

Regional STEM Mentoring Program

NorCal STEM Education Foundation: Report for 2014 - 2015

THE PROGRAM

The Regional STEM Mentoring (RSM) Program provides an organized, professional, and safe process that matches STEM professionals as trained mentors with school and community programs to mentor students in teams of 10-25, ranging from grades 5 to 11. The program and curriculum are extremely flexible in order to attract maximum participation from teachers, students and volunteers.

The program was installed within two different school districts, at 5 schools sites during its pilot year that focused on Sacramento County, CA. Three of the school sites are categorized as low to moderate income schools by the Sacramento County Office of Education (SCOE). The Pilot served over 250 students with fifteen (15) volunteer mentors participating. The volunteer mentors came to the program from Intel, the California Association of Professional Scientists (CAPS), the Professional Engineers in California Government (PECG), and UC Davis. The programs ran from August 2014 to April 2015.

THE PURPOSE

The Regional STEM Mentoring Program's overall purpose is to build a stronger, more prepared and diverse STEM workforce. Important objectives of the RSM Program were to help students develop collaboration skills with peers and adults, and inspire students to pursue STEM degrees and careers. The RSM Program aimed to accomplish this by supplementing STEM curriculum, using trained STEM professional mentors to guide teams of students and for those students to participate in a culminating rewarding event, such as a STEM fair or other showcase event.

PHASE 1: THE INSTALLATION

The Program was installed at each site in phases. The first phase focused on administration and teacher buy-in. Sites were contacted based on long-time participation in the Synopsys Sacramento Regional STEM Fair. All sites that expressed ability and willingness to adopt the Program for its pilot year were selected. Once the schools were introduced to the Program by staff, they were given pre-evaluation surveys to determine what the teachers foresaw as the problems with their student's not gaining interest in STEM.

When entering the initial phases of the RSM Program, many participants related that there is a limited exposure to experimentation in both the student and the teacher realms in school. The students are not in an experimentation setting often enough for them to grasp the scientific and engineering design methods as anything more than instructional steps, forgotten after testing. Through the unfamiliarity with experimentation and variables, students have an insecurity, or fear, of receiving the result

PROGRAM OVERVIEW

Schools:	Cordova High Folsom High WE Mitchell Middle Sutter Middle Heron Elementary
Number of students:	approx. 250
Total Mentoring Hours:	25-42, dependent upon site
Interest in STEM & Program:	Increase of 42%
Gender Split:	49% Male 51% Female
Asian/Pacific Islander	18%
African American	14%
Latino	26%
Caucasian	28%
Native American	8%
Other	6%
Students in program from Free/Reduced lunch:	41%



The program showed me ways that science can be applied to the real world.

- GABRIELLE, GRADE 9

of an incorrect hypothesis. The students do not connect incorrect hypotheses with learning; rather they connect it to failing. Finally, the students need a role model that can relate to their generation, interests, or even gender. Many students still retain the idea that STEM professionals are either secluded in a lab all day, or are the embodiment of the stereotypical depiction from the media.



PHASE 2: THE PROGRESS

To address the first problem related by the participants, the Program introduced students to the scientific method and engineering design process through multiple and frequent hands-on activities and inquiry-fueled learning. The students were guided through multiple experiments and applied explanatory methods in retrospect. In this way, the students could apply learning to an accomplishment, rather than an unknown. By promoting a tangible experiment to the methods, students are able to develop confidence in their ability to produce viable STEM hypotheses. Mentors placed emphasis on the idea that proving one's own hypothesis as incorrect was not a "wrong" answer or a failure, rather it led to further experimentation and research – a piece which the students were readily acceptant of.



This Program has made our club so much more exciting and educational.

- MS. FILIPPI, FOLSOM HIGH

The Program also exposed students to different professions in STEM through the story of how and why the STEM professionals found their pathway to their current career. The mentors who participated all had very different experiences and plans for their lives that may or may not have been realized thus far. Students were engaged by mentor's illustrations of their failures and successes when it involved their own career pathway. In the Program evaluation, students expressed stress for not knowing which career to pursue. Out of 15 mentors, 7 were female, selected to inform young girls that STEM is not just for men. With positive professional female role models, studies show that young girls are driven to accomplish high education and career goals.

Finally, teachers were partnered with mentors determined by requested area of STEM expertise. The teachers were ecstatic to receive STEM professionals as volunteers in their classrooms and after school programs. By allowing the participating teacher to choose the area of the STEM profession, the result was that the mentor was that much more beneficial. By forming a working partnership with the STEM professional, the teachers are more likely to participate and use the methods learned from the Program in the classroom.

Reportedly, teachers struggle to manage and balance each student's progress through the scientific method if they cannot be at each student's side. Through the RSM Program, students were grouped to experiment collaboratively and assigned different responsibilities. For example, recording data is a very important aspect of experimentation, and each student in one group would have a chance to experience and reflect on the experimentation process. With the help of the mentors in the classes and the teachers were able to manage the smooth production of all the experiments. By producing a manageable format to engage students in experimentation and the scientific and engineering design method, the Program allowed teachers to learn how to do so in their own classrooms. Finally, professional development for each participating teacher was held to show curriculum that was produced to implement STEM projects as an integrated curriculum, thus satisfying

the NGS Standards to be implemented in 2016.

PHASE 3: THE RESULTS

Through the Regional STEM Mentoring Program, key educational issues were addressed and participants were impacted positively. The key learnings of the participants within the program are multifaceted. The students developed a self-confidence and interest not only in STEM subject areas but also in their own learning and their power to drive it forward into STEM areas. The teachers were trained in curriculum development and team building concepts – releasing the traditional idea of the teacher as a single answer-producer, and allowing students to become involved in inquiry-based learning. The mentors were successful in assisting the students and teachers – a very rewarding task. And finally, the Program successfully impacted a large number of students, teachers and professionals. The program successfully promoted a culture of integrating hands-on STEM into the classroom; the participating schools have adopted the program's system.

Through the RSM Program's plan of hands-on, inquiry-based learning, students were able to apply STEM to everyday life and participate in real-world problem solving. The participant's young minds are now more open to pursuing majors that result in STEM careers, which in turn boosts the STEM workforce with passionate, enthusiastic new personnel.

IMPACT

Self-confidence & Self-efficacy	Positive Peer Relationships
Interest in STEM & school	Meaningful Participation
Empathy & Social Skills	Exposure to real-world issues
Positive Adult Relationships	Positive Role Models, gender
Curriculum Development	Standards Incorporated



The fun experiments were awesome.

- RYAN, GRADE 11

The RSM Program provides quality opportunities and experiences to all students, particularly those in statistically underserved communities in STEM – mainly minorities and women, especially in low socioeconomic areas. Exposure to STEM opportunities will promote interest in areas the students may never have considered without participation in the RSM Program. Combined with their participation in the STEM fair, student interest and participation in the Program will increase the pursuit of STEM-related higher education studies, eventually leading to a stronger, more diverse STEM workforce.

THE FUTURE

Though the pilot program ended in April 2015, many mentors of the participating sites are willing to work with the Foundation to creatively host the RSM Program for a second year. All mentors are returning, except for two who have moved on to other careers in different areas of the United States.

The Foundation will continue to apply for grants and seek funding sources for the Program. The Foundation will also partner with other programs throughout the summer and upcoming school year to host the mentoring program within already established and funded programs.

Finally, the Foundation will seek out partnerships that will benefit the organizations mutually to include aspects such as free/reduced lunch programs, more diverse students and low income area students.