“Realizing the Dream” at Oxnard College

The Title V HSI CCRAA STEM Grant has been instrumental in strengthening Oxnard College by addressing key challenges and opportunities for improvement through a focused effort to build institutional relationships, create sustainable programs, enhance integration with collaborative partners while increasing student outreach efforts, designing programs to remove institutional barriers, creating additional STEM curriculum degrees and certificates, enhancing enrollment and increasing retention & transfer opportunities for students. The majority of the students at Oxnard College are Hispanic and the grant activities have greatly impacted their lives and opened multiple pathways. All projects established under this grant have been institutionalized and integrated into on-going campus activities.

Oxnard College has successfully completed all of its objectives as stated in the proposal submitted in 2008. The grants’ implementation team was comprised of Faculty, Staff, Administrators, University Partners and Students who worked endless hours on the grant activities and tasks; resulting in tremendous STEM program advancements and enhancements. The following chart displays some of the highlights and opportunities made possible via the HSI CCRAA STEM Grant.

### Major Accomplishments

<table>
<thead>
<tr>
<th>OC-CSUCI Summer Bridge Program Included Classroom and Research.</th>
<th>Summer Bridge Program Hueneme High School: The Pre-engineering And Engineering Institutes.</th>
<th>OC- CSUCI Roadblock Summits with Faculty, Counselors, Advisors, Administrators, Students.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC–UCSB High School Student MESA Programs and Parent Workshops in all OUHSD Schools.</td>
<td>Environmental Studies Program – New Curriculum and Pathways Brochure Created.</td>
<td>Supplemental Instruction and Tutoring for STEM Students.</td>
</tr>
<tr>
<td>New STEM Curriculum Developed Chemistry and Physics.</td>
<td>Creation of a Faculty Resource Center.</td>
<td>Creation of a STEM Learning Center.</td>
</tr>
<tr>
<td>Student Services Institution-wide Projects.</td>
<td>Technology &amp; Equipment Purchases SMART Classrooms.</td>
<td>OC-OUHSD Youth Conference, Transfer &amp; Career Days.</td>
</tr>
<tr>
<td>Implementation of Agile Grad On-line Educational Planning Tool. 77 Group Workshops via the Instructional Technologist.</td>
<td>Diversity Workshops, Classes and Events. Enhanced Student Support and Transfer Services.</td>
<td>Implementation of eLumen software to assist with Student Learning Outcome Projects.....</td>
</tr>
</tbody>
</table>
Each of the aforementioned student activities and programs were videotaped, creating a living document of the opportunities available to current and potential Oxnard College students. The montage of videos are used as outreach tools to describe Oxnard College’s STEM program to current and potential parents, community/industry partners, students and colleagues. It is also powerful evidence of the progress made in completing our objectives.

Final Reporting Answer to Question #1: “Utilizing your evaluation results, draw conclusions about the success of the project and its impact. Describe any unanticipated outcomes or benefits from your project and any barriers that you may have encountered?”

Grant Achievement Highlights

Summary of the Oxnard College Campus-wide HSI CCRAA Grant Achievements Integrating & Promoting Sustainability of STEM Programs and Projects

• Created Websites that allows students to exchange ideas, review calendars of events, ask questions and learn about new educational opportunities. Students can also complete an on-line STEM application which assists the college in tracking the students’ progress, includes them in all mailings and notifies them of upcoming STEM events as well as keeps everyone connected into the loop of communication. This prototype can be replicated campus wide for each discipline or program.

• Developed and implemented a Supplemental Instruction program to enhance student success, retention and learning. Excellent student learning outcomes have been noted. Student and Faculty materials and manuals were created to reduce the intensity of the workload associated with tracking and monitoring the SI sessions in the future. These manuals assist in not having to “re-create the wheel” of activities for future SI sessions and class assignments for courses that have been included in this grant. It also establishes a system to integrate the SI prototype, college-wide basis.

• The campus-wide SMART classroom project is allowing students to have access to the State-of-the-Art Technologies to assist and promote learning. It allows Faculty to utilize differing teaching modalities to increase student learning and class interest. Thirty-three (33) classrooms and four meeting areas were identified utilizing STEM funding. An additional forty-two (42) classrooms were upgraded utilizing other college funding.

• Initiated the implementation of the Agile Grad software which is an on-line educational planning tool that can be easily accessed through the internet.

• Initiation of the creation of a Distance Learning Training Module, T4T and Educational tools along with Student Self-Assessment tools via the STEM grant instructional technologist. This format will be replicated and utilized campus-wide.

• Creation of the Faculty Resource Center to assist in the professional development and best practices exchange as well as access to an instructional technologist for STEM and other faculty.

• Purchasing of equipment and software to be used in the Faculty Resource Center as well as the STEM Center to advance teaching methods and interventions with students.

• Creation of the STEM Center to assist Oxnard College students. Students have access to supplemental instruction, tutoring, mentors and advisors. It is equipped with state-of-the-art SMART technology.

• Creating stronger working relationships with the community to increase public – private partnerships and future sharing of resources.
Partnership Activities with CSU Channel Islands

CSU Channel Islands (CI) engaged in the following activities:

- Outreach Coordinators placed at Oxnard College (OC)
- Spotlight on STEM events
- CI STEM Tutors Placed at OC
- HSI-STEM Diversity Series
- STEM career pathway workshops
- 2009 to 2011 Summer Institutes
- Evaluation of Summer Institutes
- STEM Articulation Summit and Wrap-Up Meetings
- Development of a STEM Brochure to communicate articulation of STEM majors
- Grant Reporting and Future Planning

As in the previous two years, the primary objective of the CCRAA HSI-STEM in 2010-2011 was facilitating the transfer of OC STEM students to CI. Direct learning support, outreach, research opportunities and alignment of institutional curriculum were all directed toward this effort. The STEM tutoring program developed during the first two years of the grant was continued in the final year of the grant. Well-trained, highly-skilled CI undergraduate/graduate students from CI STEM majors were placed as tutors in the OC STEM Center. The tutors provided a much requested and very successful service. On-site Outreach Coordinators, CI faculty presentations of majors, personal appointments with the Director of Admissions and Recruitment and our Spring Diversity Forum were each designed to prepare and motivate OC STEM students to continue in their pursuit of higher education.

Progress on articulation of courses continued, facilitating the transfer of OC students. The CI HSI-STEM Faculty Advisor program was not continued in the final year of the grant but, instead, a Spotlight on STEM night showcasing STEM majors at CI was offered to OC students.

CSU Channel Islands Outreach Specialists at Oxnard College

Since October 2009, the CI HSI-STEM staff have partnered with CI’s Admissions and Recruitment Office to place students at Oxnard College as Outreach Specialists. Several CI students have served in this capacity and were trained by CI’s Admissions Office to provide comprehensive information on each of the CI STEM majors. A total of 652 students received 1:1 with the outreach specialists. In Fall 2010, Jonathan Morata, a participant in the 2009 Summer Institute and a 2010 transfer student to CI as a Biology major, to serve as the Outreach Specialist for Fall 2010 and the entire third year of the HSI-STEM grant. As a former Oxnard College student, Jonathan was an extremely effective Outreach Specialist and was able to be an excellent role model for current OC students with ambitions to transfer to the CSU or UC educational systems.

Spotlight on STEM

In partnership with CI’s Admissions and Recruitment office, CI HSI-STEM offered Spotlight on STEM events where CI faculty engaged OC students in presentations and discussions of their current research. Faculty also provided an overview of the STEM majors available at CI and their requirements. Staff members from CI Admissions and Recruitment office were on site as well to provide individual transcript/transfer reviews for OC students wishing to learn more about the University and the requirements for transfer, and to help students in initiating an application to CI through the CSU Mentor website. Based on the feedback surveys, ninety-seven percent of the students that were in attendance over the three year period of this grant, felt that these types of events greatly expanded their STEM career opportunity-awareness.
**STEM Tutors**

An exceptional team of CI tutors assisted OC students in mastering coursework throughout the 2009-2010–2011 academic years, including summer sessions. Well-qualified tutors were identified and recommended by CI faculty. Five CI students tutored at OC more than 70 hours weekly throughout the academic year. Evening hours were available for OC students unable to attend during the day and two tutors were available to assist students enrolled in the summer session. Excellent training was provided for the tutors by the Oxnard College Learning Center Director and they were carefully supervised by the CI Grant Analyst.

![Average Course Grades](chart.png)

**Diversity Presentations**

Nationally prominent Dr. Alejandro Briseno, Professor of Polymer Science and Engineering at the University of Massachusetts, Amherst, joined CI and OC students, faculty and staff in a series of scientific presentations and motivational discussions. The CI Louis Stokes Alliance for Minority Participation co-sponsored presentations on the CI campus. Dr. Briseno told audiences his remarkable story of the journey that led him to a career in science. He explained that following a personal tragedy experienced as a young boy he sought a better direction for his life than his present circumstances. He determined he would find a place for himself in higher education. While enrolled at CSULA, teachers who recognized his emerging potential closely mentored and trained him to conduct research. They provided him the inspiration and confidence to seek a career as a scientist. He completed his B.S. at CSULA and was awarded a fellowship for well over $100,000 to continue to graduate studies in Chemistry. He completed two Master’s degrees (CSULA & UCLA) and his doctorate (University of Washington). After receiving his doctorate, he performed postdoctoral study at UC Berkeley prior to his appointment at UMass, Amherst.

Dr. Briseno was on the CI and OC campus for several events. He also spoke to a fully-engaged audience of OC STEM students in a session entitled “Si, Se, Puede: An Underrepresented Scientist Speaks About Science,” to an open audience on the CI campus on the topic, “The Future of Power and Energy through Nanotechnology”. He related well to the audiences, sharing his moving personal story and leading a practical discussion of his current research. The OC students were particularly pleased with his easy facility of Spanish and English as he addressed them in both languages, impressing upon them that there are no limits for those with the will and perseverance to achieve their goals. He further encouraged them with recommendations about building the foundation for study beyond community college. The sessions concluded with a discussion of the value of acquiring undergraduate research experience and recommendations for how students could identify such opportunities.
The framework for the 2009 Summer Institute was developed largely through a workshop on February 20, 2009, held with Oxnard College and CSU Channel Islands faculty and staff in attendance. Working in two groups, the participants outlined the features of a summer institute which they felt would be most beneficial for the students. Following, are the common program elements recommended based on this workshop:

- Interdisciplinary team-taught course potentially with both CSUCI and OC faculty as instructors
- Educational/research activity to the Channel Islands and to local businesses
- Half day for research and half day for class
- Physical activities
- Minimum competency in mathematics for acceptance into the program
- Small groups of students with faculty (possibly a 3:1 ratio) working on disciplinary/interdisciplinary research project
- Support for faculty and research to be conducted (supplies/stipend)

Four different models for the summer program were discussed from the standpoint of their pros and cons which included:

- Residential Academic Summer Program: Students would spend three weeks in one of the residential dormitories and take a 3 unit general education course.
- Non-Residential Academic and Summer Research Summer Program: Students would commute to campus and perform research for pay and take a 3 unit general education course.
- Semi-Residential Academic and Research Summer Program: Students would spend a portion of the three weeks (possibly one or two days/weekends) in one of the residential dormitories, take a 3 unit general education course, and perform research for pay.
- Residential Academic and Research Summer Program: Students would spend three weeks in one of the residential dormitories; perform research for pay and take a 3 unit general education course.

After examining the funding guidelines, it was decided that the program would be a non-residential academic and summer research program which would provide 3 units of credit for CSU Channel Islands' upper-division general education course, BIOL 335 Biosphere. Oxnard College students who completed this course and who transferred to CSU Channel Islands have met three of the nine units of resident upper-division general education.

Students were identified via Oxnard College faculty in STEM classes and through posters displayed on the Oxnard College campus. A total of 37 applications were received by the deadline. Student applications were reviewed by the CSU Channel Islands HSI STEM Faculty Advisory Group and by Oxnard College STEM faculty, and discussed at a meeting of these two groups. Twenty-five students were selected to participate in the summer institute utilizing funding provided by the grant (all twenty-five students accepted) and two additional students who were not US Citizens/Permanent Residents (one accepted) were also admitted using funding other than the grant. A significant number (35%) of the students were first-generation college students.

Faculty and students completed evaluations providing valuable information about how the 2009 Summer Institute was structured and how we might consider structuring the 2010 Summer Institute. Of the 26 students who participated in the 2009 Summer Institute, 18 students indicated that they would return for the 2010 Summer Institute because the other 8 of the 26 students were transferring to a University.
Dr. Harley Baker, CI Psychology Program, conducted an evaluation of the 2010 Summer Institute and the results of this assessment became available in November 2010. The assessment utilized a value-added assessment approach where a baseline set of data was collected from students before the summer institute and again at the completion of the program. In this assessment, students were asked to rate the quality of their experiences on a six-point scale related to interest, challenge, stimulation, engagement, value, and satisfaction with what and how much was learned. In addition, each of the Summer Institute program elements was also evaluated: instructional component (CHEM 343 or BIOL 334), research, Tall Ship experience, and enrichment activities. Overall, the assessment indicated that both the research and instructional components of the summer institute were viewed favorably by students and that the research, in particular, positively impacted their view of themselves as future STEM professionals. The Tall Ship experience component involved students spending an overnight on a working Tall Ship and conducting oceanographic research and, although it was not viewed as a challenging experience, many students felt that this was a life-changing experience.

Summarization of Dr. Baker’s report: “Student comments concerning the research projects and their faculty mentors make clear the meaning of these numerical ratings and the impact on students as they consider their futures as members of the scientific community. That so many students (about three-quarter) commented about their research experience is significant in and of itself. In most assessments, the vast majority of respondents do not offer comments even when solicited. Typically, comments, when offered tend to indicate that the commenter has strong feelings that s/he wants to make known. If that is the present case, it is clear that students overwhelmingly profited in a multitude of ways from this aspect of the Summer Institute. This is clear in the following comments. For example, consider the following statements students wrote about their experiences and their faculty mentors. Again, a number of crucial and important themes emerge from these comments. It is clear that students learned a great deal from these research projects in terms of content and technique. Many students directly said as much, and this is implied strongly in many comments. Perhaps of greater import, however, is that students experienced first-hand the love of scientific research both by conducting research and through the contagious energy and passion of the faculty researchers. Many students expressed a sense of satisfaction in learning new skills and seeing themselves as contributing members of the scientific community. Their enthusiasm, excitement and passion are alive in their comments, and makes visible the transformative effects that conducting scientific research has on students. Several also speak of seeing themselves as scientists, perhaps for the first time.”

Over the four weeks of the summer institute, students spent three of the week’s performing research with a faculty member and one of the week’s participating in an overnight oceanographic research experience on the tall ship, the Bill of Rights, which was coordinated by Prof. Chris Cogan and Dr. Uta Passow. Three groups of students rotated through this experience where they collected plankton and water quality data which was integrated at the end of the Summer Institute into a poster by two students working with Cogan and Passow. At the end of the Summer Institute, students presented their research as teams in a poster session which was open to the Oxnard College and CI communities. Posters were also displayed at a closing celebration that was open to the participants’ families and to the Oxnard College and CI communities.
The following is an example of one of the research posters produced by students participating in the 2010 OC-CSUCI Summer Institute.

### Quantifying Aerial Arthropod Productivity: Developing Indicators of Salt Marsh Functioning at Ormond Beach, Ventura County, California

**Background:**
California’s wetland extent has been greatly reduced over the past 200 years. Less than 9% of our historic wetland area remains. Most of our remaining marshes are degraded in one way or another due to altered hydrology, landscape fragmentation, pollution, invasive species, or overexploitation of focal species or resources. Efforts to reverse these trends by restoring wetlands have been gaining in popularity over the past three decades, but much remains to be learned. Important aspects of ecological restoration that have yet to be adequately addressed include the related concerns of rigorously defining the goal (or target) of the restoration and the performance metrics used to evaluate that restoration effort.

Aerial arthropod (“insect”) productivity (biomass produced per m² per day) is a promising indicator of the ecological functioning of marshes. Arthropods have long been recognized as key components of both terrestrial and aquatic ecosystems, but traditional approaches have emphasized taxonomic inventories. This is a difficult endeavor as qualified systematists are increasingly rare. Our proposed taxonomically independent approach (measuring aggregate productivity) doesn’t have such a limitation. Lastly, as a rate, productivity may be a better indicator of the current status of the ecological community.

**Overall Project Goals:**
- Develop indicators of ecological functioning to aid management
- Define current status (“health”) of coastal salt marsh & adjacent communities
- Provide concrete, realistic performance targets for salt marsh restoration

**Methodological Questions:**
- How do birds respond to bird exclusion cages?
- Are there any caging artifacts of bird exclusion cages?
- Is there an optimal elevation for arthropod trap deployment?

**Bird Response**
- 50 camera trap stations monitoring (across 11 transects, above) showed no evidence of birds using cages as roosts or perches from which to feed upon entangled or ambient arthropods.
- All bird images show birds avoiding cages (below)
- A single bird apparently approached an uncaged trap (Ormond Sal 9 10m trap-deployed 5/27/10)

**Cage Effects**
- Cages # systematic bias
  - P-values are based on student t-tests (right) clearly demonstrate insect affinity for surfaces
  - Strong decay of arthropod abundance & diversity as distance from soil/vegetation increases (p < 0.05, below)

**Elevation Effects**
- Productivity monitoring should focus on near-vegetation height (<15cm away)

**Trapping Recommendations:**
- 3 traps, spaced 10m apart, and elevated ~10cm above surrounding soil/vegetation adequately characterize arthropod productivity in each sub-marsh region
- Surrounding sticky traps with cheap, readily available tomato cages is a good modification in bird-rich or bird-sensitive regions

Although a summer research program was not planned for summer 2011, to support previous student evaluation findings and impact statements, funds were identified to support nine OC student researchers and three CI research mentors in a three and a half week session from May 26th to June 18th. In contrast with the previous two Summer Institutes (2009 = 25 students, 2010 = 62 students), the 2011 Summer Institute did not have a course component. At the conclusion of the 2011 summer institute, students presented their research in teams utilizing PowerPoint. The session was open to the Oxnard College and CI communities as well as participants’ families.

**STEM Articulation Roadblock Summit Meetings**

One of the most successful activities conducted during the grant was the STEM Articulation Summits. Facilitated by the Grant’s Project Director, CI and Oxnard College advisors and articulation officers participated in preliminary meetings which were designed to identify barriers to students continuing their STEM education. A number of problematic areas for articulation were identified as a result of this meeting. Additional follow-up meetings were held where CI and Oxnard College faculty were tasked with examining each of these barriers and determining whether a solution could be identified for the barrier.
In the second year of the HSI-STEM grant, the CI Project Director coordinated a series of meetings between representatives from both the CI and OC campuses that included the campus articulation officers, academic advisors and STEM faculty. An initial meeting (3/3/10) between the articulation officers and academic advisors in Spring 2010 resulted in the identification of a number of barriers to students transferring to CI, in general, and into STEM majors at CI, in particular. In a subsequent meeting (3/19/10), CI and OC faculty were tasked with examining these barriers and determining whether a resolution could be developed that would eliminate the barriers. Faculty then reported at a follow-up meeting (4/30/10) on progress that they had made toward eliminating the identified barriers. A total of six new course/ course requirement articulations were approved. One of these course articulations required that changes be made to an OC course (MST R160) that had not been completed at the time of the final meeting. In addition to these course articulations, an agreement was made between the CI and OC math programs to include statistics analysis software in an OC statistics course (MATH R105) to enable this course and CI’s MATH 202 to be articulated.

<table>
<thead>
<tr>
<th>CI Major/ Program</th>
<th>Oxnard College Course</th>
<th>CI Major Requirement Met by New Articulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Science and Resource Management</td>
<td>GEOG R101</td>
<td>Will be accepted as a substitute for CI’s GEOL 121 requirement</td>
</tr>
<tr>
<td>Environmental Science and Resource Management</td>
<td>MST R160</td>
<td>With some content changes, will be articulated with CI’s ESRM 200</td>
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<tr>
<td>Environmental Science and Resource Management</td>
<td>MATH R105</td>
<td>Will be accepted in lieu of CI’s BIOL 203</td>
</tr>
<tr>
<td>Biology</td>
<td>ANAT R101 + PHYS R101</td>
<td>This combined set of courses will be articulated with CI’s BIOL 210 + BIOL 211 requirement</td>
</tr>
<tr>
<td>Biology</td>
<td>MATH R105</td>
<td>Will be accepted in lieu of CI’s BIOL 203</td>
</tr>
</tbody>
</table>

Course Articulations Resulting from STEM Articulation Summit

On September 21, 2011 a final STEM Articulation Summit meeting was held on the OC campus to re-examine the barriers and determine whether any additional progress had been made. A PowerPoint presentation was given outlining the work that had been accomplished as well as updates needed. The MST 160 class is presently being advanced through the curriculum modification process at OC and, when the modifications have been approved, the articulation officers at OC and CI will work to complete articulation agreements to allow MST R160 to meet CI’s ESRM 200.

In a discussion with an OC statistics instructor, CI’s Project Director learned that OC had acquired SPSS statistics software but that learning how to use the software and implement it in classes was a barrier to integrating SPSS in the statistics course. Prof. Jorge Garcia, CI Mathematics Program, was hired as a special consultant using CI funding and tasked with running a 2 hour workshop with OC statistics/mathematics instructor. Training on the use of SPSS as well as model student assignments were provided to the six attendees by Dr. Garcia. With this training occurring prior to the final STEM Articulation Summit, the Chair of the Mathematics Program at CI agreed to examine the articulation of MATH R105 with CI’s MATH 202.

The potential articulation of Linear Algebra between OC and CI was also examined during the discussion portion of the summit, and a lively dialogue of this issue continued after the summit completed. No agreement to articulate OC’s MATH R134 with CI’s MATH 240 was agreed to by the CI Mathematics Program chair. Ongoing examination of the articulation of this course can, perhaps, be continued under OC’s and CI’s recently awarded HSI-STEM grants.
OC Advisors indicated that an informational brochure regarding STEM programs at CI would be extremely helpful in helping them to showcase our STEM majors with OC students. A draft brochure was distributed at the final STEM Articulation Summit and the feedback was incorporated into the final brochure. A total of 750 copies of the brochure were produced using end-of-grant funding and they will be placed in the OC STEM Center.

STEM Articulation Brochure

STEM Majors at CSU Channel Islands

STEM Major Core Requirements at CSU Channel Islands

<table>
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<tr>
<th>Oxnard College Course Number</th>
<th>CI Equivalent Course Number</th>
<th>B.S. Applied Physics</th>
<th>B.A. Biology</th>
<th>B.A. Biology</th>
<th>B.A. Chemistry</th>
<th>B.S. Chemistry</th>
<th>B.S. Computer Science</th>
<th>B.S. Computer Science</th>
<th>B.S. Environmental and Resource Management</th>
<th>B.S. Mathematics</th>
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<td>BIOL R120/R120L</td>
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✓ Required in the major.

Notes
1. Students in the B.S. in Chemistry, Biochemistry Emphasis are required to take Principles of Biology I and II.
2. Students in the B.S. in Mathematics must take either Physics with Calculus II or Principles of Biology I and II.
3. Students in the B.S. in Computer Science must take either the second semester of calculus-based physics or Principles of Biology II with their labs.
4. Students in several of the emphases in the B.A. and B.S. in Biology are required to take Organic Chemistry II and Physics I and II.

Updated 9/22/11
PARTNERSHIP WITH UNIVERSITY OF CALIFORNIA, SANTA BARBARA

The UCSB partners directly involved with this grant include the Research Experience and Education Facility (REEF) within the Marine Science Institute, the CA Nano systems Institute (CNSI), and the Mathematics, Science and Engineering Achievement (MESA) Program.

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Program Highlights

STEM Math Institute (MESA/OAP/EAOP).

Over the past three years, UCSB partners worked to support the OC STEM Math Institute hosted at Hueneme High School, which is based on the academic model developed through the UCSB Summer Algebra Academies. The UCSB Early Academic Outreach Program, which is not a formal participant in the HSI-STEM grant with Oxnard College, worked in support of this program, as did MESA and the Office of Academic Preparation. Early evaluations of the program indicated that participating high school students made some gains in Algebra Readiness as well as gained in knowledge of college preparation requirements as determined by pre- and post-tests (College Knowledge Survey).

More specifically, at the beginning and end of the STEM Math Institute, students took a 45-question Algebra Readiness Test developed by the CSU/UC Mathematics Diagnostic Testing Project (MDTP). The test is designed as a diagnostic tool to assess student readiness for the topics covered in a first course in algebra. Attrition did occur, but it is important to note that at least 70% of the students remained in the Institute. It is important to know that the students were exposed to undergraduate students, guest presentations by professionals in the community, and interactive MESA activities that undoubtedly impacted their perceptions of the Institute. Anecdotal information suggests that students created a “community” and developed relationships with one another beyond the Institute. Some students have shown an interest in extra-curricular activities that they may have not been interested in before they participated in the Institute.

The College Knowledge Survey indicates that at the end of each Institute, students gained more knowledge about college entrance requirements. Students also said that they found college presentations, online career exploration, online college information, college tours, and learning math to be very helpful. Approximately 93% of the students said they felt they were better prepared for school as a result of the Institute.

The College Readiness Seminar (CRS) Matrix consists of 16 seminars (10 are required) that range from topics such as career goals and life planning, high school a-g academic plan, and stress management. The Institute was able to implement 7 of the 10 required seminars. Preliminary results from the MDTP, College Knowledge Survey, and the CRS matrix provide information to staff about aspects of the Institute that seemed to be the most helpful and interesting to students, along with recommendations of improvement. Areas of improvement that could be addressed are student outreach, supplemental instruction to high school students by community college or undergraduate students, tutor/mentor training, teacher preparation, better tracking mechanism in place to monitor data collection, hours of math instruction, and percentage of time of director, counselor, and other key staff.

MESA Activities

Presentations to Oxnard College key personnel and the Oxnard College President’s cabinet and campus stakeholders were made by MESA staff. It should be noted that the introduction and orientations showed a sincere
welcome to new staff and a commitment to support for the HSI-STEM initiatives. Subsequent meetings took place introducing the staff to departmental staff including outreach, counseling, and prospective partners. Key campus stakeholders also visited each participating high school to meet all administrative personnel who were provided a brief overview of supportive activities and an opportunity to discuss needs assessment at each school.

Each year a professional development meeting was planned and implemented with high school math and science instructors who committed to advocating the pursuit of college and STEM studies. This event took place at Oxnard College to familiarize teachers with the college setting and offerings. MESA participated in the Oxnard College Career and Transfer Day each year. Participants included community college students as well as approximately 800 feeder high school students from Oxnard Union High School District. Information about the HSI-STEM program was conveyed as well as interest survey of Oxnard students interested in STEM studies.

Kick-off Academies and orientations have occurred at all of the OUHSD High School, annually, with teachers and students demonstrating enthusiastic interest in the MESA competitions, and consideration of attending the community college pathway or four year pathway to UC or CSU systems.

PROGRAM HIGHLIGHTS for the past year (2010-11) include:

**Partnership Development** (Key meetings and presentations to increase visibility of MESA and other STEM-related campus and community resources):

- Meetings with administrators for five local high schools (Channel Islands, Hueneme, Oxnard, Pacifica, and Rio Mesa High Schools), plus three feeder middle schools (Frank, Fremont and Haydock Intermediate Schools).
- MESA, in connection with O.C. STEM Center staff, representation on Engineering Academy Advisory Board, Hueneme High School – quarterly throughout academic years.
- Higher Education Week, MESA presence (tabling) and presentations at Oxnard Union High School District schools, partnering with UCSB’s Early Academic Outreach Program – Fall and Spring 2010-11.
- Classroom and MESA club presentations at partner high schools through Academic Year 2010-11.
- OUHSD School Board Presentation (including honoring of Pacifica High School MESA Advisor, Janice Zehner, as MESA Statewide Advisor of the Year) - 9/14/11.
- Engineering Career Connections seminar for OUHSD high school students, in collaboration with The Society for Hispanic Professional Engineers (SHPE), Ventura Chapter; Ventura College STEM and MESA Programs; and Naval Air Warfare Center Weapons Division (NAWCWD) – Fall 2010.
- MESA representation at STEM Expo at Ventura County Fair Grounds - met with students, teachers, and parents from Ventura, Oxnard, Thousand Oakes, Simi Valley, and Ojai areas and shared information about MESA, UCSB, and OC-STEM – 4/6/11.

**Direct Services**

Direct services have been delivered to high school students, families, and teachers (MESA Advisors) through the following:

- Over 20 STEM project workshops to prepare for MESA competitions – throughout the academic year.
- MESA College Day at University of Southern California, with college-preparation & STEM studies workshops, and opportunities for high school students to interact with representatives from 30 U.S. colleges & universities – including University of California campuses, California State Universities, other state college systems, and private colleges. Oxnard College STEM students participated as mentors/chaperones for attending high school students – October 2010.
• Preparation and coordination (with MESA staff and advisors) of approximately 500 students for competing in MESA Days: Science & Technology MESA Day at UCSB in March 2011, and approximately 130 students MESA Regional Finals at Cal Poly – San Luis Obispo in April 2011.
• UC Success Nights for UC-eligible graduating seniors (and families) at Hueneme High School – 4/27/11.
• Assistance with college applications and personal statements.
• Individual and group sessions on academic planning and STEM career preparation – throughout academic year.
• MESA participation in Youth Empowerment Conference, Oxnard College – 5/6/11.
• Oxnard MESA Annual Awards Banquet for MESA students and families (over 300 attendees), and advisors, staff and administrators, honoring graduating seniors and highlighting their college choices – 5/31/11.
• Direct student support to California State University, Channel Islands (CSUCI)- Hueneme High School Engineering Academy (based on Johns Hopkins “What is Engineering?” model) – summer 2011.
• Direct student and instructional support – MESA Activity Days - for Oxnard High School Algebra Academy, including campus visit to UCSB (with MESA Engineering Program student guides & panelists) – summer 2011.
• Chaperoning of the Oxnard College Summer STEMinar Class students on these field trips: Santa Paula Insectary and the Fillmore State Fish Hatchery; Anacapa Island; Los Angeles Zoo Hospital; Coastal Restoration Site – 7/7/11.
• Coordination of Oxnard College STEM EXPO for 700 Oxnard area secondary students, with collaborative support from Oxnard College, HSI-STEM Center, UCSB, Ventura College MESA, Oxnard Union High School District, and local and national industry and community programs (including Smithsonian Institution presenter and NASA program representative) – 9/20/11.

*MESA Advisors* (school-site teachers) received direct support through:
• Professional Development for MESA Advisors through MESA Academy for Science and Mathematics Educators. Two MESA Advisors presented STEM workshops for professional colleagues – 7/29-31/10 in San Ramon, California.
• Assistance to MESA Advisors and administrators to prepare & coordinate students for MESA Days: Science & Technology MESA Day at UCSB in March 2011, and MESA Regional Finals at Cal Poly – San Luis Obispo in April 2011.
• Increased availability of resources, including curriculum support, STEM supplies and materials.
• Guidance on competitions, events, and protocols.
• Increased communication, readily available responses for inquiries and concerns.
• MESA Advisor Orientation & meetings facilitated by MESA staff.

**ADDITIONAL STEM PROGRAM AND PROJECT HIGHLIGHTS**

*Dr. James Harber (far right) with some of his biotechnology students*
Oxnard College Biotechnology Workshop, Research & Internship Program

One strand of the HSI-STEM grant was concerned with the biotechnology skills of the students interested in pursuing science pathways. The biotechnology program as defined in the HSI-STEM grant includes the task of developing new curriculum for Oxnard College students in regular classes, special seminars, academies, internships and independent study experiences. Using a best practices model developed in the Ventura region and an exhaustive and broadly applicable industry defined needs survey, the biotechnology project was tasked with purchasing new equipment, preparing reagents and writing student versions of the operating instructions for the new curriculum.

The Oxnard High School student population is the largest and lowest performing academic population in Ventura County (http://projects.latimes.com/schools/). Those students proximal to Oxnard College who are college bound are likely to need supplemental enrichment experiences for reinforcing their knowledge prior to transfer into the Community College and beyond to the University. One component of the HSI-STEM grant was to provide bridge programs at two stages: from the High School to the Community College and from the Community College to the University. The program that has been developed via the use of the STEM grant funds created opportunities for students planning to attend or currently attending Oxnard Community College interested in biological sciences pathways.

Those HSI-STEM students studying the biological sciences for the purpose of pursuing higher degrees in medicine and medical research are increasingly expected to have laboratory research experience prior to admission to these programs. Others seeking direct employment following graduation from the University can also expect employers to be seeking a repertoire of laboratory skills in addition to solid grades. The undergraduate research positions are helping to qualify Oxnard College students for entry into these professional programs and job opportunities which would have not normally been able to pursue this option. Research internships at the University often require the student to have previously obtained laboratory skills that are not provided as part of the regular college curriculum.

Special programs of study at the community college for the development of laboratory biotechnology skills are now being made available to students due to this STEM grant. This program seeks to address the imbalance and provide equal footing for students seeking these skills. While only a fraction of students actually matriculate specifically in biotechnology programs, the curriculum of the technologies is broadly applied within the sciences disciplines. Polymerase Chain Reaction (PCR) curriculum is one such example. This current program addresses the need for laboratory skills training of both High School students expected to attend Oxnard College and, in parallel, the students who have completed significant coursework already at Oxnard College. In brief, HSI-STEM students already attending Oxnard College can apply for the Internship. High School Students and Current Oxnard College students are both eligible for the Academy Workshop.

Purposes of the Biotechnology Programs:

1. Academy:

   Provided an eight-day biotechnology bridge experience for High School Students planning to take courses at Oxnard College for:
   - High School Students Juniors and Oxnard College students who have completed Chemistry, Biology and Mathematics) were provided with experience in microbiology, molecular biology and biotechnology laboratory skills. This population was drawn primarily from High Schools to OC who were likely to attend in the next year.
2. Internship:
Provided curriculum development and research skills experience to currently enrolled Oxnard College students:
- Oxnard College students who had completed Directed Studies in Biology were provided research and curriculum development skills prior to the start of the Molecular Biology Academy. This group prepared laboratory instructional materials for the workshop, videos and instructional materials detailing protocols for the new curriculum developed with HSI-STEM biotechnology equipment. This population also had the opportunity to take the workshop for credit.

3. Internship and Academy Students additionally:
Assisted the Biotechnology Curriculum Developer in preparing curriculum for deployment in STEM workshops, seminars and courses. Beta-testing the curriculum prior to its deployment with adjunct faculty and students during the regular semester is a high priority.

Design of the Biotech Academy Workshop:

All of the participating students were provided .5 unit credit of independent study corresponding to the two weeks of study of the Workshop. Approximately one hour of lecture and three hours of laboratory were delivered to the students each day. Additional bioinformatics (computer based) assignments were required. The curriculum included: microbiology skills, cell culture skills, DNA/Protein electrophoresis, immunological methods (Elisa, Fluorescent Staining, Western), DNA/Protein purification.

Environmental Studies Program

The Environmental Studies Program has made tremendous advances in curriculum development as well as participated in the supplemental instruction program. Below is a chart that defines the tasks completed and a picture of Oxnard College students as they work in the abalone fields.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Tasks Completed</th>
<th>Status (C= Continuing  P = Pending  F = Finished)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRICULUM</td>
<td>Identify articulation problems in biology transfer sequence</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Research best practices in Biology curriculum: online</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Develop instructional materials on STEM careers for STEMinars</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Develop a career pathways brochure to be distributed to STEM students</td>
<td>F</td>
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<tr>
<td></td>
<td>Revise OC course outlines to articulate better with UC</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Integrate exploration of STEM curricula/careers in Biology curriculum</td>
<td>F</td>
</tr>
<tr>
<td>SUPPLEMENTAL INSTRUCTION</td>
<td>Curriculum development for Biology supplemental instruction – pilot</td>
<td>F</td>
</tr>
<tr>
<td>Research instructional technology - for Biology tutorial and SI</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Incoroprate supplemental instruction first as grant-funded, then as credit course on the UC CLAS model for Biology 101/120/122 path</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Install digital media from publisher (negotiated at no cost to OC) in STEM center for auto-tutorial component of SI for Bio</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

**COASTAL RESOURCES Curriculum Development**

| Writing new degree application | F |
| Coordination of existing educational partners on new OC student projects | F |

| Development and coordination of new partners | F |
| Biostatistics, CSUCI | |
| Wetland Restoration, CSUCI | |
| Environmental Resources, US Navy | |
| Channel Is Harbor and VC Fish Game Commission | |

**OC/CSUCI PATHWAY**

| Development of OC student access to CSUCI library | F |
| Comparative analysis of CSUCI/UCSB STEM pathways relative to articulation of OC courses | F |

| Student Success Initiatives | F |
| Chartering Phi Theta Kappa | |
| Student educational/research activity to UCSB and CSUCI | |
| Student job shadowing/career investigation | |

There is little debate regarding the importance of a better understanding of our natural resources and their management in the coastal communities of the world both in academia and the general public. As coastal communities grow and the world continues to experience environmental change and policy development, it is the responsibility of our educational system (Oxnard College) to provide an academic framework for understanding and analysis. Moreover, courses in this discipline provide perspective and knowledge for both the students that will enter careers in these areas as well as those who pursue a well-rounded Liberal Arts curriculum.

In addition to all of the aforementioned accomplishments, since the awarding of this grant, Oxnard College has developed curriculum in the following subject areas:

- Environmental Studies (A.A. Degree and Certificate Program)
- “STEM”inar Course (IDS 198)
- Chemistry
- Physics
Oxnard College and “Hueneme High School Engineering Innovation” at CSUCI
Summer Bridge Program

OC-Hueneme Engineering Innovation (EI) is a pre-college program for underserved and underrepresented students based on the very successful Engineering Innovation program developed by Johns Hopkins University School of Engineering.

The original EI program is a four week college-level summer program to introduce engineering careers and to develop the skills for success. Well qualified high school students discuss the fundamental knowledge of engineering disciplines, apply mathematical rigor to posed problems, and then face and solve novel engineering challenges in teams. Students take a one-week, open-book test of demanding engineering problems, administered and graded by Hopkins, and get Hopkins college credit if they earn an A or B score.

The OC-Hueneme EI was designed to challenge students who may not have the academic background or experiences that would prepare them for the college-level EI program. The program incorporated twenty projects from the EI program, including:

- Measure the material properties of spaghetti and use the results to design a bridge based on static equilibrium conditions and computer simulations -- then build it, predict the failure mode and test it with loads until collapse.
- Write truth tables for logic statements, design appropriate electronic gate circuits using simulation software, and assemble hardware to control a light-following robotic car.
- Design and build a “mousetrap” from one sheet of 14”x17” construction paper to trap and capture a Ping-Pong ball – then write engineering specifications that another team used to build (unseen) the design and test it.
- Determine the height of the Bell Tower using string and two meter sticks and calculate the uncertainty.
- Respond to a Request for Proposals for a new toy for blind children ages 10-13 that can be used safely indoors or out by single or multiple children.

Most projects were purposely less defined than the students are used to, so students have flexibility to act. The focus is not on finding “the right answers”, but on determining the best design based on their understanding of job specifications, resources and constraints. Projects had limited time so students had to stay focused on the task to complete the work. The program emphasized written and oral communications, with multiple lab reports, design documentation, project proposals and essays.

The ultimate goal of the program was to help students become more successful, measured 5 to 10 years in their future, using these criteria:

- Be curious – ask questions.
- Be able to attack a new problem.
- Work well in groups to solve problem.
- Communicate well – writing & speaking.
- Increase motivation, curiosity, and ambition.
- Build self-esteem – be confident in abilities.
Oxnard College - Hueneme High School Engineering and Design Pathways (EDCP)
Summer Programs at Oxnard College
Summer three-week course on the Oxnard College Campus (2009-2010-2011)

Overview: This class was designed with the goal of readying students for success in the Johns Hopkins engineering course the following summer. Each week focused on a subject area from that program: Mechanical Engineering, Robotics, and Chemical Engineering. To measure student growth, each week began with a pretest and ended with an assessment featuring a report and/or competition. Cooperative projects were the main modality of instruction. Students were assigned different teams each week and given a series of small tasks to accomplish leading to a summative project due by week’s end.

Target Students: Hueneme High School students who had just completed the 10th grade.

Week 1 Rube Goldberg Competition
Objective: Teams will design and build a Rube Goldberg type of device with ultimate action of putting toothpaste on a toothbrush.

Week 2 Robotics using Lego NXT
Objective: Using the Lego NXT robot kits, students will learn basic programming skills and be able to create and program a robot to perform a variety of functions.

Week 3 Chemistry
Objective: Learning about applied Chemistry. What do Chemical Engineers do?

Overall Evaluation:
Students received a group grade for each week’s projects. The students were assigned a new group each week but their scores carried forward, so that the instructors could better assess individual achievement and to better motivate the students. At the end of the three week session a trophy was awarded the student with the highest cumulative score. Weekly prizes were given to top performing teams each week.

The students both enjoyed the program and learned a great deal. Each year, all of the students that started the program finished it. There were no dropouts. Both of the instructors were very pleased as well and would like to continue the same program again next summer in 2012.
TECHNOLOGY, FACULTY RESOURCE CENTER AND STEM CENTER

Smart Classrooms

STEM classrooms were created and established as a result of this grant. This included the activities of researching, analyzing, testing, selecting, and ordering a suite of integrated smart classroom technologies (wireless internet connectivity, instructor workstation, DVD/VHS, LCD projection, document cameras, audio amplification, wireless microphones, laptop plug in port) for 33 STEM related classrooms. As a result of an ambitious facilities master plan, the College has been able to create new large capacity classrooms, and has allotted two of these new instructional spaces for STEM classes. Special enhancements were adopted for the life sciences, to enable high definition display and projection.

Design/Construction of Faculty Resource Center

The College allocated space for The Faculty Resource Center (FRC) adjacent to the STEM Teaching and Learning Center. The initial planning and design for the FRC has been completed and some lab/computer workstations and equipment were ordered and installed. There has been consultation and training with faculty on instructional technologies in small group settings and also individual sessions on-going for several months. Also, instructional hardware and software was researched, analyzed, and installed in the Marine Center (ArcView GIS), and also on campus (Maple13). The Faculty Resource Center has been established to:

- Focus on team building fostering learning communities
- Utilize the technology rich environment to enhance teaching methods and delivery
- Distance Learning T4T
- Media Center to enhance and enrich classroom and course delivery
- Creating on-site virtual learning communities and more....

Development of a Web Site

We designed three related websites which serve several distinct STEM Grant communities.

- Public - this website is open for the general public and has information resources, program information, program forms, event calendars, marketing materials, progress reports, partnership/stakeholder links, and contact information.
- Participants and Partners – this website is private, is password protected and serves as a virtual STEM center and Online Learning Community. It focuses on students, parents, faculty, staff, direct partners and other stakeholders. It has all the basic public content as well as additional content including video on-demand for Supplemental Instruction sessions, access to student progress reports, interactive STEM learning activities, and other content/activities to engage visitors.
- Project Management - this website is also private, is password protected and serves as the STEM Grant’s management center. This is available to Faculty, Staff, Partners, and stakeholders who are involved in the day to day administration of the grant. The site is a centralized repository for Time/Task management, document creation/sharing, communication and collaboration, event planning and coordination, inventory tracking, budget/finance oversight.

Design and Construction of the STEM Center

The STEM Center has been developed for our OC STEM students to have:

- Transfer Counselor sessions and Workshops
- Industry STEM-related workshops
- Supplemental Instruction and Tutoring
- Peer Groups and Club Meetings
- “STEMinar” Courses and Career Workshops, Meetings with Faculty for OC, UCSB and CSUCI and more....
The following is a PowerPoint presentation used to summarize the various “systems” established to assure sustainability and institutionalization of grant projects and activities at Oxnard College.
The Challenge

- The 2010 testing period for 11th grade Hispanics in the Oxnard Union High Schools indicated that only 14% of the students met or exceeded the State Standard for Algebra II, 24% in Biology/Life Sciences, 28% in Chemistry and 26% in English and Language Arts.
- 88% of Oxnard College Students come from the Oxnard Union High School District.
- 72.7% of Oxnard residents are identified as Hispanic. Of those aged 25 and older, 86% have less than a 4-year college degree and 40.5% have less than a high school degree.
- Hispanics are underrepresented in Ventura County’s STEM Workforce.
- Oxnard is known as the Biotechnology Condor yet few OC students have a great awareness of STEM career opportunities.

If the majority of our Hispanic/Latino and disadvantaged students are to enter postsecondary education, it must be through the open door of a community college and then transfer to earn a bachelor’s degree.

THE SOLUTION

C.O.R.E. Conditions

- Communication
  - Expectation
  - Feedback
- Organization
  - Focused
  - Time on Task
- Rapport
  - Respect for Diversity
  - Relationship Building
- Enthusiasm
  - Active
  - Cooperative

"Successful people have one thing in common, they filled their lives with positive thoughts about themselves and others." - John C. Maxwell

"The real path to greatness, it turns out, requires simplicity and diligence." - Good to Great - Jim Collins

The Communication Challenge: A Complex System
### Instructional Technology

**Using the right tool for the right job**

- **Agile Grad**
  - Educational Planning Tool for Students
  - Enrollment Management Tool for Managers

- **Enhances communication**
- **Empowers students**
- **Provides management/organization tools**

---

### Management Tools

**“Follow-up, Follow-up, Follow-up and Follow-up Some More”**

*Use the Right Tool for the Job*

- **C.O.R.E.**
  - Communication
  - Organization
  - Rapport
  - Enthusiasm

**Respect for Diversity, Relationships, Active and Cooperative, Expectations, Feedback and Focused**

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### Example Table

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<tr>
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<th>Code</th>
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<tr>
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**Agenda Item**

- Discussion
- Conclusions
- Action(s) Taken

**3 W’s**

- What
- Who
- When
Instructional Technology

Using the right tool for the right job

The Future: Video and Mobile Computing
- Enhances communication
- Opens educational opportunities and pathways between institutions
- Offers instructors more tools
- Offers students exposure to new educational experiences.

The Road to Success
- Strategic Agility
- Building Effective Teams
- Planning
- Training
- Cultivating “Thinkers”
- Assessing Impact and Outcome

Continuous Quality Improvement
- Introduce
- Connect
- Apply
- Assess
- Reflect

“…” We are all caught up in an inescapable network of mutuality, tied to a single garment of destiny. Whatever affects one directly affects all indirectly.”

The Rev. Dr. Martin Luther King, Jr.

Management Tools

Develop Assessment/ Measures of Success

“How Do You Know Where You Want to Go If You Don’t Know Where You’ve Been?”

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>CSUCI Summer Session</th>
<th>Human Services and OC Summer Bridge</th>
<th>OC Summertime Math Institute On-Campus</th>
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Evaluation Plan (Goal #3)

- Indicators of Student Learning Outcomes:
  - % increase in knowledge
  - College Awareness Factors

IDO 524B