

NSF Grant 0757113 Third Year Review Report
TEST:UP: Talent Expansion in Science and Technology-An Urban Partnership
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Project Summary

TEST:UP is a collaborative program, initiated in fall 2008, among three Hispanic Serving 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 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; and 5) improve mentoring and teaching skills of CSUF graduate students seeking community college careers. TEST:UP programs initially focused on mathematics and science students in the College of Natural Sciences and Mathematics (NSM) at CSUF. Engineering and Computer Science (ECS) students were peripherally involved since they take mathematics and science courses within NSM, but we have in the third year engaged ECS faculty and students directly. We envision that TEST:UP programs will impact hundreds of students on each of our campuses by significantly improving STEM learning environments and by facilitating the transfer of two-year students from Mt. SAC and SAC to CSUF or other four-year institutions. To accomplish the goals of TEST-UP, we 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 in seeking two-year college teaching careers.

1. What are the key activities of your project and how many students have been impacted by each of these? What is the nature of the impact? How does the quantity of impact compare to that originally projected by your proposal?

We are on track for meeting our goals for an increase of 25 STEM transfers and STEM AA degrees awarded per year and 20-30 more declared STEM majors per year at each of the partner community colleges. STEM degrees awarded at CSUF are holding about even in the face of budget-driven enrollment declines and impaction. The program's impact on increased STEM degrees awarded at CSUF would not be apparent yet, as only ~20% of STEM transfers historically graduate within 2 years of arrival. We have not met the goal of 4 CSUF graduate students teaching at the community colleges due to reluctance to take up faculty positions at a time of budget crisis in California, but have placed 3 in 2010-2011. We initiated a number of programs and processes to meet the stated goals. We hired one full-time Coordinator for STEM Transfer Student Services at CSUF and two half-time STEM Counselors and Advisors at Mt. SAC and SAC in 2008. 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 Student Services is traveling to the two-year campuses once per week, 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 has advised 145 CSUF STEM transfer students on the CSUF campus since the beginning of TEST:UP. The CSUF Coordinator employs 4 student peer advisors at CSUF through the grant and they have advised 244 STEM transfer students. These 389 advisement sessions represent 71.6 % of the total CSUF STEM transfers in that time period. The STEM adviser at SAC has seen 241 students and at Mt. SAC, which got a late start in years one and two of the grant, 207 students were advised. Of these, 78 SAC and 35 Mt. SAC students have transferred to CSUF as STEM majors as of fall 2010. Unless they come to CSUF, we have found that exit interviews are the only way of knowing if these SAC and Mt. SAC students have gone on to other four-year institutions-National Student Clearinghouse data were not found to be very accurate. SAC and Mt. SAC each reported 167 STEM transfers to four-year institution in the baseline year of 2006-2007, and respectively, 191 and 177 in 2007-2008, 208 and 189 in 2008-2009 and 204 and 226 for 2009-2010. SAC and Mt. SAC respectively awarded 44 and 255 STEM AA degrees in 2006-2007, 35 and 288 in 2007-2008, 38 and 321 in 2008-2009, and 40 and 365 in 2009-2010. *Note that SAC data for 2009-2010 are not very reliable due to a computer migration which also impacted the SAC tally of STEM majors, seen as corrected in 2010.*

The CSUF, Mt. SAC and SAC STEM advisers are actively encouraging student involvement in TEST:UP programs, advising students, and collaborating with existing student clubs and programs. At CSUF, a total of 23 educational events, 19 social events and 9 awareness events have been held for STEM transfers since program inception and funded by this grant. At SAC a total of 26 outreach and social events were sponsored since grant inception, including visits to CSUF and NASA laboratories, STEM Week activities, research weekends, conferences (such as SACNAS) and workshops on STEM opportunities and application processes to enroll in four-year universities. At Mt. SAC only 5 outreach and social events were sponsored by the grant since inception, as the program got off to a slow start on that campus in the first two years. We anticipate accelerated activities at Mt. SAC going forward as they inaugurated a new natural history and exploration center in a prime campus location.

The STEM advisers have developed educational and curricular roadmaps for STEM transfers. A STEM recruitment DVD was completed at SAC and informative STEM web sites at the three campuses are all now active and up to date. Good progress was made to more fully integrate STEM advisers with regular academic services on all three campuses, and to more actively involve STEM faculty in TEST:UP. Classroom visits in STEM subjects are increasing on both community college campuses with the permission of the Deans, department chairs and instructors, who generously allow class time to promote STEM awareness, career opportunities, surveys, and events. STEM weeks on the community college campuses and invited speakers from four-year institutions both provide forums to educate students on STEM career opportunities. One critical component of this has been to teach students how to apply to the CSU as a transfer student. We are leveraging our NSF STEP grant with other external funding by involving a number of SAC and Mt. SAC STEM majors in weekend and summer research experiences at CSUF supported by programs like the Howard Hughes Medical Institute (HHMI) biomedical research program, thus integrating the impact of the research experiences with the goals of TEST:UP. In 2011 we also initiated a research immersion during the regular semester for 5 new STEM transfers .

2. If relevant to your project or if otherwise possible, provide some basic demographic information about the participants impacted by the project.

The demographics at CSUF are 0.4% Native American, 2.7% African-American, 30.2% Hispanic, 21.2% Asian/Pacific Islander, 31.3% Caucasian, 7.2% unknown, 2.4% multiracial and 4.7% international. The campus is 58.8% female and 41.2% male. At SAC, the demographics are 0.6% Native American, 2.4% African-American, 42.7% Hispanic, 11.5% Asian/Pacific Islander, 33.0% Caucasian, 8.4% unknown, and 1.4% international. The campus is 61.6% male and 38.4% female. At Mt. SAC the demographics are 0.5% Native American, 5.7% African-American, 43.8% Hispanic, 26.0% Asian/Pacific Islander, 16.8% Caucasian, 5.4% unknown, 1.8% non-white, and an unreported % international. The campus is 52% female and 48% male. The ethnic make-up of the STEM graduates at CSUF has remained relatively constant for the past five years averaging 0.8% Native American, 2.2% African-American, 15.1% Hispanic, 31.9% Asian/Pacific Islander, 31.0% Caucasian, 12.3% unknown, 6.8% international and 1.0 % multiracial. In the international student area, ECS has 10.3% and NSM has 4.3%, while the other areas are very similar. Overall, the CSUF STEM graduates were 65.3% men and 34.7% women, with ECS graduates predominately male (88.0%). In contrast, NSM graduates were almost equal for the genders (49.6% men and 50.4% women).

3. What successes have you experienced as a result of this STEP project?

a. **Program Goals** - We are being successful in meeting our goals for an increase of 25 STEM transfers and STEM AA degrees awarded per year and 20-30 more declared STEM majors per year at each of the partner community colleges. STEM degrees awarded at CSUF are holding about even in the face of budget driven enrollment declines and impaction. Some of the SAC data for 2009-2010 are not reliable due to a computer migration, namely 4 year transfers and AA degrees and new declared STEM majors. We see the new declared STEM majors at SAC corrected in 2010 and targets were raised to reflect the correction (see appendix).

b. **Graduation of STEM Majors**-The number of STEM transfer student graduates from CSUF showed an upward trend that reached a plateau when enrollments were reduced: CSUF STEM transfer graduates in NSM and ECS numbered 199 in 2006-2007 (88 ECS,111 NSM); 223 in 2007-2008 (91 ECS,132 NSM); 235 in 2008-2009 (92 ECS,143 NSM); and 213 in 2009-2010 (73 ECS,140 NSM). It typically takes more than two years for STEM transfers to graduate with a four year degree at CSUF, so the overall impact of the enrollment reductions and impaction versus the goals of the TEST:UP program cannot yet be discerned. Enrollment factors will negatively affect achievement of the desired goals.

c. **Increased STEM Awareness**-The Coordinator for STEM Transfer Student Services and the CSUF PI and co-PI's have worked together to develop and hold programs throughout the year 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. As noted above, the STEM Transfer Student Coordinator, the STEM advisers on the community college campuses, and the peer advisors at CSUF have advised over 800 STEM students, held numerous social and educational events for STEM students and actively recruited STEM students with the cooperation of faculty and staff at the community college campuses. In 2008, SAC events (# students) included a student mixer with faculty (13), outreach activities (50), and an activity to create awareness of STEM careers (20). SAC launched a faculty mentoring program in January 2009 with a mentor/mentee mixer. In 2009, SAC brought 8 students to CSUF to take part in a Career Day event to hear about STEM careers. Classroom visits to SAC biology and chemistry classes to promote the TEST:UP

program reached 390 students in fall 2009. STEM week activities included 2 showings of the video, "Naturally Obsessed: The Making of a Scientist," with 214 students attending. A STEM Career Panel attracted 60 students and 20 came to a CSU application workshops Early Decision advisement for local high school students attracted 27 participants. Five SAC STEM students participated in the Howard Hughes Medical Institute (HHMI) biomedical research weekend research experiences at CSUF. Further in 2009 (# students): a CSUF campus visit and lab tour (6); a STEM resume workshop (9); a field trip to the NASA Jet Propulsion Lab open house (18); a CSUF transfer student orientation (12); the Richard Preston video "Hot Zone" attracted 241 participants,; and an event entitled "Partnership for Transfer Success" had 25 participants. In fall 2010 at SAC (# students): a CSU application workshop (38); a workshop on undergraduate research opportunities (9); STEM week featured a video showing of "State of the Planet's Wildlife" (118), a STEM resume workshop (38) and a STEM faculty/student mixer (38); 4 attended a conference etiquette workshop; 200 new SAC students saw STEM classroom presentations on TEST:UP; 4 attended the SACNAS national conference in Anaheim; and 4 more participated in HHMI weekend research experiences at CSUF. Recruitment materials advertised the TEST:UP program, and a book voucher system has been put into place for use in conjunction with the mentor program. Mentor and mentee information packets were also produced and a DVD was made to recruit students into the STEM majors. SAC purchased 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, the Biology Study Center. Instructional assistants and tutors for STEM students are hired each semester and both the Supplemental Instruction (SI) Program and the Tutoring Program are being held in this facility. A Science Club was founded 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 at SAC.

A pre-transfer survey was developed in fall 2010 and administered in December to ~600 students in STEM classes at SAC and ~600 at Mt. SAC. The survey is aimed at assessing preparedness for transfer to a four-year institution, and identifying key stumbling blocks, both real and perceived, in the STEM transfer process. The services of an outside consultant were contracted to code the data and detailed analyses have started. A post-transfer survey has been developed for administration to STEM transfers who come to CSUF, to be administered in spring 2011. This latter survey will help gauge the success in smoothing the STEM transfer process and point out weaknesses that require improvement.

For a number of reasons, Mt. SAC started off much more slowly than SAC in implementing the tools to achieve the program's mission. In year 3, we have welcomed the participation of Prof. Iraj Nejad in the TEST:UP program at Mt. SAC and activity is picking up nicely so there will be lots more to report from Mt. SAC in the future. In spring 2009, 3 Mt. SAC STEM students visited CSUF. In fall 2010, 13 students participated in a CSUF/Cal Tech visit to discuss STEM transfer and career opportunities, 14 participated in a UCLA visit, and 30 high school students participated in early registration STEM counseling. The CSUF Coordinator for STEM Transfer Student Services met with science and mathematics department chairs and faculty and gained access to introduce TEST:UP in classroom visits and to administer the pre-transfer survey described earlier to 593 students. The sciences at Mt. SAC recently relocated into a new building containing a study center that houses tutoring services and supplemental instruction activities. A study campaign similar to the 25-35 empowerment campaign at CSUF (encourage students to study 25-35 hours per week outside of class time) has been implemented at SAC with the goal of

increasing student study time in STEM courses. Students and their families often do not recognize that compared to high school, much more time is needed outside of the classroom to succeed in college. This is particularly true for first generation college students. The College of NSM has also implemented and funds an NSM Day that takes place before the start of the first semester at CSUF for both transfer students and first time freshmen. This is a program that augments orientation activities by bringing in new students and their families to learn more about time management and requirements for success in STEM fields at no cost to participants. These bilingual NSM days typically attract ~150 participants. NSM has also instituted mandatory on-campus academic advisement for newly arriving transfer students beginning June, 2011 registration is put on hold until they receive advisement. This will help ensure that students are taking the right paths for initial placement in appropriate mathematics and science courses.

An on-line Early Warning System was developed in 2010 to identify at-risk students in NSM and ECS within their first semester at CSUF. The system requests that faculty respond to four simple questions for all new CSUF STEM students (transfers and first time freshmen) within the first 3-4 weeks of the semester on indicators such as attendance, quizzes and homework assignments. Students identified as being at-risk are individually contacted and invited/encouraged to see the CSUF Coordinator for STEM Transfer Student Services to make plans to improve their time management and performance in class. Initial data indicate that transfer students are less likely to take advantage of intrusive interventions as compared with first time freshmen.

d. Improve the retention of transfers (and other students)- NSF STEP funding has contributed to a positive impact on our ability to retain STEM majors. The percentage of first time STEM freshmen students retained as majors in the College of NSM has increased from 59.0% to 68.4% since 2007 and at ECS retention has increased from 50.8% to 67.8%. These are listed in the appendix as intermediate indicators. We are now gathering this information for transfer student retention rates based on these encouraging results for freshmen.

e. Improve student learning by instituting supplemental instruction (SI) programs. We implemented SI programs adopted after the University of Missouri-Kansas City model at CSUF and SAC. Mt. SAC had already implemented SI using this model prior to the grant and uses TEST:UP funds to expand SI workshops. Results to date indicate consistent grade point average improvements and passing rate improvements in key gateway STEM courses. At CSUF, a goal was to improve SI strategies and to expand conversations with community college partners to develop a regional SI network. In spring 2009 ten (10) SI workshop sections were offered including an introductory level biology lab course, pre-Calculus, ,Calculus I, and , Calculus II. In fall 2009, SI workshop sections rose to 17 with additional courses added including Organic Chemistry I, and College Algebra. In spring 2010, SI workshops increased to 20 sections and now also included Organic Chemistry II, and Physical Chemistry II. In fall 2010, SI workshops increased to 35 with additional courses now including Cellular Basis of Life, and Introduction to Programming, Programming Concepts and Data Structure Concepts, three gateway computer science courses in ECS. In spring 2011, CSUF is fielding 39 SI sections, and all entirely funded by this grant with re-purposed funds .Through the end of the fall 2010 semester, approximately 2,657 students have been involved in 3 or more sessions of the SI workshops at CSUF, including 97 in chemistry, 811 in biology, 1,555 in mathematics and 117 in computer science. These SI workshops have been very successful. In introductory gateway biology courses the average improvement in GPA (students attending SI sessions regularly versus those who did not participate in SI) is 0.72 going from 2.25 to 2.97. In mathematics, the

improvement in GPA is 0.50 going from 1.90 to 2.40, and the passing rate for SI participants was 82% versus 69% for non-participants. More data are needed to statistically define the impact of SI in improving student GPAs in chemistry and computer science. As we continue to collect more data with the SI experience at both CSUF and our community college partners, we expect to define statistical confidence in results and to use these data to publish and share with the higher education community. Further, we hope to demonstrate that the use of SI in STEM courses improves graduation rates and retention in STEM majors so that we can economically justify the institutionalization of these activities. Each of the SI sessions is led by a student who has strong content and communication skills. The SI leaders in all of the disciplines also attend a day-long training session led by professors from the disciplines, most of whom have attended the U. Missouri Kansas City SI training program. 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 unit course and are required to attend. In computer science 147 students had the opportunity to join the workshop after the semester had already begun and 117 participated. In all the 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 at least 3 hours per week to creatively work on problems based on that week's lessons, using tools like the 'Jeopardy' game to engage students. Each SI leader receives ~ \$1,500 per semester as compensation for their time. At SAC, SI groups were created in spring 2009 supporting 2 sections of an introductory microbiology course. In fall 2009, SI was expanded to 4 biology sections; in spring, 2010 SI was expanded to 8 biology sections, and in fall 2010, SI was offered in 8 biology and 2 mathematics sections. Due to SAC's rapid immersion in the TEST:UP program, additional re-purposed funds were provided to support SI activities. Dr. Kathy Takahashi has oriented peer tutors at the CSUF training sessions and is assessing their effectiveness. Results to date indicate improved retention in classes and higher grades. In fall 2009-2010 average retention rates with SI increased from 71% to 92% in biology courses and from 80% to 96% in math courses. Grades (%) improved from 69% to 83% in biology courses and from 78% to 91% in math courses. Data for fall 2010 are under analysis. Mt. SAC continues to offer SI in courses established prior to TEST:UP and Eva Figueroa is the SI coordinator on campus. Mt. SAC is expanding its SI programs using TEST:UP resources starting in fall 2010, with 265 students participating in the following courses: 50 in PHYS 2AG (general physics I), 25 in PHYS 2BG (General Physics II), 75 in BIO 2 (Plant and Animal Biology), 55 in CHEM 40 (Introductory Chemistry), 30 in CHEM 80 (Organic Chemistry), and 30 in MATH 160 (pre-Calculus). Mt. SAC experience in the past two years also indicate similar and consistent improvements in passing rates and GPA with students attending at least 6 SI sessions in math and science and shown in the appendix.

4. Have the project activities been integrated within your (department, school, college and/or university)? If so, what is the nature of the integration?

The Colleges of NSM and ECS have now funded the cost of mandatory face-to-face transfer student advisement. Institutionalization of SI is expected to garner financial traction at CSUF as part of the overall CSU initiative to increase graduation rates. As noted, NSM hosts an annual bilingual NSM Day to further orient new students and their parents to achieve success in college.

5. Has this project had any impact beyond the intended project goals, for example on other students, faculty, departments, or institutions?

Within CSUF, SI is expanding to the College of Business and Economics to overcome mathematics-based bottleneck courses like accounting and statistics. At the recommendation of the External Review Board, we are hoping to organize a Southern California conference on SI with the aim of publishing results for the benefit of the STEM educational community. The community college partners recognize the value of SI which is already institutionalized at Mt. SAC. SAC is very enthusiastic about SI and are hoping to make it required in the key math and science courses, as they have some flexibility in hours per course without changing the units.

6. If you have partner institutions, what are you achieving through the partnership(s)? Has the role of your partners changed from what was specified in the original proposal?

The enhanced STEM awareness on both campuses is evident from the many activities and student attendance noted previously. A major achievement has been the STEM advisement to augment the usual counseling activities at the community colleges which transcended traditional barriers. The faculty at both community college campuses have been very supportive and participatory in advancing the goals of the program, especially advisement in the majors and on the transfer process. SAC introduced SI as a result of the TEST:UP funding, and results have been very good and consistent with what has been observed on the other campuses.

7. Have you had any positive surprises, including unexpected benefits from this grant?

Now that SI has had many positive outcomes, the native STEM populations of all three campuses are telling their friends to sign up. So the “buzz” has encouraged more demand for SI among the STEM populations. We also found anecdotally that SI peer mentors show increased interest in teaching math and science. Undoubtedly the largest benefit has been much strengthened ties between CSUF, SAC and Mt. SAC, and more understanding and appreciation of the challenges and opportunities to guide future efforts.

Other project attributes: Challenges/Adaptation/Assessment/Sustainability

8. What challenges have you faced when implementing your STEP project?

The budget crisis in California forced 10% fewer enrollments in 2009-10 and a large reduction in STEM class offerings; decreases in upper division transfer student admissions to CSUF occurred in fall 2009 followed by a sharp reduction in spring 2010 admissions (33 spring 2010 transfer admissions vs. 2,681 in spring 2009) due to the budget-driven need to control enrollment; reductions planned for 2010-11 were temporarily alleviated by California’s FY 2011 budget. For 2012 it is almost certain that severe budget driven reductions in upper division transfer student admissions will take place. These factors resulted in the number of STEM transfers from all community colleges to the Colleges of NSM and ECS decreasing since 2006-07, the year before we received STEP funding (e.g., 368 per academic year in 2006-2007; 324 in 2007-2008; 307 in 2008-2009; and 236 in 2009-2010). In fall 2010 STEM transfer enrollment in the two CSUF STEM colleges was 314, and CSUF is currently accepting spring 2011 transfers. For SAC and Mt. SAC, the same trend was apparent with 68 STEM transfers to CSUF per academic year in 2006-2007 (36 Mt.SAC, 32 SAC); 48 in 2007-2008 (23 Mt. SAC and 25 SAC); 38 in 2008-2009 (13 Mt. SAC and 25 SAC); and 35 in 2009-2010 (13 Mt. SAC and 22 SAC). CSUF implemented an impaction plan that raised the admission criteria for transfer students outside Orange County (3.7 GPA), our local admissions area. This contributed to the decline in incoming transfers from Mt. SAC, which is in Los Angeles County outside of our service area, during 2009-10 and will likely continue to impact Mt. SAC admissions to CSUF. So far there are 40 transfers from our partnering community colleges in fall 2010 (9 Mt. SAC and 31 SAC) with more expected this

spring. Budget difficulties in California make the numbers of transfers to be admitted to CSUF during 2011-2012 uncertain at this time. Collective bargaining agreements at the community colleges specify the roles of counselors and faculty members. Faculty members are generally not allowed to be directly involved in the advisement process. This makes it difficult to impress on students the hierarchical nature of STEM curricula, requiring prerequisite courses to progress on to upper division courses at the four-year institutions. With cooperation from the Deans at Mt. SAC and SAC, the influence of our on-site counselors, and weekly visits by our Coordinator for STEM Transfer Student Services, we have succeeded in breaking down some of these traditional barriers, despite considerable resistance at the outset. We found that transfer students are not very receptive to intrusive interventions, like our early warning system. They believe that they do not need it and/or that they are so used to less help that they do not see the need to change. Community colleges do not always have the data infrastructure to provide a number of information items we need to track students. Some do not have email or other means to communicate with students. Most difficult is determining transfer statistics for students who move on to four-year institutions; indeed information from the community colleges is based on exit interviews, as noted previously. National Student Clearinghouse information was found to be inaccurate. Due to a number of issues, including illness of key personnel the program got off to a slow start at Mt. SAC. The unspent funds at Mt. SAC from years one and two were re-purposed.

9. Describe any significant changes or deviations from the planned grant activities that you have made or would like to make. Explain why these changes were necessary or seem to be necessary. Provide an explanation about how these changes have already impacted or are expected to impact the project.

A total of \$149,295 in funds allocated to Mt. SAC were not spent in years 1 and 2. These funds were re-allocated to Santa Ana College and CSUF to support programs associated with the grant. With the addition of Prof. Nejad to the program, we believe we will now be able to more actively engage Mt. SAC. SAC is using re-purposed funds to further support their successful SI program by adding 15 more SI sections to assist students in mathematics and biology courses. In addition, SAC will use these funds to augment their presentation and instructional resources supporting STEM courses. CSUF is using re-purposed funds support 39 SI sections in math, biology and chemistry in spring 2011. In addition, funds are being used to support a one-year year appointment for a STEM Student Success Coordinator who is coordinating the early warning system described previously, running a STEM student retention campaign, evaluating historical and current transcripts of STEM transfer students to assess transfer-student preparedness for a four-year STEM degree program, and administering and analyzing pre- and post-transfer surveys developed specifically for this program. The latter two activities will provide increased capacity to evaluate the success of our advisement program and point out needs for change. We will be piloting a new program that places transfer students in STEM research groups or research-themed learning communities. We are adding this last element, which will involve transfer students in undergraduate research, as a result of our highly successful HHMI, REU, and US Department of Education funded projects that have brought community college students to CSUF to engage in undergraduate research in the past.

10. What intermediate measures and metrics are you using to monitor the progress of your project? [For example, say the primary goal of your project is to improve graduation rates and one of the strategies you proposed to implement was changing the way that you teach

calculus courses. An intermediate measure of success for your project might be improvements in calculus pass rates because improvements in pass rates would likely translate into improved graduation rates by the end of the grant period.]

We have intermediate measures of success, particularly the SI impacts on GPA and passing rates and the overall improvements in retention of STEM majors as shown in the appendix. In the courses where most data have been collected on SI at CSUF since 2005-2006, we are finding in Calculus I a GPA increase for STEM transfers from 1.545 to 1.845 and passing rate increase from 49.25% to 64.25% and in Biodiversity and Evolution we see a GPA improvement for STEM transfers from 1.695 to 2.76 and a passing rate increase from 49.45% to 83.95%. Also noted previously, we are meeting our goals of increased numbers of STEM majors at the community colleges and increased STEM AA degrees.

11. Do these intermediate measures indicate that you are on track to meet your project goals? Include data that support your response.

Yes, we believe that we are on track and the supporting data are summarized in the appendix.

12. What actions have you taken to address sustainability of this project beyond the grant period?

With the economic problems in California, the sustainability of the successful programs of TEST:UP will need to be defined in monetary terms. Quite simply, improved graduation rates will save money at the CSU/State level and the CSU system has an initiative to increase graduation rates. The programs we are evaluating in TEST:UP are expected to point the way towards higher graduation rates among our STEM transfer students. TEST:UP programs are consistent with and are informing CSU system wide and CSUF campus efforts to increase the graduation rates of all CSU students. Hence, opportunities may be available to institutionalize the best practices of TEST:UP to achieve this objective in STEM and very likely other CSUF disciplines. As noted earlier, the CSUF colleges are now sponsoring/funding better advisement practices for STEM transfers and their families.

13. What is the relationship between the grant activities and the internal advisory committee (IAC)? How has the IAC been involved in assessing progress, addressing challenges or facilitating change, if needed, and addressing sustainability? How often does the IAC meet and are minutes recorded?

To provide advice and to guide TEST:UP, we formed internal advisory committees on each campus and named an external advisory committee to serve the three institutions. These committees meet periodically to learn about TEST:UP programs and progress and to offer advice on factors that affect the program and to make suggestions for improvement. The CSUF IAC meets twice per year and minutes are recorded. The CSUF IAC keeps us apprised of budgetary and legislative developments in the State, and their potential impacts on our program. The IAC at CSUF is chaired by the Vice President for Academic Affairs, and members include the Associate Vice President for Undergraduate Programs, the Associate Vice President for Student Affairs, the Dean of NSM, the Associate Dean for ECS, and the chair of the Mathematics department. At SAC, the internal advisory committee has met each semester since the start of the grant. The committee is chaired by the Vice President of Instruction, with the CSUFSTEM Transfer Student Services Coordinator, the Counseling director, the math department chair, 2 biology professors, and Dean of the science and mathematics college. The IAC at Mt. SAC meets every semester. The advisory committee at Mt. SAC is chaired by the Vice President of Instruction and the other members are the Dean of Natural Science, the Dean of Instruction, the Associate Dean

of Counseling, the Director and Assistant Director of Learning Assistance programs, 2 chemistry professors, a biology professor, a mathematics professor and an earth science and astronomy professor.

14. What is the relationship between the grant activities and the external advisory committee (EAC)? How has the EAC been involved in assessing progress, addressing challenges or facilitating change, if needed, and addressing sustainability? How often does the EAC meet and are minutes recorded?

The external advisory committee meets twice each year and minutes are recorded.

The external advisory committee, comprised of faculty members from CSU San Marcos, UC Irvine, and Pasadena College, and the Vice President for Education at the Discovery Science Center, a non-profit science education “museum”, has provided speakers for seminars on SI, suggested the regional conference on SI with the aim of collecting the pertinent data and publishing results, and has provided valuable insight on use of human subjects for our surveys.

15. What have you learned from this project and its implementation? What advice would you offer to new STEP PIs?

There are many important differences between community colleges and four year institutions that impact successful interactions and success of the STEP programs. These include: the difference between advice given by community college counselors and academic advisors versed in STEM majors and careers, often leaving students unprepared to move forward in STEM areas; collective bargaining agreements that determine whether or not STEM professors can advise students on STEM issues; the differences that exist in accessibility of institutional data and identification of citizenship/permanent residence; the differences in infrastructure for communicating with students; the reluctance by students to declare a major at the community college; the fact that most community college students attend more than one community college; the differences in withdrawal policies; the lack of support from families who have no college experience; the shortage of financial aid available to allow students to spend more time on task; and the differences in attitudes of first time freshmen and transfer students including negative reaction by transfers to intrusive interventions. On the positive side, on both community college campuses and at four year institutions: student awareness of STEM opportunities and careers can be raised with activities and on-site STEM transfer counseling; supplemental instruction is effective in increasing grades, passing rates and retention of STEM majors; and trusting relationships can be built over time by producing results with non-obtrusive methods.

16. Finally, please provide an overall summary of how the state of your project relates to your original targets and to the other goals of the project. Include numerical data about students majoring in fields affected by your project compared to the originally proposed projections.

We are meeting our goals on increasing declared STEM transfers and STEM degrees awarded at the community colleges. We are holding our own on STEM graduates at CSUF despite dramatic budget impacts on enrollments. Lower enrollments and impact have not allowed us to reach our goals on increased STEM transfers to CSUF, and it is too soon to judge impact on graduation rates due to TEST:UP. We are now close to meeting goals on placement of CSUF graduate student instructors at the community colleges. Intermediate indicators of success include much improved retention rates for STEM freshmen (analysis for transfers has started) and much improved passing rates and GPA with SI. All data are summarized on the attached chart.