NSF TEST:UP Annual Report
May 2009

Participants

Participant's Name(s)	Project Role(s) What?	Institution
Steven N. Murray	Principal Investigator	CSUF
Carol Comeau	CoPrincipal Investigator	SAC
Larry Redinger	CoPrincipal Investigator	Mt. SAC
Rochelle Woods	CoPrincipal Investigator	CSUF
Martin V. Bonsangue	CoPrincipal Investigator	CSUF
Kathy Lewis	Senior personnel	CSUF
Nicole Infante	Senior personnel	CSUF
Sean E. Walker	Senior personnel	CSUF
Annie Nguyen	Undergraduate student	CSUF
Matthew Smith	Undergraduate student	CSUF
Raziel Gamboa	Undergraduate student	CSUF
Robert Malanga	Undergraduate student	CSUF
Francesca Hernandez	Undergraduate student	CSUF
Gina A. Garcia	Technician, programmer	CSUF
Tammy Camacho	Community college faculty	SAC
Jorge E. Lopez	Community college faculty	SAC
Kathy M. Takahashi	Community college faculty	SAC
Oscar Flores	Counselor	Mt SAC
Shannon K. Gilmartin	External Evaluator	

Document # 2

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. 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 students from Mt. SAC and SAC 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.]

To accomplish the goals of TEST:UP, we have developed four strategies. These are: 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 proposed to form internal advisory committees on each campus and to name an external advisory committee. These committees will meet periodically to learn about TEST:UP programs and progress.

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. Successful searches were carried out to hire the one full-time Coordinator for STEM Transfer Student Services at CSUF, and the two half-time STEM Counselors and Advisors at Mt. SAC and SAC. Suitable space has been made available for these personnel on all three campuses and STEM advising and counseling activities are on-going. The CSUF Coordinator for STEM Transfer Services is traveling to the two-year campuses on a regular basis, where she is collaborating with the half-time two-year college STEM Advisers to recruit, advise and engage Mt. SAC and SAC students. The CSUF Coordinator also advises CSUF STEM students, including transfer students, and has advised more than 100 CSUF students since the beginning of TEST:UP. The CSUF Coordinator is planning and organizing peer advising, early warning, social events, and workshops at CSUF and is working with the two-year STEM Advisers to carry out similar tasks at Mt. SAC and SAC. The Mt. SAC and SAC STEM Advisers are actively encouraging student involvement in TEST:UP programs, advising students, collaborating with existing student clubs and programs, and working to develop educational and curricular roadmaps for STEM transfers. Study campaigns have been implemented at CSUF and SAC with the goal of increasing student study time in STEM courses.

Progress is being made in establishing visibility of this new program on the three campuses but is lagging in developing presentations and events at Mt. SAC and SAC to recruit and engage STEM students and in implementing an early warning system to identify students at risk. A STEM recruitment DVD was recently completed at SAC but has not yet gone into distribution. Progress is also lagging in developing effective and informative web sites at the three campuses. During the coming year, efforts will be made to more fully integrate STEM Advisers with regular academic services, to more actively involve STEM faculty in TEST:UP, and to develop effective web tools at the three campuses.

2) Develop support networks, including facilities and programs to develop learning communities, and facilitate the transfer of STEM students to CSUF. The Coordinator for Transfer Student Services and the CSUF PIs have worked together to develop and hold orientations for new math and science STEM transfers and have successfully implemented a peer advisor program, and distributed book scholarships for CSUF STEM transfers as incentives for participating in TEST:UP programs. Peer advisors have contacted over 350 CSUF STEM students, advised 40 CSUF STEM transfers, held social events for STEM students and recruited new STEM students into the mentoring program.

During this first year at SAC we have worked toward developing linkages between existing programs and TEST:UP. SAC launched their faculty mentoring program in January 2009 with a mentor/mentee mixer. SAC students were invited to meet SAC STEM faculty mentors and learn more about the TEST: UP program. There was heavy faculty participation but the numbers of students was less than expected. Seven faculty from five STEM areas volunteered. Seven students are now involved with the mentoring program and are required to meet with faculty mentors for a minimum of two hours per semester. Recruitment materials have been ordered and received. A Book Voucher system has been put into place which will be used in conjunction with the mentor program. Mentor and Mentee information packets were also developed. A recruitment DVD was finished this spring and will be used to recruit students

into both the TEST:UP program and STEM majors. Ongoing recruitment for the program is now occurring. Additionally, we have conducted a survey of 400 students in Introduction to Biology to identify students interested in STEM Careers. This survey also gathered baseline data on current student study practices which will be used to evaluate the effectiveness of our study campaign. As we look forward to next year we will need to focus on full implementation of the study campaign. Further recruitment of mentees will be necessary to realize a more dynamic mentoring program.

We have noted a need to develop a STEM orientation for new students and a learning community to support students coming to us from the high schools. Visibility on campus is another area in which we need to continue to grow. We plan more STEM career panels and development of course patterns. While a lot has occurred this spring we need to formalize our practices as we move into next year.

The Biology Study Center at SAC, in a separate joint grant project (State Chancellor Equipment) with the Health Sciences Department, underwent renovation with improved flooring, lighting, paint and some new furniture. SAC is currently in the process of ordering computers and software, funded by the TEST: UP grant, to improve supplemental instruction provided in the center and provide a unique space for Biology students. In the course of the development of the BSC we have noted that there is a need for curriculum support strategies that target specific content areas. We are in the process of developing these items; this will continue into next year. Instructional assistants and tutors have been hired for the spring semester and both the Supplemental Instruction Program and the Tutoring Program are being held in this facility. A part-time Biologist (0.10 FTE), Anson Lui, has been hired to develop study resources for the center. A Science Club was implemented in fall 2008. One of the goals of this club is to inform STEM students of resources that are available to them through the TEST: UP program and the Biology Study Center.

Mt SAC is in the process of recruiting faculty members for their faculty mentoring program and in developing their engagement activities.

The sciences at Mt SAC recently relocated into a new building containing a study center. Mt SAC is still in the process of integrating TEST:UP resources and activities into its programs.

3) Improve student learning (and therefore student success) in pivotal math and science introductory discipline courses by instituting supplemental instruction (SI) programs. Efforts were made this year to improve student learning in key math and science courses by implementing SI programs adopted after the University of Missouri-Kansas City model.

NSF funding for SI courses from TEST:UP is mostly directed at the two community colleges. At CSUF, the goal was to improve SI strategies actually funded by other means and to expand conversations with community college partners to develop an SI network in the region. At CSUF, in spring 2009 the Department of Mathematics, Department of Chemistry and Biochemistry, and Department of Biological Sciences initiated or expanded their SI programs as part of this grant. SI workshops were offered in BIO 171, an introductory level biology lab course; CHEM 301A, organic chemistry; MATH 125, precalculus; and MATH 150A, calculus I.

A total of approximately 100 students have been involved in the workshops, including 10 in chemistry, 23 in biology, and 70 in mathematics. Each of these sessions is led by an upper-division student or graduate student who has strong content and communication skills. The SI leaders in mathematics and chemistry also attended a day-long training session led by Mrs. Lewis and Dr. Engelke of the Department of Mathematics. Dr. Engelke and Mrs. Lewis attended the U. Missouri Kansas City SI

training program in fall 2008 to help prepare for this work. Ms. Gina Garcia, our Coorindator of Transfer Student Services also attended this workshop to increase her knowledge of SI instruction and peer-mentor training.

The SI approach varies by department. In biology and chemistry, students in targeted SI courses have the option to attend SI sessions that are offered twice each week. In mathematics, students sign up for the SI as a separate 1.5 unit course and are required to attend in order to receive credit for the SI course. Since grant notification came after the spring 2009 schedule was released, students were unable to sign up for the workshops in advance. Based on direct recruiting efforts, students joined the workshop after the semester had already begun. The experience in mathematics was that many students welcomed the opportunity to get the extra support, and have reported that they appreciate – and perhaps need – the increased accountability that the SI provides. In all three disciplines, SI leaders attend the professor's lecture each day to ensure that their SI sessions are current, and to act as a role model for students in the course. SI leaders then meet with students 3 hours per week to work on problems based on that week's lessons. We are still working to identify the most effective means for offering SIs at CSUF.

At the time of this report we are mid-way through the semester and so do not have final grades to report. Initial data look promising, especially in calculus I, where there is a natural comparison group. In these three sections of calculus, 32 students participated in the workshop with 35 students choosing not to; however, more than half of these were because of scheduling conflicts. The combined data from the three workshop sections of Math 150A showed that 56 % of workshop students passed Exam I compared with 17 % of non-workshop students. On Exam II, the passing rates were 87 % (workshop) and 60 % (non-workshop). There was a mean difference of about 12 percentage points, or about one full letter grade, between workshop and non-workshop students on each exam. Moreover, to date, 8 of the non-workshop students have either dropped the course or are no longer attending; all of the workshop students are still attending the course and are expected to complete the course.

While students are self-selected into the workshops, there are no differences between the two calculus groups in terms of HSGPA or prior mathematics courses-taking or mathematics achievement. In fall, 2009, the mathematics SI offerings will be increased from 3 to 8 SI sessions targeting 16 sections, including two each of college algebra, pre-calculus, calculus I, and calculus II.

At SAC, Dr. Kathy Takahashi (Biology Faculty) and Crystal Jenkins (Chemistry Faculty) attended the University of Missouri-Kansas City SI training program. Four SI groups have been created supporting sections of an introductory biology course. Dr. Kathy Takahashi has oriented peer tutors and is assessing their effectiveness. The SI groups were piloted in Microbiology earlier this year. Supplemental individual tutoring is also being done with our STEM majors. Academic Excellence Workshops will be expanded to other content areas next year.

Mt SAC continues to offer SI courses established prior to TEST:UP and has an identified SI coordinator. Mt SAC is in the process of expanding its SI programs to other courses using TEST:UP resources. Although progress is lagging, Mt SAC is in the process of expanding its SI programs to other courses using TEST:UP resources as proposed.

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. We plan to implement this program beginning in Fall 2009.

To provide advice and to guide TEST:UP, we proposed to form internal advisory committees on each campus and to name an external advisory committee. These committees are to meet periodically to learn about TEST:UP programs and progress.

Training and Development

TEST:UP is working to engage faculty and staff from CSU Fullerton, Mount San Antonio College, and Santa Ana College in focused efforts to attract and retain more STEM students. The project itself involves replicated efforts on the three campuses to institute Supplemental Instruction and other programs to improve student learning and performance in key gateway math and science courses. At CSU Fullerton, the project is building on support from a Title V program to achieve this objective. Visiting faculty have been invited to campus to make presentations on SI or other learning enhancement programs that have been successful on their campuses. A College retention committee is actively engaged in discussions of supplemental instruction and other learning enhancement strategies and working on centralizing SI support across several college departments. TEST:UP participating faculty and the Coordinator for STEM Transfer Student Services attended a University of Missouri-Kansas City workshop to learn how to successfully develop SI programs. Thus, TEST:UP is providing a platform for faculty from math and science departments to discuss methods of improving student learning and performance in key STEM courses. 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 with community college faculty working to implement similar strategies at Mount San Antonio College and Santa Ana College. The full-time 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. 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. Moreover, 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.

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. In addition, we have successfully established a relationship with Citrus College and are working on a program to add this two-year college to our collaborative. We plan to increase contacts with other community colleges in the CSUF service area during the coming year and expand outreach activities to increase awareness of the value of a STEM education and career opportunities in STEM fields.

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 the 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 this kind of student population. 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. The 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. As mentioned above, it is too early to report results.

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 hope 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.

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. One of our key project staff will be entering a Ph.D. program at UCLA to continue work in these areas. We anticipate other TEST:UP participants advancing their careers with knowledge and experience obtained from our program.

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 Mount San Antonio College and Santa Ana College 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 are developing improved understanding of STEM programs and the needs of STEM students for counselors, advisers, and others on our campuses. In addition, we hope 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.

Special Reporting Requirements: Information Specially Required

We are extremely concerned about the impact of national and state budget reductions on our project. The State of California is facing huge cuts as it struggles to build the 2009-2010 budget. The CSU and community college systems are facing unprecedented cuts in revenue and responses to these cuts will significantly alter the baseline conditions in effect at the time this proposal was submitted. Reductions in state funding have already had a significant and direct impact on our project and will continue to result in the loss of tutorial and SI support programs for STEM students, from which TEST:UP was to build. In addition, our campuses will be admitting fewer students and will be offering fewer sections of STEM courses. This will almost certainly result in fewer STEM graduates and will likely slow the time to graduation for STEM and other students. These events are beyond our control but are clearly changing the landscape for our project.

At CSUF, admission of new students and almost certainly STEM majors will be down from previous years and our Fall 2009 schedule of mathematics and science courses will be serving at least 10% fewer students. Our summer 2009 program, which provides opportunities for students to complete entry level gateway courses in math and chemistry, has been cut by 67%. Similar impacts of budget reductions are affecting our efforts at Santa Ana College and at Mt San Antonio College. At Santa Ana College, the scheduled offerings were reduced by 10% this academic year. In addition, twenty-five percent of SAC's summer schedule has been reduced with more cuts looming. Current budget plans are for California's community colleges to receive an 11% budget cut and to reduce their enrollment by 250,000 students. These plans call for a 10% cut to the CSU system and a reduction in system wide enrollment of 50,000 students. These reductions are unprecedented for both the community college and CSU systems. Clearly, our project will be significantly impacted by the responses our campuses take to make ends meet in these difficult budget times. This summer, we will work together to determine whether adjustments need to be made in our projected use of NSF resources to maximize the impact of TEST:UP and our ability to achieve project goals. Given this situation, we are in the process of re-establishing our baseline data set so we can evaluate the impact of our programs. Indeed, if we can increase retention and graduation rates of STEM transfer students and increase or even maintain our rate of success in elevating student performance in our entry level STEM courses as a result of TEST:UP programs despite a significant cuts in resources we will have accomplished something of local and perhaps national importance.

Animals, Human Subjects, Biohazards

No changes to report.