NSF TEST:UP Annual Report
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Participants

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Project Activities and Findings

Project Activities

TEST:UP is a collaborative program, initiated in fall 2008, among three institutions—California State University, Fullerton (CSUF), a four-year, comprehensive university, and Mt. San Antonio College (Mt. SAC) and Santa Ana College (SAC), two of CSUF's feeder community colleges. CSUF is a four-year comprehensive university and Mt. SAC and SAC are two-year community colleges. All campuses are located within 23 miles of each other and have diverse student bodies with enrollments exceeding 27,000 students. Through TEST:UP, our collaborative program seeks to: 1) increase the recruitment and retention of STEM majors at Mt. SAC and SAC; 2) produce more STEM associate degrees and STEM transfers to four-year schools; 3) improve the retention of transfers (and other students) majoring in STEM fields at CSUF; 4) increase the number of students obtaining baccalaureate degrees in STEM disciplines at CSUF and other four-year institutions; and 5) improve mentoring and teaching skills of CSUF graduate students seeking community college teaching careers.

TEST:UP programs focus on mathematics and science students, but have been designed to also impact engineering and computer science students and majors particularly at the two-year colleges. We envision that TEST:UP programs will impact hundreds of students on each of our campuses by significantly improving STEM learning environments and also facilitate the transfer of two-year STEM students from Mt. SAC, SAC and other community colleges to CSUF or other four-year institutions. Our ultimate vision is that TEST:UP will result in a collaborative and replicable model of cooperation

between two- and four-year institutions that results in the production of more STEM students and graduates.

Like other projects in the National Science Foundation's STEP program, TEST:UP has two overarching goals:

1) To increase the number of STEM transfer students to four-year universities and colleges and,
2) To increase the number of AA degrees and baccalaureates earned in STEM majors.

More specifically, once our program is fully implemented at Mt. SAC and SAC we proposed to increase by ca. 5% annually the number of new STEM majors (U.S. citizens or permanent residents) (20 to 30 students per college for a total of 40 to 80 students annually) and to increase by 25 annually (50 at the two institutions) the number of students (U.S. citizens or permanent residents) who complete their associate degrees (or requirements) or who transfer to four-year institutions (including but not limited to CSUF) in any STEM major. At CSUF, we projected that TEST-UP will increase by 40 students annually the number of transfer students (U.S. citizens or permanent residents) who eventually earn STEM baccalaureate degrees (equal to approximately halving the first-year dropout rate of STEM transfers) and to generate 40 more STEM bachelor's degrees per year (U.S. citizens or permanent residents) [equal to reducing by 20% to 25% the number of students (mostly freshmen) who fail to successfully complete introductory courses in science and mathematics.]

Program Strategies

To accomplish the goals of TEST-UP, we have developed four strategies. These are to:

1) improve counseling, guidance, and mentoring opportunities and improve information and knowledge of STEM careers for Mt. SAC and SAC STEM and potential STEM students,
2) develop support networks, including facilities and programs to develop learning communities, and facilitate the transfer of STEM students to CSUF,
3) improve student learning (and therefore student success) in pivotal math and science introductory discipline courses by instituting supplemental instruction (SI) programs, and
4) develop a teaching intern/mentoring program to improve the pedagogical and mentoring skills of CSUF graduate students interested seeking two-year college teaching careers.

To provide advice and to guide TEST:UP, we have formed functioning internal advisory committees on two of our campuses (CSUF and SAC) and an external advisory committee that provides advice on the entire collaborative program. These committees periodically meet to learn about TEST:UP programs and progress and provide advice on on our program elements.

Project Findings

1) Improve counseling, guidance, and mentoring opportunities and improve information and knowledge of STEM careers for Mt. SAC and SAC STEM and potential STEM students. Gina Garcia, CSUF's full-time Coordinator for STEM Transfer Student Services resigned in summer 2009 to enroll in a Ph.D. program at UCLA where she will be studying issues related to our STEP grant. A successful search was completed to replace Gina with Cathy Fernandez-Weston who came to CSUF from Virginia Tech. Cathy assumed the position in August 2009. The CSUF Coordinator for STEM Transfer Student Services continues to meet and collaborate with half-time STEM Advisors at Mt. SAC and SAC. Tammy Camacho and Oscar Flores continued as the half-time STEM Advisors at SAC and Mt. SAC. The two half-time STEM Advisors have been integrated into SAC and Mt. SAC counseling centers and are meeting with students regularly.

Although it is still too early to quantify, this program appears to have greatly improved STEM advisement on the two-year campuses. Existing systems required students to make appointments to see campus counselors who generally did not offer targeted STEM advisement. Often, students needed to wait for two plus weeks to obtain such advisement. This program has now greatly increased student access to STEM academic advisors. Drop in STEM advisement is now available and there has been an increase in student knowledge of the need to get advice if a STEM degree is being sought. This is particularly important for STEM majors where hierarchical curricula are the rule and is very important for students with little knowledge of college programs, as is the case with first-generation college students and for many who belong to traditionally underrepresented minority groups. In addition, the STEM advisors are assisting students with the CSU application process, which is highly important given the current constraints on two-year admissions to CSUF and other CSU campuses resulting from budget cuts.

TEST: UP has assisted more than 250 students on the Mt.SAC and SAC campuses with developing academic plans for transfer. Mt. SAC and SAC advisors have recruited participants in the TEST: UP program on their respective campus through class visits, information tables, career day fairs and STEM week events. TEST: UP has assisted over 20 students on the two campuses in the CSU application process for fall 2010.

At SAC, STEM advisement was provided to 'Early Decision' students. The TEST: Up counselor is working with SAC Early Decision students. These are high school students from local feeder high schools in the Santa Ana Unified School District that will be placed into their first college course in Fall 2010. Preliminary math placement tests indicate that tentatively 1,036 students will go through this process. Handouts have been developed for these students identifying STEM counseling contacts and student contact information collected so that counseling staff can follow-up.

The coordinator and STEM Advisors at SAC presented to almost 400 students in Math, Biology and Chemistry courses about STEM careers, student success in STEM, Pathways to STEM majors, and the SAC STEM recruitment DVD that addresses academic progression and STEM career options was developed and shown. The video is under revision and will be close-captioned once completed.

In fall 2009, classroom visits were made to six sections of Biology 109, Introduction to Biology and five sections of Chemistry 209, Introduction to Chemistry to recruit STEM majors at SAC. Websites linking academic programs, information on articulation, supplemental instruction and counseling were revised to provide students interested in STEM disciplines greater access to important information.

In an attempt to further educate the campus communities on STEM and potential careers two videos were presented on the SAC campus. The first video 'Naturally Obsessed' was viewed by over 200 students and a second viewing was seen by over 150 students. The second Video shown was 'Hot Zones' this video was viewed by 150 students and a second viewing is being scheduled to accommodate students that were turned away because of space. On the SAC campus, Coordinator for STEM Transfer Student Services and STEM Advisor serve on a STEM planning committee that works to promote STEM education on campus.

SAC underwent a major student information system conversion that involved all aspects of college data processing. Information retrieval became increasingly difficult as we moved further into 2009. The difficulty in tracking students from community college to CSUF was discussed by the Internal Advisory Committee. Two Conferences for next year (STEM Transfer and STEM Tech) were discussed and recommended by the advisory committee for attendance by appropriate personnel. Outreach to spring biology (major track) sections was suggested to reinforce fall transfer and 'Golden Four prerequisites.

At Mt. SAC, the advisement program is now working effectively to engage STEM students. Tools were developed that have allowed students to discover multiple ways of achieving their STEM educational goals.

2) Develop support networks, including facilities and programs to develop learning communities, and facilitate the transfer of STEM students to CSUF. Besides working to improve STEM advisement and STEM student engagement on the SAC and Mt. SAC campuses, the CSUF Coordinator for Transfer Student Services also advises CSUF STEM transfer students and oversees an office that caters to STEM transfers and directs them to CSUF academic advisers, peer-learning communities, and other engagement opportunities. An increasingly visible office site has been established to provide assistance and direction for CSUF transfer students majoring in STEM disciplines. No such office existed prior to this program and new transfers entered CSUF without strong guidance and orientation and as individuals. Orientations have been developed for new math and science STEM transfers and a peer advisor program has been implemented. Book scholarships have been made available for CSUF STEM transfers as incentives for participating in project programs.

The CSUF Coordinator for Transfer Student Services and the CSUF PIs, Department Chairs, and faculty have worked together to develop and hold a special orientation for incoming freshmen and two-year transfer math and science majors. Students and parents are invited and receive special academic advisement and information on study expectations for CSUF courses. Peer panels discuss pitfalls and keys to academic success and attempts are made to develop peer groups. A focused campaign to embellish on students the need to study has been initiated. Only recently was an orientation for new transfer students required by the university and this is now completed by most students on-line. Therefore, most new CSUF transfer students enter our institution without strong institutional or social connections.

This year a Web-based early warning system has been developed at CSUF where faculty in key courses provide direct performance/preparation feedback to students very early (within the first two weeks) in the semester. Students identified as in need of assistance are then contacted by the Coordinator for Transfer Student Services to discuss strategies for improving academic performance.

The Coordinator for Transfer Student Services is overseeing a successful peer mentoring program and distributing book scholarships as an incentive for CSUF STEM transfers to participate in TEST:UP programs.

CSUF STEM Transfer peer advisors met with potential transfer students from Mt. SAC and SAC as well as with transferred students from various community colleges and other four year institutions that had transferred to the CSUF campus. CSUF hosted several field trips to the campus that include STEM lab tours and education on STEM majors for community college students. CSUF STEM Transfer student services peer advisors have engaged over 325 students, have served over 50 CSUF STEM transfers, and held social events for STEM students. We are having some success in getting new transfers to join our peer-led learning communities but more work here is necessary. Student traffic continues to grow in the office and this bodes well for connecting and engaging CSUF's new STEM transfer students, an outcome that should generate better retention and more graduates. Time will determine whether this strategy will be successful in generating improved performance, better retention, and more STEM graduates from entering transfer student cohorts.

A STEM Transfer Student Services blackboard site was created to allow for better communication with first year transfer students on campus. A STEM Transfer Student Services facebook page is currently

begin created to allow for better communication between two-year students and CSUF STEM students. A CSUF web site dedicated to TEST:UP is now up (http://nsm.fullerton.edu/testup/). This web site provides information on the program and documents and presentations to be shared with others interested in improving student learning and performance, and ultimately increasing the number of two-year transfers and baccalaureate degree recipients in STEM majors.

At SAC, infrastructure for the faculty mentoring program was developed and faculty were successfully recruited. The linking of SAC faculty and students is a key in recruiting to these difficult and complex majors. Through these linkages students were referred to resources which efficiently exposed them to academic programs and career options (STEM panels). Mentoring program numbers were reviewed and some of the challenges with mentoring students and their willingness to commit time were discussed by the SAC Internal Advisory Committee.

A book voucher system was put into place at SAC, which is used in conjunction with the mentoring program. Mentor/Mentee packets were developed for use by faculty and students involved in the program. Students were assigned mentees. A survey of 400 Introduction to Biology students was done to identify students interested in a STEM career. Linking/networking programs to TEST: Up allowed maximization of resources to students. The book voucher system provided incentive to students to participate in activities which would be advantageous to their academic progression but would cost them valuable time. The initial survey of students provided a baseline against which we will measure interest and effectiveness of our interventions in the short term.

A part-time Biology faculty was hired to develop academic resources for the Biology Study Center and a Science Club was implemented in Fall 2008. Outreach activities to create awareness about TEST:UP and services were offered.

Implementation of a study campaign based on the CSUF Study 25-35 model occurred with the goal of communicating to STEM students the need to spend more time studying.

This year the grant covered the cost of student transportation to CSUF and an upcoming fieldtrip to a Jet Propulsion Laboratory (JPL) open house so that students may learn about Space Flight operations and JPL's ongoing research. SAC students lack role models in the sciences. Seeing research put into practice is a unique experience which can inspire an inquiring mind.

Concurrent enrollment, per California State University and department guidelines, as a bridging strategy for a select number of STEM students was discussed and recommended by the Internal Advisory Committee to pilot next year. Developing a learning community for a STEM class in spring 2011 focusing on STEM career development similar to GEOL 590, Geoscience seminar offered at CSUF and in development at Mt. SAC was also discussed by the committee.

At Mt. SAC, students were provided with the opportunity to tour University Chemistry and Biology laboratories. A Q&A session with faculty and students was offered to address what it takes to be a STEM major at a university. Both UC and CSU campuses were visited to allowed students to compare and contrast differences between both public educational systems in California.

An Application workshop was held for Mt. SAC STEM students applying to both public and private universities. It provided overall assistance with personal statements and held Q&A sessions with various emphases on the differences between public and private schools as well as UC and CSU.

3) Improve student learning (and therefore student success) in pivotal math and science introductory discipline courses by instituting supplemental instruction (SI) programs. The principal purpose of this strategy is to improve student learning and therefore success in key math and science courses by implementing Supplemental Instruction (SI) programs modeled after the University of Missouri-Kansas City (UMKC) system. NSF funding for SI courses is mostly directed at the two community colleges. Faculty selected to participate in SI have been sent to UMKC for training and then provided assistance in developing SI workshops for their courses. At CSUF, the goal was to improve SI strategies but the workshops were to be funded by state monies and other sources. A core element of this strategy is to develop an SI collaborative network among participating two and four-year faculty. This way course resource materials can be shared, peer facilitator training centralized, improved knowledge of student needs developed, and greater understanding of curricular interfaces between CSUF and our two-year partners achieved.

An overarching goal of this strategy is to develop the ability to identify the characteristics of at-risk students that ultimately benefit from SI to the point where their academic performances improve and they are retained as STEM majors and then to strongly target this group to ensure that they obtain SI experiences. Although improvements in course GPAs, etc. are sought, we envision this program as more than just one that assists students. We hope to obtain some predictive capability that will eventually enable us to focus resources and efforts on a specific student population - one that will ultimately become STEM graduates if we provide assistance in their entry level courses.

At CSUF, the goal was to improve SI strategies largely funded from sources other than TEST:UP and to develop collaborations with our community college partners to develop an SI network in the region. We have had success with this effort at CSUF and at SAC. We have developed and improved SI instruction at CSUF and SAC and are working towards the development of meaningful, collaborative interactions between faculty involved in SI and SI peer facilitators at our two campuses. We have not yet been successful in achieving this goal at Mt. SAC.

At CSUF, an element of TEST-Up is to initiate and develop an SI program in key gateway courses in the College of Natural Sciences and Mathematics. Beginning in fall 2008, the program was initiated with four sections of three courses, including Biology 171, Evolution and Biodiversity (the entry level biology class for biology majors); Mathematics 125, Precalculus; and Mathematics 150A, Calculus I. In spring 2009 the program was expanded to include seven sections of these courses plus Mathematics 150B, Calculus II. In fall 2009, the CSUF SI program included eighteen sections of SI for these courses plus Mathematics 115, College Algebra, and Chemistry 301, Organic Chemistry I. In fall 2009, 440 students participated in SI workshops led by 14 SI leaders. In spring 2010, Chemistry 361A, Physical Chemistry I was added to the list of courses with SI workshops and these numbers grew to 21 SI sections being offered, xx student participants, and xx SI leaders.

CSUF SI leaders were recruited, interviewed, selected, and trained for the work according to the University of Missouri-KC model. Each department structured its SI sections according to departmental needs; the initial one- or two-day training of SI leaders was done college-wide. Workshop sections varied from 12 to 28 students, with the average size around 18. SI leaders were paid $1,500 per semester and attended all course sessions for their linked SI class in addition to leading the SI workshops for 3-5 hours per week. Funding for the SI facilitators was provided by Title V and GPS-2 grants from the U.S. Department of Education in addition to departmental and college resources. No NSF STEP funds were used to fund the CSUF SI leaders; only the co-PIs working on the STEP grant received funding to develop this program. The fall 2010 semester will be funded by a University Mission and Goals grant

from the President of CSUF and funds provided by the College Dean. Funding sources for the spring 2011 workshops has yet to be determined.

The fall 2009 results showed that: 1) students participating in SI had a passing rate of approximately 84 % v. 64 % for the non-SI group; 2) students participating in SI outscored non-SI group by more than half a grade point (2.59 v. 1.97); and 3) students participating in SI had a F/WU failure rate less than half that of non-SI group.

While students self-selected into the SI, there was evidence of value-added from SI participation. First, there were no significant differences between SI and non-SI groups in SAT-M, SAT-V, or HSGPA, so that SI participants did not seem to have a pre-college academic advantage. Second, there were no significant differences between SI and non-SI groups in college GPA and course-repeating patterns, so that SI participants did not seem to have an in-college academic advantage. And third, in multiple-section courses such as Math 150A and Math 150B, the non-SI group achieved at or above the level of all other non-SI sections, suggesting that the achievement of SI students did not come at the expense of the achievement of non-SI students. Exit survey data indicated that more students would have participated in SI had they known about the SI program when setting up their schedule, especially in calculus.

While recruiting SI leaders takes some directed effort, our experience is that there are a number of Upper Division undergraduate students who are excited about this opportunity. Funding the CSUF SI takes continued effort; as mentioned above we are currently funded through the end of the fall 2010 semester. Getting timely SI information out to students is an ongoing challenge. This semester, our SI leaders will visit each section of the prerequisite classes to make a recruiting presentation and collect names and emails of interested students. Each of these students will be sent a personal email invitation with the SI schedule attached.

The principal challenge at CSUF has been securing stable institutional funding for the SI peer facilitators and faculty involved in offering the SI courses. This has been done on a semester by semester basis, largely through external and internal grant support. This was not envisioned as a challenge at the time the proposal was generated so funds were requested to organize and administratively push the program with faculty involvement and buy-in. However, the reduction in state funding to CSUF has compromised our ability to operate this program with the needed predictability. However, enrollment in the program is expanding and the campus culture is changing as students are telling one another about the benefits of the SI workshops and successful results (improvements in GPA and pass rates) are being achieved.

Although we have fully enjoined one of our two-year community college partners in our SI effort, the other has not made progress using NSF provided funding and, therefore, is unable to show results for STEP funded SI programs.

At SAC, SI program development is continuing and growing based on knowledge gained during the first year of the STEP grant. Two STEM faculty attended the University of Missouri-Kansas City SI training program. SI leaders were trained by faculty and SI was piloted in microbiology with four groups. SI was then expanded to Biology 109, 139, 229, and then two sections of Chemistry and one of Astronomy. In fall 2008, 99 students participated in SI and in spring 2009, 180 students participated.

Although it is too soon to determine if this strategy will be successful preliminary data from the SAC experience indicates enhanced course success with those students participating in SI. Increased success in pivotal courses will increase completion of STEM transfer courses and increase the pool of transfer students. Statistics from fall 2009 and preliminary data from spring 2010 were reviewed by the Internal

Advisory Committee. Flaws in some of the methods of data collection were identified. The Internal Advisory Committee recommended a qualitative survey of classes to continue assessment.

Mt. SAC continues to offer SI courses established prior to TEST:UP but has not yet taken advantage of NSF STEP funding to expand its SI programs to other courses or to engage its faculty in TEST:UP collaborative activity.

4) Develop a teaching intern/mentoring program to improve the pedagogical and mentoring skills of CSUF graduate students interested in seeking two-year college teaching careers. CSUF has a significant number of graduate students who seek to obtain a teaching position at a two-year college. These students are trained at CSUF through formal coursework, mentored on best practices for engaging students and implementing active learning strategies, and have teaching experience as assistants in labs and discussion sections. A teaching internship at one of our community college partner institutions will provide an attractive transition toward a professional career while further connecting STEM students at the two-year institutions with CSUF.

To implement this strategy, CSUF teaching interns were to be placed in positions at the two-year colleges where they were to function as part-time faculty instructors and/or SI instructors. Following the Preparing Future Faculty (PFF) model for doctoral students, prospective teaching interns were envisioned to go through a formal interview process before being selected. Therefore, interns would not only gain teaching experience at a two-year college but also would become familiar with recruitment interview practices. Each teaching intern was to be hired using two-year college (not NSF) funds and assigned a community college faculty mentor. In addition to their teaching commitment, each intern was to receive a stipend from NSF TEST:UP funds to carry out advisement and mentoring duties at the two-year college site.

This element of TEST:UP was again postponed with plans to implement the program in fall 2010 or spring 2011. At SAC, the Internal Advisory Committee was updated and they recommended investigation of a current model used by University of California Irvine project at SAC for this program. This model is different from the one described in our NSF proposal but has worked well and enhanced participants ability to meet minimum qualifications for Community College faulty as identified by the Board of Governors of California Community Colleges. This will be discussed during the coming year with the hope of implementing the intern program at SAC.

Training and Development

TEST:UP is engaging faculty from CSUF and SAC in new and more focused efforts to attract and retain more STEM students; less such activity has taken place at Mt. SAC. The project envisioned TEST:UP providing the impetus for the three campuses to work together to institute SI and other programs to improve student learning and performance in key gateway math and science courses.

TEST:UP participating faculty at CSUF and SAC and the CSUF Coordinators for STEM Transfer Student Services attended workshops held at the University of Missouri-Kansas City to learn about the UMKC SI model. Instructional strategies are being modified and new approaches being taken on the CSUF and SAC campuses. Participating TEST:UP faculty are learning about effective strategies to increase student learning and performance in entry level math and science courses, sharing this

knowledge with one another and conversations between some CSUF and SAC faculty have developed as part of this collaborative SI effort.

CSUF PIs Steve Murray, Rochelle Woods, Marty Bonsangue (Math), and CSUF faculty members Sean Walker (Biology), Kathy Lewis (Math), and others are actively involved in College retention efforts and attending meetings related to TEST:UP goals. The full-time CSUF Coordinator of STEM Transfer Student Services and the two half-time STEM advisers are developing skills in advising and counseling students and learning about STEM careers. The Coordinator also is strengthening and applying her skills in student services to form student communities and to make students aware of the coursework and achievement needed for transferring to four-year institutions in STEM fields. This year, the CSUF Coordinator of STEM Transfer Student Services attended SI Supervisor Training, at Kansas City, Kansas, the NSF-STEP Two Year/Four Year Partnership Workshop, at Belknap, Oregon, the National Institute for the Study of Transfer Students conference in Addison, Texas, and the NSF STEP Project Directors Meeting in Arlington, Virginia.

CSUF undergraduate and graduate student SI leaders are being educated in methods of engaging students and stimulating them to advance their own learning by working cooperatively to solve problems. Several of these students have gained interest in teaching and are now considering teaching careers in math and science, an unplanned outcome of our STEP project. CSUF undergraduate peer mentors are learning the importance of learning communities and are being educated in how to engage students, organize activities, and develop functioning learning groups.

At SAC, an advantage of TEST:UP is that NSF funds have provided opportunity and the resources for faculty to meet and make contact with STEM faculty from other colleges and universities. Dr Cher Carrera (Department Chair, Mathematics) attended the NSF STEP Two-Year/Four Year Partnership Workshop at Belknap, Oregon. This workshop laid the foundation for her further involvement in this program. In spring 2010, Cher Carrera and Carol Comeau (Dean of Science, Math and Health Sciences) attended the NSF STEP Program Directors meeting in Arlington, Virginia, which was funded by TEST:UP. Dr Patty Oertel will be attending the American Society for Microbiology Conference for Undergraduate Educators in San Diego. This year's theme is 'Telling the Story of Science'. As a new STEM faculty member, this interactive conference will provide her with the latest research in teaching and learning science. Effective strategies and new ideas to implement in the classroom will be presented to increase student understanding. It will update her on current research and provide insight on how to put science on exhibit. Joel Sheldon, Math Center Specialist attended the January SI workshop at California State University, Fullerton (CSUF) with SI student leaders.

Outreach Activities

We have made other community colleges aware of TEST:UP and its programs and goals. We envision using TEST:UP as a vehicle to form closer bonds between CSUF and neighboring community colleges in order to facilitate the transfer of STEM students. To date, TEST:UP has served as the foundation for expanding CSUF STEM relationships with two other community colleges: Citrus College and Cypress College. We now have subcontracts with Citrus for increasing STEM advisement and Citrus and Cypress for providing summer research experiences on the CSUF campus for two-year STEM students. This has enabled us to hire a second full-time Coordinator for STEM Transfer Student Services

who is developing similar STEM advisement programs at Citrus College. At CSUF, we still must expand outreach activities to increase awareness of the value of a STEM education and career opportunities in STEM fields.

At SAC, a STEM week was organized in October 2009 in collaboration with the newly formed STEM Planning Committee (representatives from MESA, Center for Teacher Education(GSP2), TEST: Up, CSUF College of Natural Sciences and Math, University Transfer Center (USDA Grant) and CSUF Center for Careers in Teaching. There was a STEM Fair with displays and demonstrations on science, engineering and technology. There was a STEM panel presentation with four representatives from Agriculture and Environmental industry, engineering, faculty from math and science and a research scientist.

Publications

None to date since the program is in its first semester. However, baseline data are being collected for the purpose of program evaluation and dissemination.

Contributions Within Discipline

Increasing the numbers of STEM transfers to four-year institutions and the number of STEM baccalaureate degrees is of national significance and stand as the principal goals of this project. Various strategies for achieving these objectives are being used in two- and four-year colleges throughout the country. In TEST:UP, we are focusing on developing approaches that prove most successful with the students that populate our three campuses. These populations are characterized by high numbers of: 1) traditionally under-represented students in STEM fields, 2) students with little or no parental college experience, and 3) students that come from low-income families. Moreover, our institutions are commuter campuses where students move back and forth between home, work, and school. It has historically been difficult to produce large numbers of STEM students from a student population dominated by these characteristics. Yet, increasingly in southern California and various parts of the country, campuses like our own are becoming more highly populated by students with these characteristics. Through TEST:UP, we hope to improve our understanding of the effectiveness of approaches to recruit, retain, and successfully transfer or graduate these students in a timely way.

Our project is designed so as to have the potential to provide robust qualitative and quantitative testing of program elements, including SI workshops, peer learning communities, transfer facilitation programs, and increased STEM advisement on two-year campuses. Although progress has been made in developing evaluative approaches to assess TEST:UP program elements, it is still too early to report results. Nevertheless, evaluative tools have been and are being developed with advice in guidance of TEST:UP participating faculty and administrators and Shannon Gilmartin, our external evaluator.

Contributions to Other Disciplines

We are increasing knowledge among traditional STEM faculty of the importance of taking a more holistic approach in assisting STEM students- an approach that strongly involves student affairs. In addition, we are working with some success to increase dialogue within and between faculty in the

various STEM disciplines focusing on the identification of best practices for achieving elevated student performance in STEM subjects. We also are transferring some of our experiences and knowledge from STEM academic personnel to traditional counselors on the two-year campuses.

Contributions to Human Resource Development

We are developing students and staff with increased skills and knowledge to work in the fields of STEM teaching and STEM recruitment/retention. This year, we lost Gina Garcia, one of our key project staff, who entered a Ph.D. program at UCLA to pursue dissertation work in these areas. We know that other TEST:UP participants are advancing their careers with knowledge and experience obtained from our program.

An unplanned outcome of the SI program is the increased interest in teaching careers from undergraduate peer facilitators. We are working to quantify this and to explore relationships between SI facilitator experiences and increases in the number of students seeking to become math and science teachers.

Contributions to Resources for Research and Education

We are in the process of developing improved advisement materials and roadmaps to guide STEM students in developing realistic plans to transfer from Mt. SAC and SAC to CSUF. We are developing SI materials to be shared among our participating campuses. In addition, we are in the early stages of developing web based informational resources to make STEM students aware of careers, internships, and research opportunities.

Contributions Beyond Science and Engineering

We continue to develop improved understanding of STEM programs and the needs of STEM students for counselors, advisers, and others on our campuses. In addition, we are working to increase the dialogue between STEM and non-STEM faculty about STEM students and opportunities, as well as with other persons who may work with or advise STEM students at our institutions.