

LSC Analytic Memo
Students Using Mathematics Successfully (SUMS)

Topic: Capacity Building

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1. BRIEF DESCRIPTION OF THE CONTEXT OF SUMS

Beginning in the 1996-97 school year, the Students Using Mathematics Successfully (SUMS) Project used the, what was then current, California Mathematics Framework (1992) and National Council of Mathematics (NCTM) Curriculum and Evaluation Standards (1989), as models for the professional development of 1620 teachers, and 480 instructional assistants & administrators (Grades Pre K-9) from the Santa Ana Unified School District. The project galvanized parents, teachers, support staff, administrators, and community advocates who expect quality education for students. Specifically, the goals of this project were to change:

- the classroom behavior of teachers and students as they do mathematics to reflect the reform efforts outlined by the National Council of Teachers of Mathematics (NCTM).
- teachers' attitudes and self-confidence in doing mathematics themselves and teaching mathematics.
- schools' current parent involvement efforts in mathematics education to reflect reform thinking for parental involvement, including parents as resources in schools and in the community.
- schools' current community/business partner involvement efforts in mathematics education to reflect reform thinking for community/business partner support.
- students' abilities to do mathematics in ways reflected in the NCTM Standards and Addenda Series, e.g. investigations, problem solving.
- the current district textbook series and help teachers successfully implement the newly selected state mathematics adoption, K-9.
- teachers' expectations of mathematical achievement for minority students to reflect the reform philosophy that all students can do mathematics, including Limited English Proficient (LEP) students.
- teachers' expectations of mathematical achievement for female students to reflect the Gender Equity Agenda that girls should be encouraged as much as boys.

Over a five year period, the goal was to have all teachers, instructional assistants, and administrators from pre-K to grade 9 (2,100 participants) participate in two years (100 hours) of staff development in mathematics content and pedagogy with emphasis on newly-adopted instructional materials and reform. Ongoing support of this instruction included implementation of site-based Action Plans focusing on teacher discourse, reflection, and classroom observation and coaching, resulting in an additional 100 hours of participation. Parents, community and business partners were to learn about reform as well as assist in the reform effort through site-based events and activities resulting in another 100 hours of

participation. As part of the district's commitment to the project, two district-wide staff development days a year were to be devoted to mathematics, involving all teachers, instructional assistants, and administrators.

The following figures indicate the results to date. As can be seen we have actually served almost 750 more teachers than we originally planned, but not all for the total of 100 hours. The following data do not include 63 administrators who completed at least 50 hours of SUMS Professional Development and 28 preschool teachers and 233 instructional assistants who received between 6.25 and 50 hours of professional development.

SUMS Teachers	Hours Completed	Sessions to 100 hrs.
1,028	6.25-50	7-11
323	50.25-87	3-6
165	87.5 - 100	1-2
853	100 +	0
2,369	Total	

2. HOW SUMS ADDRESSED CAPACITY BUILDING

The Students Using Mathematics Successfully (SUMS) Project was built upon four previous projects (Santa Ana – Fullerton Elementary Mathematics Project –SAFEMAP- 1 and 2, Secondary SAFEMAP, and the Language and Mathematics Project - LAMP) that offered two years of professional development in mathematics and pedagogy to volunteer teachers. SAFEMAP 1 and 2, and LAMP addressed grades K-8 and Secondary SAFEMAP addressed grades 5-12.

All projects were with the Santa Ana Unified School District (5th largest in CA with 62,874 students is 92% Hispanics, 85% at the poverty level and 70% English Learners). Through SAFEMAP 1 (1987-1989), 77 teachers completed at least one semester of coursework. In SAFEMAP 2 (1990-1992) an additional 146 teachers completed courses in mathematics content and methodology. The project also provided instruction in mathematics for principals and assistant principals. Through Secondary SAFEMAP, funded by the California Postsecondary Education Commission (1993 - 1995), a project that focused on improving the preparation of secondary school mathematics teachers, 130 teachers completed at least one semester of mathematics content and pedagogy. Finally, in LAMP, a project for K-5 teachers, we built on the structure developed in the SAFEMAP projects by concentrating on the mathematics program and teachers of a single school (Monte Vista Elementary) while networking with other school staffs via their representatives to LAMP, preparing 121 teachers.

Teachers from the four projects received four semesters of mathematics and mathematics pedagogy course work. Beginning with the first project, I recruited and mentored a small number of teachers to become instructors in subsequent projects. This mentoring took place over a period of 10 years and culminated in identifying 58 teachers as instructors in 1996, who subsequently became the instructors and professional curriculum developers for the SUMS project. Thus, capacity building was necessary in order to launch the SUMS project.

In addition to preparing instructors, SUMS relied on graduates of previous projects for the three coordinator positions and the six instructional consultant (professional development curriculum writers and trainers of the instructors) positions. Finally, 84 site support providers (two per school site) were recruited from past projects to serve as lead teachers to “support” other teachers in the implementation

of the adopted curriculum and in the implementation of the school site action plan in mathematics. The district paid them a stipend for this work. Later on, as the SUMS professional library began to take shape, each school nominated a “professional librarian” to oversee the collection. Also, the project initiated a Math Field Day for students supported by a grant from a local business and two teachers per school volunteered to be the Math Club coaches. The project paid these teachers a small stipend for the extra responsibility.

3. STRATEGIES SUMS USED THAT WORKED WELL

Over the period of the SUMS project, 58 SUMS instructors taught at least one year in the project—most of these teachers remain in the district in leadership roles. In addition, SUMS supported 42 “Professional Librarians”, teachers on school sites responsible to monitoring mathematics education resource books and mathematics-and-literature books with corresponding lessons. The SUMS professional library consisted of 82 books for middle school, 162 for elementary school, and 37 for State preschool, most of which were purchased by the Santa Ana Library for SUMS. The SUMS Site Support Providers, one primary and one upper grade, received additional preparation in monthly meetings to support their work at the site level related to implementing the adopted curriculum. Their duties included classroom observations, demonstration lessons, leading articulation meetings, grade level planning, team teaching, and new teacher assistance. SUMS also supported 84 math club coaches (two per school) that prepared teams of students for the district Math Field Day. The different jobs provided opportunities to involve more teachers in leadership roles and nurture some until they could assume more challenging positions in the project (e.g., instructor). All of these teacher-leaders were speakers at the annual district mathematics conference attended by all teachers. This cadre of teacher-leaders has served the district well on math curriculum committees, as mentor teachers, Family Math instructors, grade level chairs, and textbook adoption committee members, for examples.

4. CHALLENGES SUMS FACED IN BUILDING CAPACITY

In any project of this type, one of the challenges faced in capacity building is the sustainability of the efforts once the project is finished. To get an idea of the residual effect of the SUMS project, in the spring of 2005, 806 surveys were sent out to teachers who had taken 100 or more hours of SUMS professional development, and to 33 teachers who had been SUMS Instructors. Ten SUMS Instructors and 216 teachers responded to the survey, providing a relatively large teacher sample. Although the teacher response rate was not as high as would be desired, the necessity of administering the survey just before spring break probably meant that not all teachers received it in time to meet the return deadline. The following questions and responses are that part of the survey related to residual effects of SUMS.

To what extent are SUMS features such as the SUMS Professional Library and Librarians, Math Field Day Competition and SUMS Instructors still contributing to supporting mathematics education in the Santa Ana schools?

The survey probed the teachers to determine to what extent each of the SUMS components was still supporting mathematics instruction in the schools. Teachers responded on a scale of 1=great extent to 5=not at all/no longer in place. The SUMS Professional Library, a collection of math related books for both teachers and students was identified as the most long-lasting of the formal structures instituted by SUMS, with around 70% of both teachers and SUMS instructors indicating that it was still supporting math instruction at their school either somewhat or to a great extent. The SUMS librarians, however, were generally no longer available.

One principal reported in an interview that the SUMS Professional library still existed as an intact entity at their school. Two others noted that the library was maintained as a coherent set of teacher references within the school's main library. According to the former District Math Coordinator, of the 38 elementary schools in Santa Ana, around half kept the SUMS Professional Library intact, available, and widely advertised. The fate of the Library at the other schools was variable. In some of them, the SUMS Librarian kept all of the books for personal use. Some of these teachers have left Santa Ana, while others still lend out the books. Some schools put the SUMS books into their general library and teacher resource libraries, so teachers new to Santa Ana may be using the SUMS library books without knowing it. The schools that kept the SUMS Professional library intact do an excellent of letting new teachers know of the existence and the books are used on a regular basis.

The Math Field Day is still offered as an all day, district-wide mini-conference in mathematics for grades 4 and 8, but only 40% of teachers responding to the survey indicated that such an event was still supporting math instruction at their school. This might reflect primary teachers lack of involvement in the event.

What are the lasting impacts of SUMS?

Impact on the schools

All three principals, former members of the SUMS Advisory Board, believed that there was a positive residue from SUMS in their schools. One said that he saw the SUMS approaches being used in “teacher presentation modes...SUMS training showed how to make math interesting.” Another noted that most of her teachers have had training in SUMS strategies, and that “they are still using them to teach the ‘basic’ standards,” although she did not see much use of SUMS materials. She insisted that “math is not ignored. [We] still have to test on it [and] go through the curriculum.” But, she admitted that the “big conversations about math are not there. They are on language arts.”

Impact on teachers as professionals

Teachers were asked to rate some tangible factors (e.g. math instructional strategies and math activities learned from SUMS), as well as value added to teachers as individuals (e.g. increased confidence, a feeling of being more professional as a math teacher). By these measures, SUMS has had substantial lasting impact on those teachers who participated fully in it. Most encouragingly, 93% of the teachers indicated in the survey that they were more confident teaching mathematics and 86% felt more professional as math teachers because of their SUMS training. Moreover, 37% of the teachers responding agreed with the statement “I have assumed the role as a leader of math instruction in my school.” These findings support the conclusions of the final evaluation report; SUMS has increased the capacity for exemplary math instruction among those teachers who participated fully in the professional development it offered. (See Figure 1.)

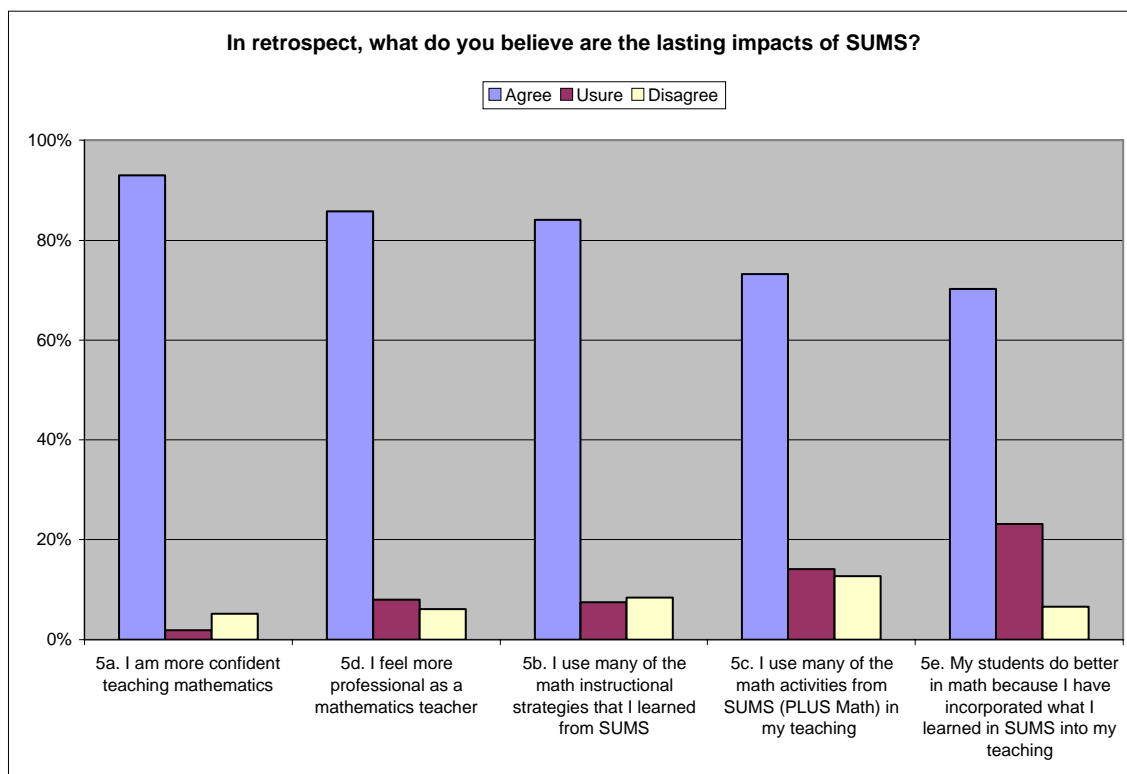


Figure 1. Perceived lasting impacts of SUMS (N=212±)

Impact on mathematics teaching practice

Overall, teachers believe that SUMS has also had a positive impact on how mathematics is taught in the classroom. The overwhelming majority of the teachers responding (84%) to the survey indicated that they use many of the instructional strategies learned from SUMS and 74% use many of the specific activities. (See Figure 1.) Forty-one teachers added insights in their open-ended responses in the survey, as well as in their comments to the Likert scale items. These were coded and tabulated by category. Seventeen of these responses specifically mentioned SUMS approaches, activities (lesson plans), and strategies as having a lasting impact on their mathematics instruction. Examples of their comments include the following.

Many teachers at our site were SUMS trained and we continue to use SUMS strategies.

I still use the SUMS units & books whenever possible. And I try to send some activities home translated for families to do. But not all teachers use the library & SUMS units, we have new people since SUMS- I don't think they have any idea the items are in our library.

I have several of the SUMS related literature books in my personal library. Many of the SUMS units are also in my personal inventory. I still use many of the activities I learned.

Three teachers (two of them former SUMS Instructors) indicated that they felt being available as on-site consultants was a lasting impact of SUMS.

Broader impacts of SUMS on teachers

Sixty-five teachers and one SUMS Instructor provided final comments on the survey that shed additional light on the program’s impact. About a third wrote that SUMS had been valuable to them as teachers of mathematics and to their students who are learning math.

SUMS was a positive long-term change in math instruction. Many teachers still share with me an activity or idea they learned in SUMS (SUMS Instructor)

The concrete ways to teach abstract concepts were most helpful to me and my students.

It was an invaluable asset to my program. I am a better and more confident math teacher...

SUMS made a huge impact in teaching mathematics to my students!

Another third of the teachers commented on how much they had enjoyed being part of SUMS Professional development.

I really enjoyed the quality of instruction and felt very motivated to implement the lessons right away.

I loved SUMS and truly believed in it. I'm trying my best to continue using it in spite of circumstances.

It was rewarding to attend the SUMS Program at Valley High School.

How is expertise in math instruction gained by teachers shared with peers?

The survey specifically targeted teachers who had accumulated over 100 hours of SUMS training or who had been SUMS Instructors. Thus it was reasonable to expect that they might assume more leadership roles in mathematics, at least in their schools. To pursue this hypothesis, teachers were asked in the survey to answer the question, “In what ways do you share your expertise in math instruction with your peers at your school or in the district (for example, meet regularly to discuss math teaching, share math teaching strategies or specific math activities, etc.)?” Nearly 70% shared either at grade level meetings or informally with other teachers, another indication that they are helping to increase capacity within their schools. An additional 12% shared as math leaders in their school. Their responses are categorized in Table 2.

Number of teachers responding	Method of sharing
33	In grade level groups
23	Informally with other teachers
10	As a math leader
17	Do not share

Table 2. Teachers’ reflections on how they share their math expertise

Following are some sample quotes.

During grade level or staff meetings, the SUMS lessons are still discussed and our SUMS trainer is always available to help us.

In normal conversation or grade level meetings we discuss math strategies & activities. Other teachers come to me to ask for help with activities & strategies to enhance SAXON.

I share my resource books, math literature and sub units with colleagues. I also share instructional strategies.

Most teachers are set in their ways, but any time they come to me I teach them the ways I learned to teach 3-4th grade concepts – at a concrete level.

At staff meetings for staff development, sharing of ideas & how important the language of math is to all students. (SUMS Instructor)

In summary, the evaluation study revealed that SUMS has had the following major positive impacts in SAUSD.

- **Capacity built within those teachers who fully participated in SUMS remains its strongest legacy.** The most lasting impact of SUMS is the professional growth of the participating teachers. Teachers became involved in SUMS to learn new instructional strategies for teaching math to their students, to obtain more math activities to use in the classroom, and to raise the level of math achievement among students in the district. Most encouragingly, the overwhelming majority of the teachers responding to the survey indicated that they were more confident teaching math and that they felt more professional as math teachers because of their SUMS training. Furthermore, around a third of SUMS Instructors and teachers felt they had assumed the role of leaders in their schools. The project PI also points to changes in some of the principals that was brought out by SUMS, as well as the leadership roles that a group of former SUMS Site Support Providers and SUMS Instructors have taken in mathematics within the district. These findings support the conclusions of the final evaluation report; SUMS has increased the capacity for exemplary math instruction among those teachers who participated fully in the professional development it offered.
- **Some elements from SUMS are still supporting math instruction.** The SUMS Professional Library, a set of literature books and excellent references on math instruction provided to teach school remains viable in many school sites (although a dedicated SUMS librarian does not). These books provide continuous sources of materials and ideas for those teachers who take the initiative to seek them out and use them. The Math Field Day competition is also still extant, although it does not impact the primary grades.
- **SUMS materials and strategies are also still being used, albeit with difficulty by some teachers, and are still being shared.** The overwhelming majority of the teachers responding to the survey indicated that they use many of the instructional strategies learned from SUMS, and they use many of the specific SUMS activities. These findings are bolstered by comments from the principals interviewed. In addition, some teachers report that they share the expertise they have gained through SUMS with their colleagues, especially in course alike-meetings. This word-of-mouth transmission, while not ideal, can help to develop a community of practice that ultimately can have an impact wider than a single classroom.

5. WHAT THE LSC COULD HAVE DONE DIFFERENTLY?

There are few things we could have been done differently because, all-and-all, the coordinators and supporting professionals were committed to the success of SUMS and worked very hard to develop and deliver an exemplary professional development program. Careful planning and thought went into developing capacity in teachers and principals. There were some events that took place in the state that were beyond the control of the grant, and we dealt with them in the best way possible. We listened to the feedback provided by our outside evaluator and made midcourse adjustments regularly as needed. The three project coordinators tried to keep a distance between their responsibilities of preparing the professional development and the district's elementary and middle school mathematics curriculum responsibilities. They were concerned about being overworked. In retrospect, this caused some communication and support problems during the project. In doing things differently, I believe we would have controlled that situation better, hiring additional consultants if necessary to keep the project more closely aligned with the district's specific curriculum needs and having more influence on the district program.

Yet, even the district curriculum coordinator was having problems controlling the mathematics curriculum because of site-based management introduced by the new superintendent (who came aboard just as the grant was beginning but who was obviously not involved with the writing of the grant proposal). Many principals began experimenting with more traditional curriculums that were not part of the adopted mathematics program. In response to some of this variability, we once again stressed the importance of standards-based teaching that was not tied to a particular curriculum.