



STEP Partnership of San Diego (SPSD) - Second Year

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Abstract

The Mathematics, Engineering, and Science Achievement (MESA) Program assists educationally disadvantaged students to graduate from four-year institutions with a math-based major. MESA focuses on student groups who historically have had low levels of attainment.

The National Science Foundation (NSF)-supported STEP Partnership of San Diego (SPSD) incorporates the successful MESA model at each partner campus (San Diego State University, San Diego City College, and Southwestern College); enhancing essential services (e.g. academic support, STEM competitions, leadership development, etc.) that help students excel academically and prepare for the STEM workforce. Together, MESA and SPSP create a partnership of educational, industry, and government organizations forming a pipeline from community college to university to STEM industry. The goals of SPSP are to: increase the number of students who pursue STEM academic and career pathways, increase retention in STEM disciplines, and promote opportunities in STEM post-graduate studies.

Challenges: 1) Our online database has taken much longer to implement than anticipated by our outside evaluators due to turnover, 2) Building industry alliances in the science fields, and 3) Difficulty getting partner companies to pay for interns given the current state of the economy. California companies find it difficult to hire interns at all without the support of this NSF grant. While our students are supported now through NSF, it is challenging to get the companies to guarantee future support, potentially hindering our ability to sustain the internship component.

Successes: 1) Even in difficult economic times, we've exceeded the number of projected internships our first summer and are likely to repeat this summer, 2) Enrollment at each partner campus has increased by 10% or more each academic year (2007-2008 and 2008-2009), 3) This summer we'll offer research opportunities in addition to industry internships, and 4) Students are satisfied with the activities offered by SPSP, as evidenced by evaluation results.

Goals

- Increase the number of students
 - In STEM academic and career pathways
 - Graduating with B.S. degrees in STEM fields
 - Participating in STEM industry internships/research
- Increase retention of students in STEM disciplines
- Promote opportunities in STEM post-graduate studies

Demographics

Ethnicity

Program • Gender • Major

| Students | City | SDSU | SWC | Total | Percent |
|------------------------------|------------|------------|------------|------------|---------------|
| MESA | 131 | 194 | 109 | 434 | 81.1% |
| NSF - Year 1* | 15* | 18* | 22* | 57* | |
| NSF - Year 2 | 44 | 46 | 11 | 101 | 18.9% |
| Total Students Served | 175 | 240 | 120 | 535 | 100.0% |
| Gender | | | | | |
| Male | 110 | 177 | 76 | 363 | 67.8% |
| Female | 65 | 63 | 44 | 172 | 32.2% |
| Total Students Served | 175 | 240 | 120 | 535 | 100.0% |
| Student Majors | | | | | |
| Science | | | | | 20.8% |
| Biology | 25 | 0 | 24 | 49 | 9.1% |
| Chemistry | 5 | 12 | 6 | 23 | 4.3% |
| Nursing | 8 | 0 | 2 | 10 | 1.9% |
| Pharmacy | 3 | 0 | 0 | 3 | 0.6% |
| Physics | 4 | 1 | 4 | 9 | 1.7% |
| Pre-Med | 6 | 0 | 2 | 8 | 1.5% |
| Other Science | 4 | 0 | 5 | 9 | 1.7% |
| Technology | | | | | 0.4% |
| Engineering Technology | 1 | 0 | 1 | 2 | 0.4% |
| Engineering | | | | | 68.6% |
| Aerospace Engineering | 7 | 23 | 1 | 31 | 5.8% |
| Architectural Engineering | 5 | 0 | 7 | 12 | 2.2% |
| Bio Engineering | 7 | 3 | 4 | 14 | 2.6% |
| Bio-Chem Engineering | 5 | 0 | 5 | 10 | 1.9% |
| Chemical Engineering | 1 | 0 | 0 | 1 | 0.2% |
| Civil Engineering | 15 | 53 | 7 | 75 | 14.0% |
| Computer Engineering | 7 | 29 | 5 | 41 | 7.7% |
| Construction Engineering | 1 | 7 | 0 | 8 | 1.5% |
| Electrical Engineering | 21 | 36 | 9 | 66 | 12.3% |
| Environmental Engineering | 3 | 5 | 3 | 11 | 2.1% |
| Mechanical Engineering | 12 | 49 | 7 | 68 | 12.7% |
| Structural Engineering | 5 | 0 | 0 | 5 | 0.9% |
| Other Engineering | 10 | 0 | 15 | 25 | 4.7% |
| Math/CS | | | | | 10.3% |
| Computer Science | 7 | 11 | 10 | 28 | 5.2% |
| Mathematics | 13 | 11 | 3 | 27 | 5.1% |
| Total Students Served | 175 | 240 | 120 | 535 | 100.0% |

* Students accepted under the NSF STEP grant in the first year have graduated or are included in second year (NSF-2) totals.

Approximately 200 students have taken advantage of private tutoring and group Academic Excellence Workshops (AEWs) offered at each campus through the support of the National Science Foundation STEP grant.

Strategies

- A regional STEM pipeline of educational institutions that supports multiple pathways to STEM careers.
- Educational experiences and activities based on industry driven standards for comprehensive student development – academic, personal, and professional.
- The use of best practices in STEM education.
- An active pool of industry partners with shared accountability for success.
- Evaluation of SPSP effectiveness.

Implementation Progress

SPSD builds on MESA best practices:

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|--|
| MESA Supported Programs |
| Individual Academic Plans |
| STEM Course Clustering |
| Academic Excellence Workshops (AEW) |
| Tutoring |
| College and Career Exploration |
| Transfer Assistance to Four-year Universities (2-year colleges only) |
| Assistance Applying to Graduate Schools (4-year universities only) |
| College Orientation Course |
| Scholarships |
| Collaboration with Student/Professional Organizations |
| SPSD Enrichment and Leadership Development Activities |
| StrengthsQuest |
| Summer Team Internship Program |
| Scholarships |
| Training Academies for Industry Skills |
| Professional Development |
| STEM Competitions |
| San Diego Region Joint Planning Conference |
| Faculty Advisors |

The SPSP collaborative establishes out of classroom professional development activities that focus on team building skills and facilitates group interaction, both of which are vital in the STEM fields.

Leadership Summit
February 13 – 15, 2008

Participation: 33 Students; 10 Staff; 2 Companies

Student leaders and emerging leaders from all participating programs came together for leadership development activities and networking opportunities.

Evaluations Results: Students rated the agenda, activities and presentations, team competitions, and their overall experience 3.5 or higher on a 4.0 scale.

The most frequent responses to students' favorite activity were the Engineering Design and Team Building Challenges.



Shadow Day November 20, 2008

Participation: 100 Students; 12 Companies
Exposed program students to professional environment by allowing them to shadow an engineer at his/her workplace for the day.

Evaluations Results: Shadow Day was characterized as a positive experience for 96% of student attendees. 83% of students reported that they were more interested in the career area they shadowed than before the event. 93% of students felt that this experience helped prepare them for an internship or future employment.

Joint Planning Conference August 22, 2008

Participation: 35 Students; 2 Companies
Together professional and student leaders from diversity focused engineering and science organizations in the San Diego region shared expectations, goals, calendars, and strategies for the upcoming year.

Evaluations Results: Students felt this event provided opportunities for networking, enhanced leadership skills, and good information. 86% of students responded with positive feedback when asked if they would recommend this event to others.

Successes

MESA and SPSP program students interned at 17 science and engineering companies in Summer 2008. 37 students were able to participate in paid team internships. One third of students were invited to continue at their host company after the completion of the internship program.

Internship program goals were met during this first year. Even through difficult economic times, the number of internships provided exceeded expectations for the first year.



"I would rate my overall experience here as excellent! I was able to accomplish my projects and learn a lot while doing so. I am glad I got to be the first intern here at this office because instead of getting an intern treatment, I felt like I was treated like a fellow colleague. This made the experience less like an internship and more like a real career."

-Rolando Herrera, Fleet Readiness Center, Southwest Intern 2008

Summer 2008 Internships

| |
|---|
| Caltrans* |
| Fleet Readiness Center Southwest* |
| General Atomic Electronic Systems, Inc* |
| Infrastructure Engineering Corporation* |
| Howard Hughes Program |
| National Oceanic and Atmospheric Administration |
| Northrop Grumman Corporation* |
| REU, University of Minnesota |
| Rick Engineering Company* |
| San Diego Water Department |
| San Diego Coastkeeper* |
| San Diego Zoo |
| Shiley Center for Orthopaedic Research & Education at Scripps Clinic* |
| Sempra Energy |
| SMDEP, University of Washington |
| SPAWAR Systems Center San Diego* |
| UCSD Laboratory of Sleep and Chronobiology* |

* Internship Opportunities from Summer 2008 that will continue into Summer 2009.



Summer Team Internship Program

Participation: 37 Students; 17 Science and Engineering Companies

Teams consisted of 2-3 students. There were 17 teams. Students were required to complete a minimum of 100 internship hours, meet weekly, collaborate on a poster presentation, and present their internship experience to industry and academic guest at a summer luncheon.

2008 Summer Team Internship Partners



Summer Team Internship opportunities are expected to increase by 50% in Summer 2009, based on current interest of students and companies. Encouraged by the NSF Internal Advisory Committees, SPSP recruited faculty doing research and biotechnology companies in 2008. As a result, students will be able to take advantage of 3 new research opportunities and 4 new biotechnology opportunities. Additionally, almost 60% of companies that provided internships in 2008 committed to provide internships again in 2009.

Summer 2009 Internships

| | |
|---|---|
| Assure Controls (Member of BIOCOM) | Naviscan** |
| BAE** | Northrop Grumman* |
| Barney & Barney LLC (Member of BIOCOM - recruiting Math Majors) | Raytheon |
| Biosite** | Rick Engineering Company* |
| California Healthcare Institute | San Diego Coastkeeper* |
| Caltrans* | Shiley Center for Orthopaedic Research and Education at Scripps Clinic* |
| City of LA Bureau of Sanitation, Wastewater Engineering Services (Located in Los Angeles) | Southern California Biotechnology Center (Member of BIOCOM)** |
| Fleet Readiness Center Southwest* | SPAWAR Systems Center San Diego * |
| General Atomic – Electronic Systems Inc* | UCSD Laboratory of Sleep and Chronobiology* |
| Infrastructure Engineering Corporation* | Faculty Research Project: Professor Misael Camarena, City College** |
| Kennedy/Jenks Consultants | Faculty Research Project: Dr. Gordon Lee, SDSU** |
| Kyocera America Inc. | Faculty Research Project: Dr. Peter Salamon, SDSU** |
| Malcolm Pirnie | |

* Companies that provided internship opportunities in 2008.
 ** Faculty Research Projects and Biotechnology Internships

Challenges

- Matching the needs of the SPSP grant with those of industry for summer team internships.
- Meeting industry needs for internships that are longer than 100 hours.
- Establishing new relationships with employers in life and physical sciences to better support science majors.
- Providing research opportunities with faculty members at different institutions.
- Implementing an online activity and reporting system for tracking and evaluation purposes.