a small American-Indian group of 2%. This school falls into the medium range for participation in the nation's free or reduced-price lunch program with 48% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 13 to 1.

The middle school is a mid-size school serving approximately 460 students in grades six through eight. Many of the students come from families that live in poverty and some are undocumented citizens. Caucasian and Hispanic students equally make up 80% of the school population. African-American students make up about 16% of the school population. American-Indian students make up the remaining 4% the student population. This school falls into the high range for participation in the nation's free or reduced-price lunch program with 87% of students eligible to receive free or reduced-price lunch. The student/teacher ratio is approximately 11 to 1.

The elementary school did meet AYP in the 2008-09 school year. The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 81%, 5% lower than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 84%, 3% lower than the statewide results. The percentage of 3rd grade students testing at standard in reading was 72%, coming in 12% lower than the statewide results. The percent of 5th grade students testing at standard in reading was 75%, 9% lower than the statewide results. The middle school did not meet AYP in the 2008-09 school year. The percentage of 7th grade students testing at standard in mathematics in the 2008-09 school year was 60%, 18% lower than the statewide results. The percent of 7th grade students testing at standard in reading was 65%, 21% lower than the statewide results.

Six teachers from the elementary school participated in the study, three 3rd grade teachers and three 5th grade teachers. Two 3rd and 5th grade classrooms were randomly assigned to use the SuccessMaker math program, and one 3rd and 5th grade classroom was assigned to the comparison group. At the middle school, two 7th grade teachers participated in the study. One 7th grade teacher's three classrooms were assigned to use SuccessMaker math and the other 7th grade teacher's three classrooms were assigned to the comparison group. None of these teachers were new to the school or district.

The district adopted a widely published elementary basal mathematics curriculum with an early copyright date for the elementary school. Five of the six teachers primarily use the district adopted curriculum with some supplementation, and one teacher strictly adheres to the district curriculum. Teachers have used this program for an average of four years. Teachers have received training from the district and many have received support from their peers to fill in any training gaps. Daily math blocks range in time from one hour to one-and-a-half hours. All teachers have some form of additional support in the classroom during math instruction. Four of the teachers have a paraprofessional in their classroom, and the other two have student teachers.

Additionally, one teacher has a hearing impaired interpreter in her room, and another has a special education teacher in her room.

All six elementary teachers prefer to use a combination of skills-based and discovery-based teaching methods. Teachers teach math whole group for about 60% of the time, and use small groups about 40% of the time. A number of classroom strategies were present during math instruction. Two of the six teachers frequently use leveled instruction, and half frequently use centers. All teachers used center activities and speed drills to some extent. Only one teacher reported using seatwork, and infrequently at that. As far as technology use for teaching math, educational websites and computer games were employed to varying degrees. One teacher reported frequently using their interactive white board.

The district adopted program for the middle school was a widely published basal math curriculum with an early copyright date. Both 7th grade teachers strictly adhere to the district curriculum and have been using the curriculum for an average of 6 years. The teachers have received training on the district adopted curriculum. The math daily blocks last an hour-and-a-half and both teachers have assistance from paraprofessionals in the classroom. Both teachers prefer to use a combination of skills-based and discovery-based teaching methods and teach whole group about 75% of the time. One of the teachers sometimes used centers for math instruction, and only occasionally used leveled instruction or cooperative learning; the other teacher did not use these teaching strategies. One teacher infrequently used educational websites and computer games while the other teacher used educational technology two to three times per week.

Those teachers randomly assigned to use the SuccessMaker Math program from both schools were trained two days before school began. These teachers also received additional trainings in September and December. Students in the elementary school were baseline tested the third week of September and tested again the second week of May. Students in the middle school were baseline tested the second week of September and were post tested the second week of May. Students in the elementary school stopped using the program the first week of May and students in the middle school stopped using the program the second week of May. These schools place a heavy emphasis on state testing and there is a lot of pressure for students to do well. This year, for the first time, all students were required to take the state assessments online, which limited the amount of time the 7th grade students had on the program during the second half of the school year.

The elementary school has a dedicated up-to-date computer lab with over forty stations. The elementary SuccessMaker teachers took their students to use the program in the computer lab three days a week for twenty minutes. Additionally, one 3rd grade teacher used the program on classroom stations about 30% of their total usage minutes. The median 3rd grade student used the math program approximately 27 hours, attempting 48 exercises every thirty minutes with a success rate of 73%, while the median 5th grade student used the math program approximately 33 hours, attempting 44 exercises every thirty minutes with a success rate of 74%.

The middle school had an older computer lab with at least 30 computer stations. The computers had to be updated in order to meet the technology requirements necessary to run the SuccessMaker program. The SuccessMaker teacher at the middle school took her students to use the program in the computer lab two days a week for 30 minutes as part of to their normal block

of mathematics instruction. The median student used the math program approximately 21 hours, attempting 43 exercises every thirty minutes with a success rate of 63%.

New York District

The participating New York elementary school resides in a suburb of NYC. In 2008-09 the school district served a community of 16,000. The median household income is approximately $74,000 indicating an upper-middle class community. Facilities are new at this school, as the building is only two years old. This school draws from a low-income community, but sets high standards for students, who are required to wear uniforms and demonstrate appropriate school behavior. The school has been recognized for best practices and as a "Closing the Gap" school. Teachers are very proud and supportive of their students and describe them as making "learning their priority" and "surpassing goals despite some of the difficulties they face."

The school is mid-sized serving approximately 400 students in grades kindergarten through five. The school has one primary ethnic group, African-American, making up a total of 57% of the school population. Hispanic students make up 39% of the school population. Multi-racial students make up the remaining 4% of the student population. This school falls into the high range for participation in the nation's free or reduced-price lunch program with 75% of students eligible to receive free or reduced-price lunch. Approximately 22% of the students are designated as not English proficient. The student/teacher ratio is approximately 19 to 1.

The elementary school did meet AYP in the 2008-09 school year. The percentage of 3rd grade students testing at standard in mathematics in the 2008-09 school year was 98%, 5% higher than the statewide results. The percentage of 5th grade students testing at standard in mathematics in the 2008-09 school year was 98%, 10% higher than the statewide results. The percentage of 3rd grade students testing at standard in English Language Arts was 85%, coming in 9% higher than the statewide results. The percent of 5th grade students testing at standard in English Language Arts was 100%, 18% higher than the statewide results.

There were four teachers that participated in the study from the New York elementary school. Out of two teachers in 3rd grade, one was randomly assigned to use the SuccessMaker math program, and one was assigned to the comparison group. In 5th grade, there were also two teachers and one was randomly assigned to the SuccessMaker group, while the other was assigned to the comparison group. None of these teachers were new to the school or district.

The district adopted a widely published elementary basal mathematics curriculum with a late copyright date. Teachers receive training on the curriculum about twice a year and have followed this curriculum for an average of 3 years. The degree of curriculum implementation varies by teacher. One teacher reported strict adherence to the district adopted curriculum, two teachers reported using some supplementation, and the fourth teacher reported using heavy supplementation.

Teachers at the New York school have daily math blocks ranging from 50 minutes to one hour. None of the teachers receive additional support in their classrooms during their math block. All teachers adhere to a math teaching philosophy that combines skills-based and discovery-based methods. Teachers conduct math lessons using whole group instruction about 60% of the time, and small group instruction about 40% of the time. Teachers reported using a number of strategies for math instruction including cooperative learning, speed drills, centers, and leveled

instruction. As for technology, all teachers used educational websites and computer games. One teacher frequently uses their interactive white board for math instruction.

The New York school has a good quality computer lab with over 40 Mac stations. The SuccessMaker teachers took their students to use the program in the computer lab three days a week for twenty minutes. The SuccessMaker classes used the math portion of the program in addition to their block mathematics instruction. The median student in the 3rd grade used the math program approximately 18 hours, attempting 42 exercises every thirty minutes with a success rate of 73%. The median student in the 5th grade used the math program approximately 16 hours, attempting 55 exercises every thirty minutes with a success rate of 67%.

Those teachers randomly assigned to use the SuccessMaker Math program were trained a few months after school began on December 8th. These teachers also received an additional training in February and March. Students completed baseline testing the second week of February and tested again the week of June 14th. Students' last week using the program was the week of June 22nd.

Table 3 Gatti Evaluation SuccessMaker Math RCT Sample Demographic Information

Group	Grade	[1]Student Count	[2]Percent One Grade Equivalent Below	Percent Not English Proficient	Percent Reduced Lunch	Percent Caucasian	Percent Hispanic/ Native American	Percent African American/ Caribbean	Other Ethnicity or No Information
Arizona District 1									
SM	3	30 (73%)	47%	57%	97%	17%	63%	13%	7%
Comparison		15 (68%)	53%	33%	100%	13%	80%	7%	0%
SM	7	22 (69%)	55%	23%	91%	9%	77%	14%	0%
Comparison		42 (72%)	57%	24%	93%	14%	79%	0%	7%
Arizona District 2									
SM	3	44 (69%)	45%	48%	86%	5%	93%	2%	0%
Comparison		43 (68%)	74%	53%	95%	5%	84%	9%	2%
SM	5	38 (76%)	45%	50%	87%	5%	87%	5%	3%
Comparison		42 (82%)	83%	38%	86%	10%	86%	2%	2%
SM	7	67 (74%)	46%	33%	84%	4%	91%	4%	1%
Comparison		59 (81%)	53%	25%	95%	7%	86%	5%	2%
Arkansas District									
SM	3	64 (97%)	8%	2%	9%	89%	2%	5%	4%
Comparison		43 (96%)	7%	2%	21%	95%	2%	0%	3%
SM	5	49 (98%)	12%	4%	12%	88%	4%	2%	6%
Comparison		43 (91%)	9%	7%	12%	93%	0%	0%	7%

California District									
SM	3	38 (90%)	68%	0%	79%	0%	100%	0%	0%
Comparison		57 (95%)	35%	0%	78%	0%	100%	0%	0%
SM	5	24(100%)	46%	0%	63%	4%	96%	0%	0%
Comparison		24 (96%)	46%	0%	63%	8%	92%	0%	0%
Indiana District									
SM	3	29 (76%)	31%	0%	69%	93%	0%	0%	7%
Comparison		16 (89%)	50%	6%	69%	88%	6%	0%	6%
SM	5	36 (90%)	47%	8%	83%	83%	3%	3%	11%
Comparison		16 (84%)	25%	0%	69%	100%	0%	0%	0%
Kansas District									
SM	3	41 (95%)	44%	0%	56%	54%	24%	15%	7%
Comparison		19 (95%)	63%	0%	79%	47%	37%	11%	5%
SM	5	43 (98%)	28%	0%	49%	63%	26%	7%	4%
Comparison		20 (91%)	35%	0%	60%	60%	10%	25%	5%
SM	7	48 (81%)	74%	0%	83%	45%	32%	23%	0%
Comparison		36 (80%)	50%	0%	78%	42%	33%	19%	6%
New York District									
SM	3	15 (94%)	27%	0%	87%	0%	60%	40%	0%
Comparison		11 (79%)	73%	0%	100%	0%	64%	36%	0%
SM	5	13 (68%)	62%	0%	85%	0%	54%	46%	0%
Comparison		20 (95%)	90%	0%	90%	0%	45%	55%	0%
Pennsylvania District									
SM	3	21 (91%)	38%	0%	62%	43%	0%	52%	5%
Comparison		19 (90%)	32%	0%	58%	42%	0%	58%	0%
SM	5	21 (91%)	38%	0%	81%	38%	0%	62%	0%
Comparison		19 (90%)	0%	0%	58%	42%	0%	58%	0%

1. Percents within parentheses next to student counts indicate the percent of students tested at baseline that were also tested at the end of the school year.

2. Study sample was broken out by baseline GMADE national norm cutoff score for 1.0 grade equivalent below grade and month at the time of testing.

Pennsylvania District

The participating Pennsylvania school resides in a suburban area. In 2008-09 the school district served a community of 8,000. The median household income is approximately $40,000 indicating a middle class community. This is a brand new school that emphasizes technology. It is housed in a renovated building, which was once the local high school. The school day and year are extended, uniforms are required, and students are admitted based on a lottery system. The

structure of the school requires high parent involvement, which in turn motivates the students to learn. Teachers describe having diverse classrooms in terms of learning abilities.

Three teachers participated in the study from the Pennsylvania school: two 3rd grade teachers and one 5th grade teacher. Out of the two 3rd grade teachers, one was randomly assigned to use the SuccessMaker math program, and the other was assigned to the comparison group. The participating 5th grade teacher had two classroom sections of math. One classroom was randomly chosen to use SuccessMaker math, and the other was assigned to the comparison group.

The district adopted a widely published elementary basal mathematics curriculum. None of the teachers strictly adhered to this curriculum. The 3rd grade teachers supplemented the basal program with an activity based program developed by a local retired teacher. Teachers have daily math blocks of one-and-a-half hours. The 3rd grade comparison and 5th grade teacher receive additional support in their classrooms during their math block. All teachers share a combined skills-based and discovery-based math teaching philosophy, all conduct math lessons using whole group and small group instruction in equal parts, and speed drills. Technology was very prevalent in math instruction. All teachers used various educational websites and computer games. Each teacher also used their interactive white board regularly.

Those teachers randomly assigned to use the SuccessMaker Math program were trained a few weeks after school began on August 26th. These teachers also received an additional training in October and March. Students completed baseline testing the first week of September and tested again the week of June 8th. Students' last week using the program was the first week of June. SuccessMaker classrooms used the math portion of the program in addition to their block mathematics instruction.

After initially using the program in the computer lab, the 3rd grade SuccessMaker students settled on using the program in the classroom three days a week for twenty minutes. Classroom use accounted for 75% of the total usage time. The 5th grade SuccessMaker students used the program in the computer lab four days a week for fifteen minutes. The median 3rd grader used the math program approximately 24 hours, attempting 42 exercises every thirty minutes with a success rate of 72%. The median 5th grade student used the math program much less, approximately 9 hours, attempting 43 exercises every thirty minutes with a success rate of 71%.

Participants

The final diverse sample consisted of 1,186 3rd, 5th, and 7th grade students from eight school districts in seven states located in different regions of the US.

The research team recruited sixty-three diverse 3rd, 5th and 7th grade classrooms from eight urban and suburban school districts in seven different states (i.e., AZ, AR, CA, IN, KS, NY, PA). The final study sample consisted of 505 3rd grade (i.e., SuccessMaker = 282, comparison = 223), 408 5th grade (i.e., SuccessMaker = 224, comparison = 184) and 273 7th grade (i.e., SuccessMaker = 136, comparison = 137) students. It can be seen from Table 3 that the AZ and NY sites had considerable attrition. These three districts have a highly transient population and thus had comparatively high attrition. Eighty-five percent of the 3rd grade students tested at baseline

remained in the final study sample (i.e., SuccessMaker = 85%, comparison = 85%). Likewise, 80% of the 5th grade (i.e., SuccessMaker = 74%, comparison = 89%) and 71% of the 7th grade (i.e., SuccessMaker = 65%, comparison = 78%) students tested at baseline remained in the final study sample.

It can be also be seen from Table 3 the study sites show considerable variation in math achievement and ethnicity, as well as percent of students eligible for reduced priced lunch. Although, overall low-achieving at baseline (i.e., 3rd = 40%, 5th = 39%, 7th = 55% one grade equivalent below), the study groups do not statistically vary on baseline achievement at the three grade levels. Also, the study groups at the three grades did not vary in percent of English proficient students (i.e., 3rd = 86%, 5th = 90%, 7th = 81%). The percent of the students eligible to receive free or reduced priced lunch was high (i.e., 3rd = 68%, 5th = 63%, 7th = 87%) and statistically different at 3rd grade (i.e., SuccessMaker = 63%, comparison = 74%). The sample also tended to be heavily Hispanic (i.e., 3rd Hispanic = 47%, Caucasian = 39%, African-American = 11%; 5th Hispanic = 36%, Caucasian = 47%, African-American = 13%; 7th Hispanic = 69%, Caucasian = 19%, African-American = 10%).

Data Analysis Procedures

Statistical analyses were performed on students' end-of-year GMADE Total score and subtests, as well as, math academic attitude survey raw scores for each grade level. Results were also broken out and analyzed for separate levels of four key demographic variables (i.e., English proficiency, ethnicity, gender, meal status[7]). In addition, results were calculated for those students performing one grade equivalent below their current grade and month at the time of testing. Further, the performance for the comparison group was compared to four blocks of program usage (i.e., block 1 = 1 to 9 hours, block 2 = 10 to 19 hours, block 3 = 20 to 29 hours, block 4 = 30 or more hours).

Statistical analyses were performed on students' end-of-year GMADE Total and subtests, as well as, academic attitude survey scores for the three grade levels. Results were also broken out and analyzed for key subpopulations of students.

Rigorous research design dictates that all characteristics of the study participants and their environmental influences that may impact the results must be equated across study groups. This is advised even when classrooms of students are randomly assigned to study groups. Random assignment can only probabilistically equate study groups prior to the start of the study. The statistical equating of confounding factors and maintaining a controlled and consistent environment for the study participants ensures that differences found in the study groups on outcomes of interest may more confidently be attributed to the study conditions assigned to these groups.

[7] The CA site could not provide meal program status for individual students. The CA site did, however, provide the percent of students receiving free or reduced priced lunch in each classroom. Participation in the meal program for each student was estimated by choosing the most likely participants as determined via the EM algorithm using all available known student and classroom level information.

Comparisons were made between study groups (i.e., comparison vs. SuccessMaker) using model adjusted group mean differences. Model adjusted group mean differences were calculated holding all covariates constant in an attempt to statistically equate the study groups on those constructs and remove their influence from the study group effect. Covariates included baseline scores, student demographic,[8] and 2009-2010 school year classroom environment indicators.[9] When results are broken out by a demographic variable or a grouping indicator, such as the below one grade level designation, the group mean difference is no longer adjusted by that variable along with the remaining model covariates, rather, these differences are separated by the levels of that variable.

A random intercepts model was employed to estimate and test model adjusted group mean differences. While students were the unit of analysis, the nine school 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.[10] A naïve covariance structure[11] within a robust empirical standard error formulation was used to calculate confidence intervals for estimated effects. The result of this procedure is group mean differences are unbiased and statistical hypothesis tests are consistent[12,13] despite the nested nature of data.

All statistical significance tests are two-tailed, with a Type I error rate of 0.05. Statistically significant estimates mean the probability of sampling scores that result in a value that much greater than zero, when it is in fact null, is p = 0.05 or 1 in 20 samples. Statistical significance implies that the samples are likely drawn from two separate populations or that the group averages are unlikely to be the same in the population. Standardized effect size estimates (i.e., effect size = estimated adjusted group difference / comparison sample standard deviation) are computed for statistically significant model adjusted group mean differences using the sample standard deviation for the comparison group's end-of-year scores.[14] The statistical models were able to find moderate to large effect sizes statistically significant. The average minimal detectable effect sizes for 3rd, 5th, and 7th grade were 0.39, 0.29, and 0.43 respectively. Effect sizes as large as these are most likely of practical significance. The careful review of efficacy studies for educational materials[15] indicate that the average adjusted group mean difference for studies with large samples (i.e., more than 250 students) is only 0.13 standard deviations.

[8] gender, meal program status, ethnicity, English proficiency

[9] teacher education and experience, classroom assistance, teacher substitution, regular math instruction in minutes, classroom demographics, class size, baseline classroom achievement and variation, testing time span, program usage time span, current curricular choices, basal curricula adherence, years using basal curricula, self report of frequency of use of specific teaching strategies (i.e., leveled instruction, cooperative learning/peer tutoring, center rotations, speed drills/math facts, test preparation, progress monitoring)

[10] Donnar, A. & Klar, N. (2000) *Design and analysis of cluster randomization trials in health research*. Arnold Publishers, London.

[11] Initially a compound symmetric structure was assumed for the error variances but the extra parameter was not statistically significant for any of the statistical models.

[12] Liang, N. M. & and Zeger, S. L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika*, *73*, pp. 13-22.

[13] SAS's Mixed procedure was used to analyze the data, see SAS Institute Inc. (2008) Online documentation 9.2. A linear model was defined with all fixed effects, full degrees of freedom (i.e., N-2), using the sandwich estimator for all standard errors with districts set as the subject or independent level of nesting and a naïve, independent working covariance structure.

[14] Hedges, L. V. & Olkin, I. (1985). *Statistics methods for meta-analysis*. Academic Press, NY.

[15] Slavin, R. & Smith, D. (2009). The relationship between sample sizes and effect sizes in systematic reviews in education. *Educational Evaluation and Policy Analysis*, *31*(*4*) pp. 500-506.

III. RESULTS

Report section III summarizes the results of data analyses, including statistical and qualitative results, and group comparisons at baseline. The first subsection demonstrates the closeness of the samples on the quantitative outcome measures at baseline. The second subsection addresses research question one, comparing achievement for the SuccessMaker group to that of the comparison group. Section two further addresses achievement for increasing levels of SuccessMaker usage. The third subsection then breaks out the SuccessMaker v. comparison group achievement results by subpopulations.

The fourth and fifth subsections address both research questions two and three. That is, do SuccessMaker students demonstrate more positive attitudes toward mathematics and mathematics instruction, and, how did teachers and students react to the program? Section five summarizes comments collected from SuccessMaker teachers during focus groups interviews and end-of-year student SuccessMaker opinion surveys.

Baseline Group Equivalence

Tables 4-7 present both the simple sample[16] and model adjusted[17] baseline group mean differences for each measure of achievement and attitude for 3rd, 5th and 7th grade classrooms. These tables also show statistical significance test results and effect size measures for the baseline group mean differences. No achievement or attitude outcomes were statistically significantly different between the study groups at baseline, and no effects were of practical significance.

Table 4	Third Grade Baseline GMADE Score Study Group Comparisons						
Measure	Sample Size SM/CP	Sample Difference	Sample p-value	Sample Effect Size	Adjusted Difference	Adjusted p-value	Adjusted Effect Size
GMADE Overall	505	1.59	0.5047	0.11	0.54	0.8188	0.04
GMADE Subtest 1	505	0.57	0.4004	0.12	0.12	0.8615	0.03
GMADE Subtest 2	505	0.41	0.6891	0.07	0.12	0.9028	0.02
GMADE Subtest 3	505	0.63	0.4804	0.10	0.29	0.7447	0.04
Adjusted baseline group mean differences are estimated holding student demographic variables constant across groups. Sample group mean differences are estimated allowing student demographics to vary as they were sampled and randomly assigned.							

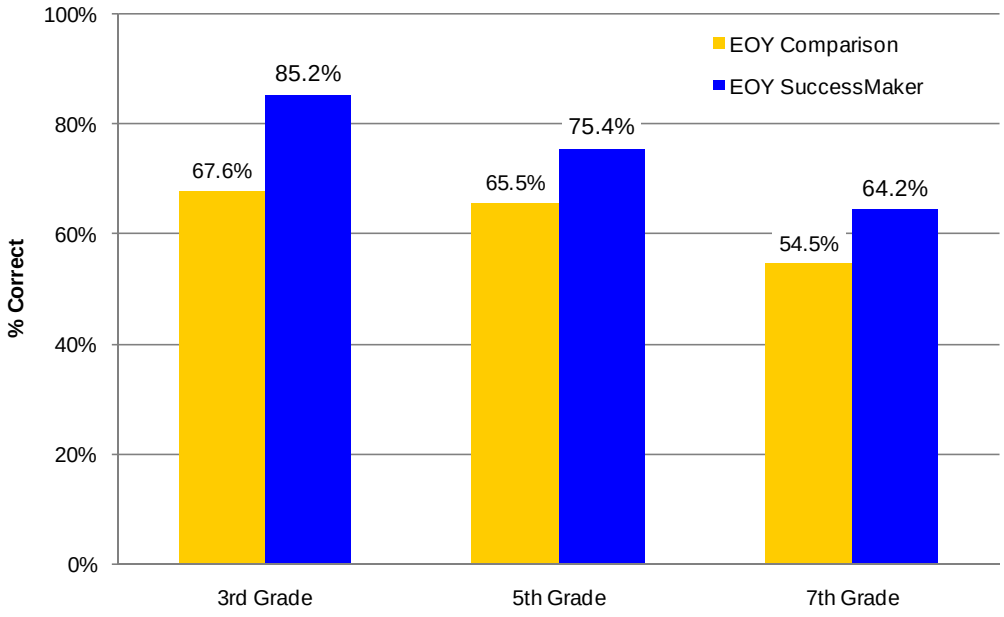
[16] Sample group mean differences are estimated allowing student demographics to vary as they were sampled and randomly assigned.
[17] Adjusted baseline group mean differences are estimated holding student demographic variables constant across groups.

Table 5	Fifth Grade Baseline GMADE Score Study Group Comparisons						
Measure	Sample Size SM/CP	Sample Difference	Sample p-value	Sample Effect Size	Adjusted Difference	Adjusted p-value	Adjusted Effect Size
GMADE Overall	408	2.77	0.2280	0.19	1.96	0.3792	0.13
GMADE Subtest 1	408	1.08	0.1853	0.20	0.74	0.3274	0.13
GMADE Subtest 2	408	1.00	0.2197	0.20	0.71	0.3631	0.14
GMADE Subtest 3	408	0.70	0.3833	0.12	0.51	0.5323	0.09
Adjusted baseline group mean differences are estimated holding student demographic variables constant across groups. Sample group mean differences are estimated allowing student demographics to vary as they were sampled and randomly assigned.							

Table 6	Seventh Grade Baseline GMADE Score Study Group Comparisons						
Measure	Sample Size SM/CP	Sample Difference	Sample p-value	Sample Effect Size	Adjusted Difference	Adjusted p-value	Adjusted Effect Size
GMADE Overall	273	-0.44	0.6767	-0.04	-0.27	0.7987	-0.02
GMADE Subtest 1	273	-0.57	0.4059	-0.12	-0.56	0.4166	-0.12
GMADE Subtest 2	273	0.02	0.9676	0.00	0.05	0.9122	0.01
GMADE Subtest 3	273	0.12	0.6703	0.03	0.24	0.4294	0.06
Adjusted baseline group mean differences are estimated holding student demographic variables constant across groups. Sample group mean differences are estimated allowing student demographics to vary as they were sampled and randomly assigned.							

Table 7	Baseline Math Academic Attitude Survey Score Comparisons						
Grade	Sample Size SM/CP	Sample Difference	Sample p-value	Sample Effect Size	Adjusted Difference	Adjusted p-value	Adjusted Effect Size
Grade 3 Survey	497	-0.01	0.9678	0.00	-0.07	0.8365	-0.02
Grade 5 Survey	406	0.78	0.0958	0.15	0.68	0.1645	0.13
Grade 7 Survey	269	-0.16	0.7053	-0.03	0.03	0.9467	0.01
Adjusted baseline group mean differences are estimated holding student demographic variables constant across groups. Sample group mean differences are estimated allowing student demographics to vary as they were sampled and randomly assigned.							

Figure 1: GMADE Total



After adjusting for student & classroom characteristics, 3rd, 5th & 7th grade SuccessMaker Math users out scored their comparison group counterparts by 17.5% (SE=2.19%), 10.0% (SE=2.72%) and 9.8% (SE=2.23%) respectively.

Figure 2: GMADE Concepts and Communication

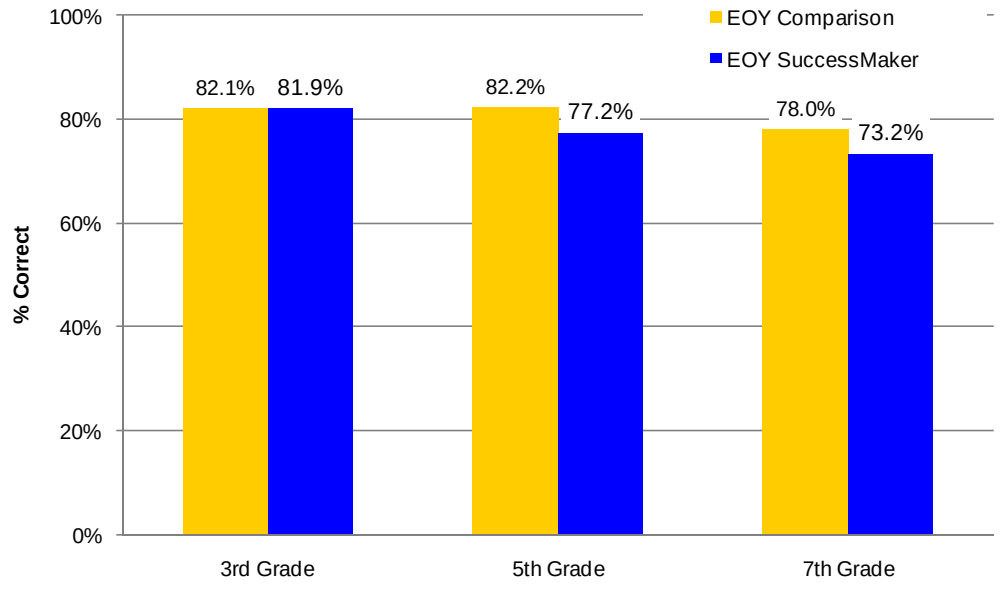
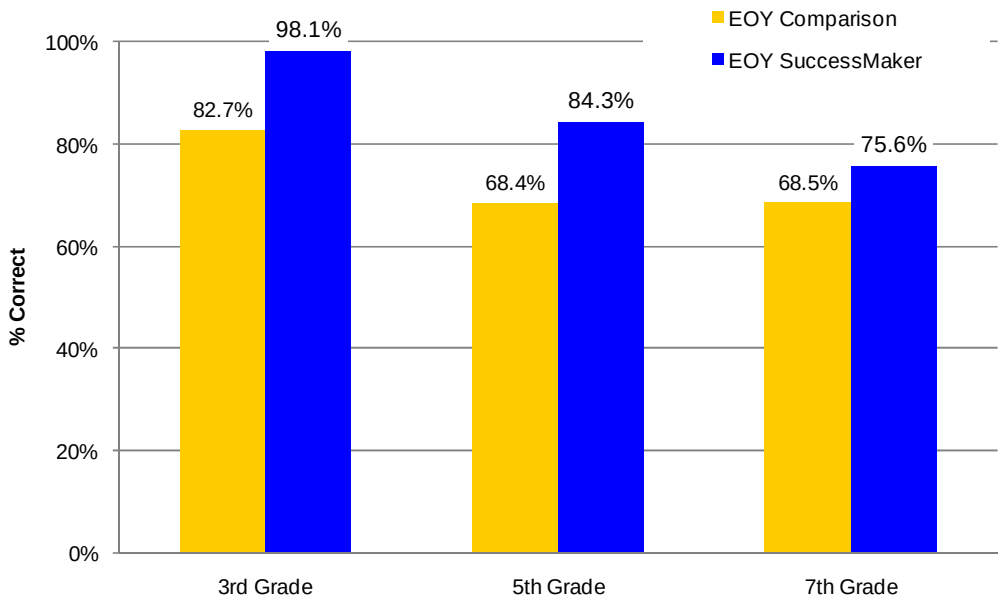
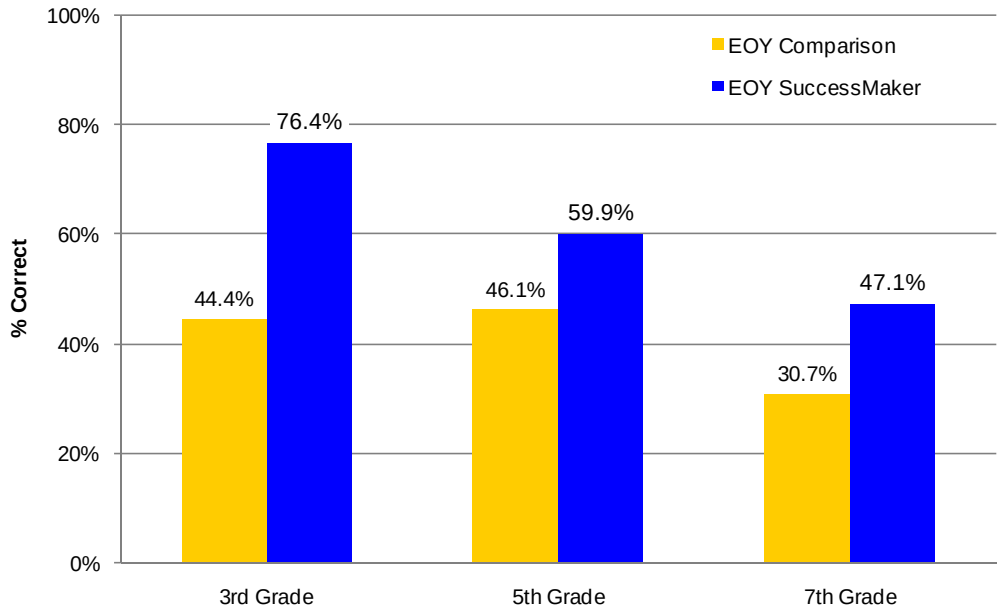


Figure 3: GMADE Operations and Computation



After adjusting for student and classroom characteristics, 3rd, 5th and 7th grade SuccessMaker Math users outscored their comparison group counterparts by 15.4% (SE=4.95%), 15.9% (SE=3.65%) and 7.0% (SE=5.46%) respectively.

Figure 4: GMADE Process and Applications



After adjusting for student and classroom characteristics, 3rd, 5th and 7th grade SuccessMaker Math users outscored their comparison group counterparts by 32.0% (SE=3.71%), 13.8% (SE=2.58%) and 16.4% (SE=3.62%) respectively.

Group Comparisons of Achievement Gains

This section will address research question one:

RQ1: Do 3rd, 5th, and 7th grade students making regular use of the SuccessMaker Math program demonstrate higher mathematics achievement as compared to students that did not utilize SuccessMaker Math?

This section will also addresse the program's comparative effect on achievement for increasing levels of SuccessMaker usage.

Figures 1 through 4 present the SuccessMaker and comparison model adjusted group mean differences on the GMADE total and subtest scores.

SuccessMaker students in 3rd, 5th, and 7th grade statistically significantly outperformed their comparison group counterparts on the GMADE Total score. The magnitude of the difference in performance observed at all three grades was remarkable, 1.00, 0.53, and 0.61 standard deviations for 3rd, 5th, and 7th grade respectively.

3rd Grade Scale	GMADE Effect Size[1,2]
GMADE Total	1.00
Concepts and Communication	***
Operations and Computation	0.75
Process and Applications	1.32

*** Indicates group means are not statistically significantly different

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

5th Grade Scale	GMADE Effect Size[1,2]
GMADE Total	0.53
Concepts and Communication	-0.29
Operations and Computation	0.75
Process and Applications	0.59

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

7th Grade Scale	GMADE Effect Size[1,2]
GMADE Total	0.61
Concepts and Communication	***

Operations and Computation	***
Process and Applications	1.01

*** Indicates group means are not statistically significantly different

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

The effects for GMADE total score were consistently large across usage levels when separated out by blocks of ten hours. At all three grades, ten to nineteen hours of program usage was enough to see SuccessMaker users outperform nonusers by large amounts. Increasing usage for the 3rd and 5th grade samples did not statistically increase the amount those users outperformed the comparison group. The 7th grade sample, however, continued to increase their generally large comparative effects from blocks two to three to four.

3rd Grade Usage[1]	Ave. Hours[2]	GMADE Effect Size[3]
less than 10 hours	9 (3)	***
10 to 19 hours	17 (147)	1.23
20 to 29 hours	25 (106)	1.18
30 or more hours	32 (26)	1.21

*** Indicates group means are not statistically significantly different.

1. usage time rounded down to nearest hour

2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size

3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

5th Grade Usage[1]	Ave. Hours[2]	GMADE Effect Size[3]
less than 10 hours	7 (11)	0.74
10 to 19 hours	15 (94)	0.70
20 to 29 hours	23 (54)	0.64
30 or more hours	35 (65)	0.55

1. usage time rounded down to nearest hour

2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size

3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

7th Grade Usage[1]	Ave. Hours[2]	GMADE Effect Size[3]
less than 10 hours	9 (4)	0.70
10 to 19 hours	16 (72)	0.75
20 to 29 hours	24 (51)	0.93(2)
30 or more hours	31 (9)	1.14(1,2,3)

1. usage time rounded down to nearest hour

2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size

3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

Superscripts indicate which usage blocks' effect sizes statistically significantly differ.

After adjusting for student & classroom characteristics, 3rd, 5th & 7th grade SuccessMaker Math users statistically outperformed their comparison group peers on the Process and Applications subtest by 32.0% (SE=3.71%), 13.8% (SE=2.58%) and 16.4% (SE=3.62%) correct respectively. The magnitude of the difference in performance observed at all three grades was very large, 1.32, 0.59, and 1.01 standard deviations for 3rd, 5th, and 7th grade respectively.

The 3rd, 5th, and 7th grade SuccessMaker Math students statistically significantly outperformed the comparison group students on the GMADE Process and Applications subtest by a staggering 1.32, 0.59, and 1.01 standard deviations respectively.

The effects for Process and Applications scores were also consistently large across usage blocks. At all three grades, ten hours of program usage was enough to see SuccessMaker users outperform nonusers by large amounts on this subtest. Increasing usage for the 3rd grade sample did not statistically increase the amount those users outperformed the comparison group, all 3rd grade usage groups show very large comparative effect sizes. Surprisingly, those 5th graders in the lowest two usage block out performed the comparison group substantially more than the highest two usage blocks. The 7th grade sample continued to increase their large comparative effects from blocks two to three to four.

3rd Grade Usage[1]	Ave. Hours[2]	Process and Applications Effect Size[3]
less than 10 hours	9 (3)	1.28
10 to 19 hours	17 (147)	1.46
20 to 29 hours	25 (106)	1.46
30 or more hours	32 (26)	1.50

1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

5th Grade Usage[1]	Ave. Hours[2]	Process and Applications Effect Size[3]
less than 10 hours	7 (11)	0.95(3,4)
10 to 19 hours	15 (94)	0.77(3,4)
20 to 29 hours	23 (54)	0.47
30 or more hours	35 (65)	0.42

1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

Superscripts indicate which usage blocks' effect sizes statistically significantly differ.

7th Grade Usage[1]	Ave. Hours[2]	Process and Applications Effect Size[3]
less than 10 hours	9 (4)	1.65(2)
10 to 19 hours	16 (72)	1.16
20 to 29 hours	24 (51)	1.45(2)
30 or more hours	31 (9)	1.81(2,3)

1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation
Superscripts indicate which usage blocks' effect sizes statistically significantly differ.

The 3rd and 5th grade SuccessMaker Math users statistically outperformed their comparison group counterparts on the Operations and Computation subtest by 15.4% (SE=4.95%) and 15.9% (SE=3.65%) correct respectively. The magnitude of the differences in performance observed at both grades were equivalently very large, 0.75 standard deviations. The 7th grade SuccessMaker students performed statistically the same as the comparison group on this subtest.

And yet again, the effects for the 3rd and 5th grade samples were consistently large across usage levels with SuccessMaker users outperforming nonusers by large amounts. The 3rd grade sample needed ten hours or more to statistically outperform the comparison group. The 5th grade sample was extremely consistent in their comparative effect sizes except for the 20-29 hour usage block where the SuccessMaker students outperformed the comparison group substantially more than the already large differences seen with the other blocks. The 7th grader users were statistically equivalent to their comparison group counterparts for all usage levels on this subtest.

3rd Grade Usage[1]	Ave. Hours[2]	Operations and Computation Effect Size[3]
less than 10 hours	9 (3)	***
10 to 19 hours	17 (147)	0.93(1)
20 to 29 hours	25 (106)	0.80(1)
30 or more hours	32 (26)	1.02(1)

*** Indicates group means are not statistically significantly different.
1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation
Superscripts indicate which usage blocks' effect sizes statistically significantly differ.

5th Grade Usage[1]	Ave. Hours[2]	Operations and Computation Effect Size[3]
less than 10 hours	7 (11)	0.81
10 to 19 hours	15 (94)	0.82
20 to 29 hours	23 (54)	1.09(4)

30 or more hours	35 (65)	0.79

1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation
   Superscripts indicate which usage blocks' effect sizes statistically significantly differ.

7th Grade Usage[1]	Ave. Hours[2]	Operations and Computation Effect Size[3]
less than 10 hours	9 (4)	***
10 to 19 hours	16 (72)	***
20 to 29 hours	24 (51)	***
30 or more hours	31 (9)	***

*** Indicates group means are not statistically significantly different.
1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

Finally, the SuccessMaker students in 3rd and 7th grade performed similarly to their comparison peers on the Concepts and Communication subtest. The 5th grade comparison group performed statistically significantly greater than 5th grade SuccessMaker students on this subtest. This advantage for the comparison group students seems to be in large part due to a single usage block.

3rd Grade Usage[1]	Ave. Hours[2]	Concepts and Communication Effect Size[3]
less than 10 hours	9 (3)	***
10 to 19 hours	17 (147)	***
20 to 29 hours	25 (106)	***
30 or more hours	32 (26)	***

*** Indicates group means are not statistically significantly different.
1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

5th Grade Usage[1]	Ave. Hours[2]	Concepts and Communication Effect Size[3]
less than 10 hours	7 (11)	***
10 to 19 hours	15 (94)	***
20 to 29 hours	23 (54)	-0.57
30 or more hours	35 (65)	***

*** Indicates group means are not statistically significantly different.
1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

7th Grade Usage[1]	Ave. Hours[2]	Concepts and Communication Effect Size[3]
less than 10 hours	9 (4)	***
10 to 19 hours	16 (72)	***
20 to 29 hours	24 (51)	***
30 or more hours	31 (9)	***

*** Indicates group means are not statistically significantly different.
1. usage time rounded down to nearest hour
2. Ave. Hours = average of students' usage in hours, parentheses indicate sample size
3. Effect Size = estimated adjusted group difference / comparison sample standard deviation

Group Comparisons by Subpopulations

When the data was broken out for student subpopulations, 3rd grade Hispanic, low SES, non-English proficient, female, and lower-achieving SuccessMaker students all statistically significantly outperformed their comparison group peers on GMADE Total score (i.e., 0.50 to 1.31 standard deviations), as well as the Process and Applications (i.e., 0.91 to 1.65 standard deviations) and the Operations and Computation subtests (i.e., 0.49 to 1.19 standard deviations). The 3rd graders performed statistically similar on the Concepts and Communication subtest.

3rd Grade Subpopulation	GMADE Effect Size[1,2]
Lower achieving	0.50
Male	0.98
Female	1.06
Reduced priced lunch	1.01
Full priced lunch	0.82
Not English proficient	1.31
English proficient	0.88
African American	***
Hispanic	0.95
Caucasian	0.64

*** Indicates group means are not statistically significantly different.
1. effect size = estimated adjusted group difference / comparison sample standard deviation
2. The average effect size for studies with large samples (i.e., more than 250 students)

has been recently estimated at 0.13 standard deviations.

3rd Grade Subpopulation	Concepts and Communication Effect Size[1,2]
Lower achieving	***
Male	***
Female	***
Reduced priced lunch	***
Full priced lunch	***
Not English proficient	***
English proficient	***
African American	***
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

3rd Grade Subpopulation	Operations and Computation Effect Size[1,2]
Lower achieving	0.49
Male	0.72
Female	0.79
Reduced priced lunch	0.76
Full priced lunch	***
Not English proficient	1.19
English proficient	0.60
African American	***
Hispanic	0.72
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

3rd Grade Subpopulation	Process and Applications Effect Size[1,2]
Lower achieving	0.91
Male	1.26
Female	1.35
Reduced priced lunch	1.34
Full priced lunch	1.25
Not English proficient	1.65
English proficient	1.29
African American	1.52
Hispanic	1.41
Caucasian	1.18

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

Low SES, non-English proficient and female 5th grade SuccessMaker students statistically significantly outperformed their comparison group peers on GMADE Total score (i.e., 0.48 to 0.53 standard deviations), as well as, both the Process and Applications (i.e., 0.49 to 0.63 standard deviations) and Operations and Computation subtests (i.e., 0.55 to 0.73 standard deviations). In addition, 5th grade African-American students using SuccessMaker statistically outperformed their peers not using SuccessMaker on the Process and Applications subtest. Conversely, 5th grade African-American comparison group students statistically outscored the SuccessMaker group on the Concepts and Communication subtest.

5th Grade Subpopulation	GMADE Effect Size[1,2]
Lower achieving	***
Male	0.60
Female	0.49
Reduced priced lunch	0.53
Full priced lunch	0.50
Not English proficient	0.48
English proficient	0.55
African American	***
Hispanic	***
Caucasian	0.58

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

5th Grade Subpopulation	Concepts and Communication Effect Size[1,2]
Lower achieving	***
Male	***
Female	***
Reduced priced lunch	***
Full priced lunch	-0.40
Not English proficient	***
English proficient	-0.25
African American	-0.48
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

5th Grade Subpopulation	Operations and Computation Effect Size[1,2]
Lower achieving	***
Male	0.81
Female	0.70
Reduced priced lunch	0.73
Full priced lunch	0.73
Not English proficient	0.55
English proficient	0.77
African American	***
Hispanic	***
Caucasian	0.88

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

5th Grade Subpopulation	Process and Applications Effect Size[1,2]
Lower achieving	***
Male	0.64
Female	0.52
Reduced priced lunch	0.63
Full priced lunch	0.57
Not English proficient	0.49
English proficient	0.64
African American	0.61
Hispanic	***
Caucasian	0.68

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

Seventh grade low SES, non-English proficient, and female students all dramatically outperformed their comparison group counterparts on GMADE Total score (i.e., 0.57 to 0.66 standard deviations) and the Process and Applications subtest (i.e., 1.06 to 1.39 standard deviations). Further, lower-achieving and Hispanic 7th grade SuccessMaker students statistically outperformed their comparison group peers on the Process and Applications subtest (i.e., 0.58 and 1.19 standard deviations). The study groups scored statistically the same for all 7th grade populations on the Concepts and Communication and the Operations and Computation subtests.

7th Grade Subpopulation	GMADE Effect Size[1,2]
Lower achieving	***
Male	0.61
Female	0.66
Reduced priced lunch	0.57
Full priced lunch	0.78
Not English proficient	0.60
English proficient	0.57
African American	***
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

7th Grade Subpopulation	Concepts and Communication Effect Size[1,2]
Lower achieving	***
Male	***
Female	***
Reduced priced lunch	***
Full priced lunch	***
Not English proficient	***
English proficient	***
African American	***
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

7th Grade Subpopulation	Operations and Computation Effect Size[1,2]
Lower achieving	***
Male	***
Female	***
Reduced priced lunch	***
Full priced lunch	***
Not English proficient	***
English proficient	***
African American	***
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

7th Grade Subpopulation	Process and Applications Effect Size[1,2]
Lower achieving	0.58
Male	0.85
Female	1.14
Reduced priced lunch	1.06
Full priced lunch	0.80
Not English proficient	1.39
English proficient	0.99
African American	***
Hispanic	1.19
Caucasian	***

*** Indicates group means are not statistically significantly different.

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

Student Academic Attitudes

SuccessMaker Math students at 3rd and 7th grade demonstrated statistically higher attitudes than their comparison group counterparts. These very large effects were also seen for several at-risk populations.

This section will attempt to answer research question two:

RQ2: Do 3rd, 5th, and 7th grade students using the SuccessMaker Math program demonstrate more positive attitudes toward mathematics and mathematics instruction as their comparison group counterparts?

Figure 5 presents the average model adjusted math attitude survey score mean differences. The 3rd and 7th grade SuccessMaker students both had statistically significantly higher math academic attitudes than the comparison group (i.e., 3rd = 0.99 standard deviations, 7th = 0.62 standard deviations). The 5th grade SuccessMaker students had similar attitudes to their peers not using SuccessMaker.

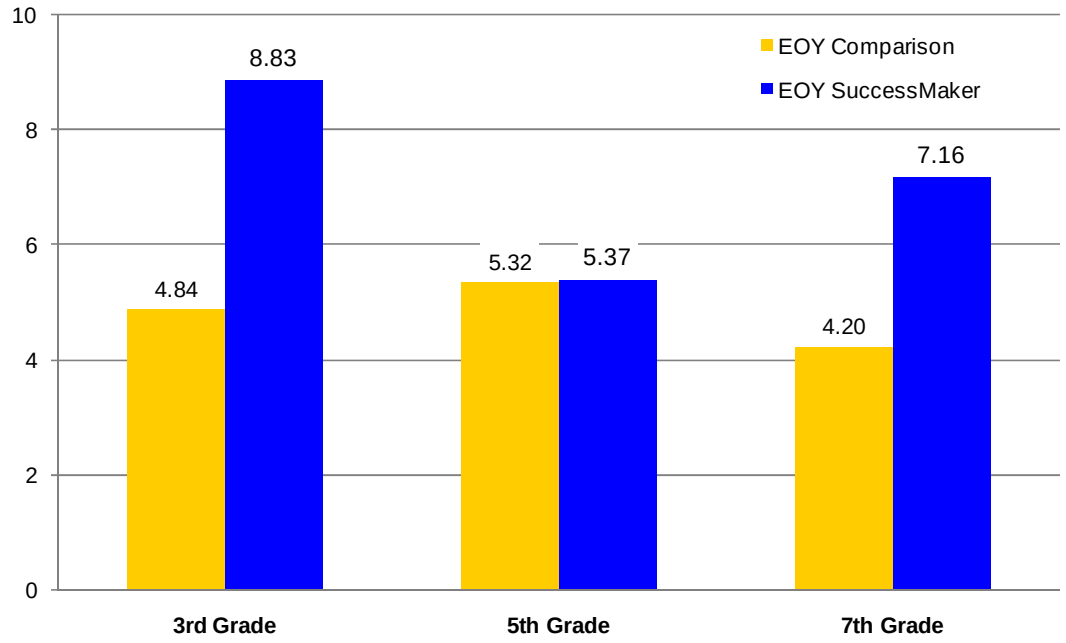
Student Math Attitude Scale	Effect Size[1,2]
3rd Grade	0.99
5th Grade	***
7th Grade	0.62

*** Indicates group means are not statistically significantly different

1. effect size = estimated adjusted group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

Figure 5: Math Academic Attitude Survey



After adjusting for student and classroom characteristics, 3rd, 5th & 7th grade SuccessMaker Math users outscored their comparison group counterparts by 3.99 (SE=1.52), 0.06 (SE=0.99) and 2.95 (SE=1.43) respectively.

The very large effects seen at 3rd grade were consistent for students in at-risk populations or Hispanic, lower SES, not English proficient, female, and lower achieving students (i.e., 0.29 to 1.13 standard deviations).

3rd Grade Subpopulation	Student Math Attitude Effect Size[1,2]
Lower achieving	0.29
Male	0.91
Female	0.96
Reduced priced lunch	1.03
Full priced lunch	***
Not English proficient	1.13
English proficient	0.95

African American	***
Hispanic	0.98
Caucasian	***

*** Indicates group means are not statistically significantly different

1. Cohen's *d* effect size = estimated group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

The 5th grade SuccessMaker and comparison group students, across all populations, had similar attitudes.

5th Grade Subpopulation	Student Math Attitude Effect Size[1,2]
Lower achieving	***
Male	***
Female	***
Reduced priced lunch	***
Full priced lunch	***
Not English proficient	***
English proficient	***
African American	***
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different

1. Cohen's *d* effect size = estimated group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

Several 7th grade at-risk populations (i.e., female, lower SES, not English proficient) had statistically higher math attitudes than the comparison group (i.e., 0.61 to 0.69 standard deviations).

7th Grade Subpopulation	Student Math Attitude Effect Size[1,2]
Lower achieving	***
Male	***
Female	0.63
Reduced priced lunch	0.69
Full priced lunch	***

Not English proficient	0.61
English proficient	***
African American	***
Hispanic	***
Caucasian	***

*** Indicates group means are not statistically significantly different

1. Cohen's *d* effect size = estimated group difference / comparison sample standard deviation

2. The average effect size for studies with large samples (i.e., more than 250 students) has been recently estimated at 0.13 standard deviations.

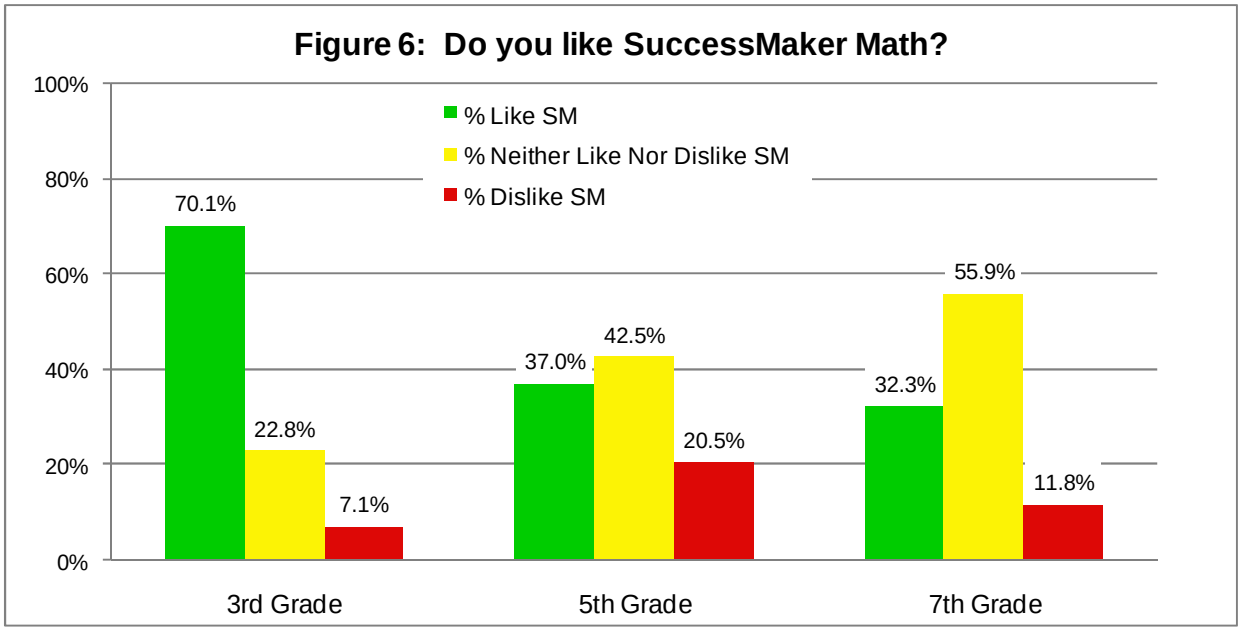
Teacher and Student SuccessMaker Opinions

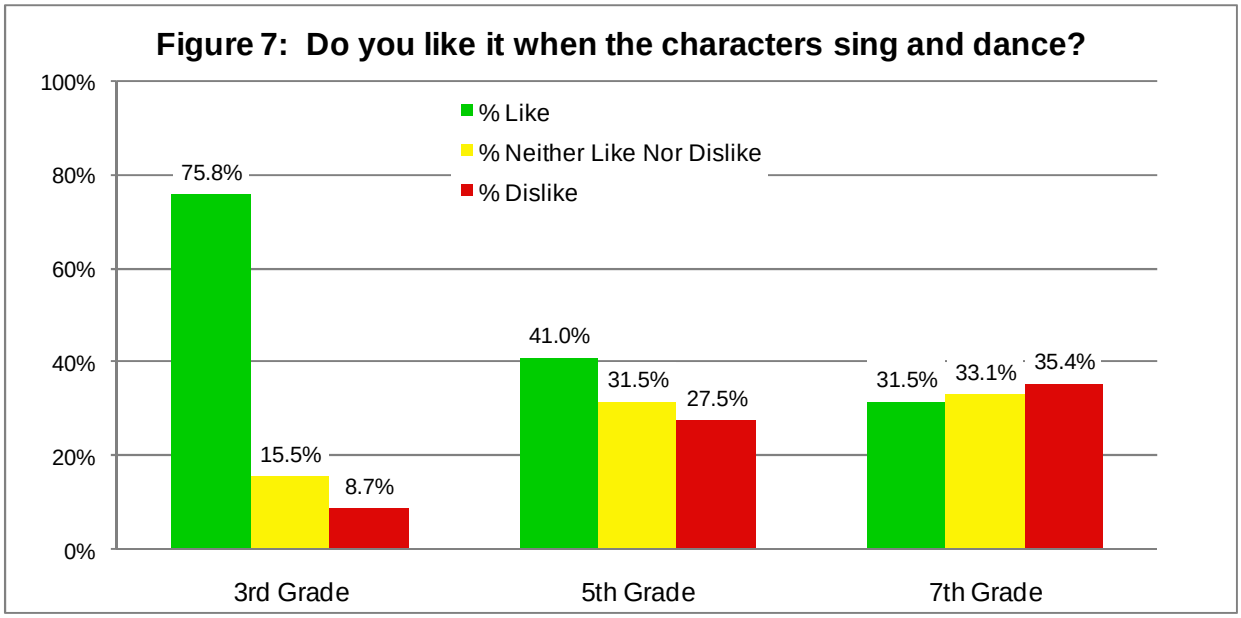
This section addresses research question three:

RQ3: How did teachers and students react to the SuccessMaker Math program?

The first sub-section summarizes the student math academic attitude survey results. The second and third sub-sections summarize the end-of-year student SuccessMaker opinion surveys and comments collected from SuccessMaker teachers during focus groups interviews, respectively.

When students were surveyed, 93% of 3rd grade, 79% of 5th grade, and 88% of 7th grade students indicated they liked using the SuccessMaker program.





Student SuccessMaker Math Attitudes

SuccessMaker students were surveyed at the end of the school year as to their opinions on several aspects of the program (i.e., 3rd = 268, 5th = 200, and 7th = 127 responses). Figures 4 and 5 show students' reactions to the math program. The overwhelming majority of 3rd grade students (i.e., 70%) indicated they liked using the program, and only 21% of 5th grade and 12% of 7th grade students indicated they disliked using the program. Similarly, 3rd grade students responded most positively to the characters and animation, and found the learning activities engaging with 90% reporting they liked the characters and 76% reported liking the animation. Not as many older students found the characters and animation engaging. Of 5th graders, 18% disliked the learning activities and 28% disliked the animation. Increasingly at 7th grade, 25% of students reported disliking the learning activities and 35% indicated they disliked the characters and animation.

Teacher SuccessMaker Attitudes

Opinions about the SuccessMaker program were systematically collected from teachers during focus group sessions. Focus groups were conducted at each school during site visits between April and early June. These sessions provided a forum for teachers and administrators to answer specific questions as well as express their professional and personal opinions regarding the program. The teachers were encouraged to speak without hesitation or inhibition, and to be as candid as possible. The focus group sessions provided extensive insight into teacher and student experiences with, and attitudes about, the SuccessMaker Math program. This information was supplemented with opinions gained from students when students were observed using the program.

The focus group results describe what teachers and students liked about the SuccessMaker program, how the program could be improved, and how teachers are using specific features of the system.

The sessions provided the research team with the following insights into teacher and student experiences with the program. Teachers and students quickly became comfortable with the SuccessMaker program, and felt the program was a good educational investment. The teacher response to the program was overwhelmingly positive, with 80% of the 646 recorded comments coded as positive in nature.

Teacher response to SuccessMaker was overwhelmingly positive, with 80% of all responses coded as positive in nature.

Teachers felt that their current print supplements or past computer-based interventions could not compete with SuccessMaker when it comes to interactivity, differentiated content, immediate feedback, and student engagement.

5th grade teacher: "I love how it differentiated for me. It gave them the test. It found out what their weaknesses were without me going in there. It did all the work for me."

7th grade teacher: SuccessMaker puts them where they need to be and builds them up. With [previously used computer program] they wouldn't go to certain areas if they didn't know them.

Teachers like the interactive nature of the educational activities that comprise the program. Teachers also like that the instruction is differentiated for the individual student. The marriage of the interactive learning objects to the differentiated content keeps students engaged and challenged in their own independent learning environment.

3rd grade teacher: "It's good because you feel like everyone got what they needed. Felt like SuccessMaker was your co teacher."

7th grade teacher: "I think it's a very essential tool for students that are at different levels."

Teachers stressed the importance of having a program that is aligned to the content of the current curriculum as well as state standards and assessments. An overwhelming majority of the teachers felt that the program was aligned with both state and district educational objectives, as well as to curriculum content. Several teachers used the program specifically to prepare for benchmark and state testing.

3rd grade teacher: "[My students] hit all skills possible in the beginning. My kids are ready to go."

5th grade teacher: "I noticed fractions. In 5th grade we spend a lot of time on that. I was excited when that came up for some of our students."

Teachers indicated that students are learning concepts from the program that are different from what has been traditionally taught or before it is even introduced in the classroom. This provides a new and exciting dimension to learning as it creates an environment of confidence and discussion for the students when a concept they have experienced on the program is identified in class.

5th grade teacher: "They see it [new material] for the first time in SuccessMaker instead of seeing it in class under pressure. It takes some of the pressure out. They are not as intimidated."

5th grade teacher: "I found my kids were already motivated, they would recognize when we got to a new concept in class, "well I've already had that on the computer". I had one girl who said, "I saw that on SuccessMaker two months ago," gave them more confidence in the classroom."

Further, teachers felt the program reinforces skills already discussed in class.

3rd grade teacher: "Some of my kids are very hard to motivate, but with SuccessMaker they will do it. So if I can link what we are doing in the classroom with what they did in SuccessMaker, they are automatically more interested."

First 3rd grade teacher: "Really reinforces. Second 3rd grade teacher: "Vocabulary too, they will say we heard that in SuccessMaker."

Teachers felt the initial placement and adaptive motion through the content worked well.

3rd grade teacher: "The IP on math, I thought was great."

5th grade teacher: "I didn't see any frustration, it seemed like they were progressing at their own pace. It was great."

The program's reporting feature was also well-received by the teachers. Though all teachers were trained on the reporting feature by the time of the site visits, many teachers were still relatively new to the reporting feature for a variety of reasons, including; starting the program later in school year, time constraints, and lack of interest.

3rd grade teacher: Then I notice wow, most of my kids have mastered that skill and we don't have to review that. It was pretty easy once we figured out what we were doing

3rd grade teacher: "I did a little bit with it. Didn't do near as much as I wanted to. Think I did three separate lessons. I liked it because I could base my lessons off of it. I like it because there are a lot of questions, but you could kind of navigate through those questions. Like little modules you could check off."

5th grade teacher: "I wish I had used more of the reports. I did not utilize that enough."

Most teachers tended to walk around the room when students were using SuccessMaker in the lab, looking over students' shoulders, monitoring their progress and answering their questions. In doing this, teachers gained a lot of insight into their students' development as well as the ability to deliver personal instruction.

3rd grade teacher: "I had one student; she would just sit there and look at me. I don't understand this. I found out she did not know how to count by fives. I didn't know that."

Individual preference and teacher expectations dictated how teachers utilized the reports and what they liked most about the reporting system. The research team found that teachers most

often used the reports to inform classroom instruction, to identify students for remediation and to discover off-task behavior, as well as to monitor and report student progress.

3rd grade teacher: "At the last parent-teacher conference, I ran off the areas of difficult report for each parent. They liked it."

3rd grade teacher: "I have used those [reports] for leveling students, to split them into groups."

5th grade teacher: "I look at how many questions they have answered. Sometimes they have been on there for 20 minutes and answered 2 questions. I do look at that. It tells me who is on it and [who is] just sitting there."

5th grade teacher: "When I would see the students struggling the next day I could go back to their last session and see what their score was. I could say, oh this was not the score you told me yesterday. This is what you need to work on, [for example] if it was integers or something."

Teachers firmly believe that their students like using the program. When formally interviewed, teachers were overwhelmingly positive about their students' interactions with the program. Of the 179 recorded comments, 79% were positive in nature. Teachers felt that the program ultimately makes math more attractive to their students than it has been in the past.

3rd grade teacher: "My kids enjoyed it. There was not a day or a moment where they would say, "Oh why do we have to be here?" They look forward to going."

3rd grade teacher: "My kids were really excited to show me their scores at the end of the day. Just that competition with themselves to do better."

3rd grade teacher: "And the speed games. I hear a lot of good feedback about the speed games."

5th grade teacher: "My kids really like it; they really look forward to it."

7th grade teacher: "The 7th graders, they'd rather do math on the computer than in the classroom"

Teachers firmly believe that their students like using SuccessMaker Math and feel that the program makes the learning process more fun for students.

Although most teachers felt that the characters and animation were appropriate, a few found the characters too immature and the animation distracting. Whereas third 3rd teachers overwhelmingly found the animation and graphics a welcome component to the program, negative response to the graphics and animation were most prevalent with the 5th and 7th grade teachers.

3rd grade teacher: "The animation hooked them in."

5th grade teacher: "They think it's silly. One girl complained about the dog licking the screen. They just want to move on."

A majority of teachers felt that the program challenged both their special needs and higher achieving student populations. Teacher also felt the SuccessMaker math program was more engaging and challenging than previous printed and computer-based supplements, helpful for ELL students and struggling readers, and an overall good educational investment.

3rd grade teacher: "I saw the kids picking up a lot more English."

3rd grade teacher: "I really like it for enrichment for my high kids."

5th grade teacher: "I do think it was really beneficial for those kids that need that enrichment. The kids that just don't get it, even my low kids had great gains."

7th grade teacher: "I have an ELL and he does better on SuccessMaker than he does in the classroom."

A majority of teachers felt the initial placement and adaptive motion of students through the program was effective and the learning activities were well-differentiated and aligned to their current curricula and state educational objectives. Although most teachers made minimal use of the reporting system, the teachers overwhelmingly responded positively to the reporting system and believe it met their needs. Teachers reported rare minor technical issues (ex., logging in, activities loading), most likely a result of their district and school infrastructure. Teachers also felt the SuccessMaker math program was more engaging and challenging than previous printed and computer-based supplements, helpful for ELL students and struggling readers, and an overall good educational investment.

IV. DISCUSSION

Teachers and students quickly became comfortable with the SuccessMaker program, and felt the program was a good educational investment. When interviewed, the teacher response to the program was overwhelmingly positive. Teachers appreciated the reporting system, felt the initial placement and adaptive motion of students through the program were effective, the learning activities were well-differentiated and aligned to their current curricula and state educational objectives, the program challenged both their lower and higher achieving student populations, and that the audio and graphics allowed ELL and lower reading achieving populations to learn.

Teachers firmly believe that their students like using SuccessMaker Math and feel that the program makes the learning process more fun for students. Students themselves reported positive attitudes towards the program as well as more positive academic attitudes than non-users.

Teachers also firmly believe that their students like using the program and feel that the program makes the learning process more fun. Students appreciate the capacity of the program to allow them to laugh and interact with their own virtual learning environment. When surveyed, only a small minority of students indicated they disliked the program. Further evidence that the program resonated positively with students can be seen in the math attitude survey results where SuccessMaker students had higher scores than did their comparison group counterparts. The 3rd and 7th grade differences were both statistically significant, very large (i.e., 3rd 0.99 standard deviations, 7th 0.62 standard deviations) and also seen for several at risk populations.

Teachers came up with creative solutions to get all students on the program each week, overcoming packed classroom lesson plans and filled computer lab schedules. Most teachers went to the lab 2 or 3 times a week for an average of 24 minutes. Ten teachers went to the lab more than three times a week. Only four teachers had their students use the program in the classroom for 30% or more of their total usage. Total program usage was a median of 19, 18, and 17 hours, for 3rd, 5th, and 7th grade respectively.

The final study sample was diverse and very large at 1,186 students. Three districts have a highly transient population and thus had comparatively high attrition. Though diverse, the sample was specifically heavily Hispanic, low SES, and overall low achieving, including the type of at-risk students that would benefit from a well-conceived and implemented mathematics intervention.

The data indicates clearly that diverse populations of students receiving SuccessMaker Math can be successful in significantly increasing achievement.

The achievement data indicates clearly that diverse populations of students receiving SuccessMaker Math can be successful when receiving as little as ten to nineteen hours on the program. After holding confounding factors constant for both groups (i.e., baseline scores, student demographic information, and classroom environment indicators) and estimating end-of-year raw score group mean differences SuccessMaker students in all three grades statistically

significantly outperformed their comparison group counterparts on the GRADE Total score and *Process and Applications* subtest. Likewise, SuccessMaker students in 3rd and 5th grade statistically significantly outperformed their comparison group counterparts on the *Operations and Computation* while 7th grade students performed similarly to their comparison peers on this subtest. SuccessMaker students in 3rd and 7th grade performed similarly to their comparison peers on the Concepts and Communications subtest. The 5th grade comparison group performed statistically significantly greater than 5th grade SuccessMaker students on this subtest.

In summary, the SuccessMaker Math program was found to significantly positively impact student achievement scores in important domains of math achievement for users with as little as ten to nineteen hours of usage. Large comparative effects were also seen for at-risk populations. Furthermore, student attitudes were positively impacted by the SuccessMaker Math program.