

**TEST:UP External Evaluation: Program Year 2 (2009-10)**  
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**Introduction**

This report summarizes findings from the Year 2 external evaluation of the Talent Expansion in Science and Technology: An Urban Partnership (TEST:UP) program. Funded by a National Science Foundation (NSF) STEP grant, TEST:UP is based at California State University, Fullerton (CSUF), Mt. San Antonio College (Mt SAC), and Santa Ana College (SAC). CSUF is a public four-year university located in Orange County, enrolling over 36,000 students; it is the number-one transfer destination for students in the state's community college system. Mt SAC and SAC are neighboring public two-year institutions in the cities of Walnut and Santa Ana, respectively; together, these two colleges enroll about 80,000 students. TEST:UP is a multi-component initiative designed to increase 1) student matriculation, persistence, and degree attainment in STEM<sup>1</sup> majors at these three campuses, and 2) student transfer from SAC and Mt SAC to CSUF in STEM fields. Lessons from these efforts will be used to inform similar initiatives nationally.

TEST:UP is currently preparing for a comprehensive NSF review at the end of Year 3 (Spring 2011) (TEST:UP has secured NSF funding for four years, with a possible fifth-year extension). This report is intended to provide feedback on program progress in advance of the comprehensive review. I first describe major program highlights in the past year, and then discuss current and upcoming challenges. I conclude with several questions and recommendations that focus on capacity-building, indicators of success, and raising the program's profile in both the STEM and student transfer communities.

At the time of this report, top TEST:UP leadership at each campus is shifting. At CSUF, PI and Dean of the College of Natural Science and Mathematics (CNSM) Steve Murray is moving to senior administration at the university; the new PI of TEST:UP will be Mark Filowitz, Associate Dean of CNSM (Robert Koch has been appointed the new Dean of CNSM). At SAC, Carol Comeau has a new position as Interim Dean of Business (in addition to her position as Dean of the Science, Math, and Health Science Division), and although she will remain as Co-PI

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<sup>1</sup> "STEM" denotes science, technology, engineering, and math disciplines.

of TEST:UP, she is bringing Dr. Cheryl Carrera, Chair of the Mathematics Department, into the leadership team to help oversee the grant. Similarly, at Mt SAC, Co-PI Larry Redinger may bring in someone new to run the program on a day-to-day basis; more details on Mt SAC TEST:UP administration are forthcoming. These current and prospective changes will be discussed more fully throughout the report.

### ***Methods of Evaluation***

My evaluation methods mainly include interviews with members of the executive team and with faculty and staff affiliates, as well as extensive document review. I have conducted an analysis of the CSUF STEM enrollment and degree data that were submitted to the NSF as part of TEST:UP's annual reporting cycle. I also have been working closely with TEST:UP's STEM Transfer Student Services (STSS) Coordinator, Cathy Fernandez-Weston, to develop surveys for STEM transfer students at participating TEST:UP campuses. This report draws from all of these activities to gain insight into this dynamic program.

## **Major Program Successes and Challenges:**

### **Results of the "Check-In" Interviews**

In June and July 2010, I conducted "check-in" interviews with TEST:UP's incoming PI, Co-PIs, and affiliated faculty and staff in order to learn about program accomplishments and challenges over the past year (see Appendix A for a copy of the interview protocol). My interview group included: Mark Filowitz, incoming PI, CSUF; Carol Comeau, Co-PI, SAC; Rochelle Woods, Co-PI, Assistant Dean for Student Affairs, CNSM, CSUF; Martin Bonsangue, Co-PI, Professor and Vice Chair, Department of Mathematics, CSUF; Cathy Fernandez-Weston, STEM Transfer Student Services Coordinator, CSUF-SAC-Mt SAC; Kathy Takahashi, Professor of Biology, SAC; and Sean Walker, Associate Professor of Biology, CSUF (via email).<sup>2</sup> I was unable to arrange an interview with Larry Redinger, Co-PI, Mt SAC, despite several invitations.

The following represents a summary of those accomplishments and challenges as identified by interview participants. Because Mt SAC was not included in my interview group, this summary reflects progress at two of the three core TEST:UP campuses.

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<sup>2</sup> I also have had ongoing correspondence with founding PI Steve Murray throughout the past year.

## ***Major Program Accomplishments***

1. The Supplemental Instruction (SI) workshops at CSUF are widely regarded as a major program success. Implemented at many campuses around the country, SI workshops go beyond traditional tutoring models, and provide peer-based support and instruction for gateway STEM classes with historically lower passing rates.<sup>3</sup> At CSUF's CNSM, SI efforts are ably steered by Marty Bonsangue and Sean Walker; their ongoing research indicates that these workshops enhance student achievement in the STEM courses where they are offered. With each semester, more SI workshops are being made available in CNSM, reaching increasing numbers of students (Math and Biology departments have led the way in SI, with Chemistry slowly ramping up). There is also evidence of positive professional development outcomes for the SI student leaders. CSUF is seeing increasing levels of faculty buy-in for these workshops (or at least greater "openness" rather than "skepticism"); the increasing popularity of SI reflects a culture shift towards more student-centered pedagogies and STEM learning environments.

SI efforts at SAC also have been promising. As Carol Comeau and Kathy Takahashi explained (Kathy has been the SI coordinator for the TEST:UP grant at SAC), getting SI off the ground has presented a few challenges; there are some logistics of SI that do not readily align with existing parameters of a two-year campus, e.g., finding SI student leaders who can run the workshops on a regular basis, and hiring processes that are asynchronous with academic calendars. However, the initiative is moving forward, and in fact, starting Fall 2010, select gateway math courses will now require students to attend SI-like discussion sections, indicating that the format is "catching on". Assessment of SI is underway; student grades, course passing rates, student evaluations, and workshop observations all comprise a constellation of assessment activities helping Kathy, Carol, and others to make refinements and continue to build up SI (to add to these data, the STEM "Pre-Transfer STEM Student Survey", described below, includes questions about students' SI participation and perceptions). As Kathy and I discussed, it might be helpful to make connections with other two-year institutions around the country that have implemented SI with success.<sup>4</sup>

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<sup>3</sup> SI can be used for non-STEM courses as well—see <http://www.umkc.edu/cad/si/index.shtml>.

<sup>4</sup> La Guardia Community College is one example—see the presentations of the 6<sup>th</sup> International Conference on Supplemental Instruction, online at: <http://www.umkc.edu/cad/si/ic2010/abstrats.shtml>.

2. A second major program accomplishment is establishing connections between two- and four-year campuses, i.e., bringing people from these two types of institutions together in ways that they had never been brought together before, and building a common language to facilitate partnership and collaboration. The language aspect was cited as particularly important—heretofore, institutions did not “speak the same language”, which was a major obstacle to meeting mutual objectives. TEST:UP has essentially bridged the language divide by creating mechanisms that are shared by each campus and support teamwork (e.g., the STEM Transfer Student Services Coordinator). Conversations can begin with these common mechanisms. (For the anthropological or linguistic evaluator, it would be interesting to trace how the language of each group is interpreted and adapted by the other, and how new meanings and frames—a new interpretive structure for student transfer and institutional partnership—emerge at intersection points. How is TEST:UP a game-changer in the very words used to describe the transfer process?)

3. A third program accomplishment is cultural: STEM community-building at SAC. Pre-TEST:UP, SAC was in the initial stages of re-visioning campus support and opportunities for its STEM students. Having TEST:UP helped to focus and facilitate institutional efforts in this area. TEST:UP funds have been used to build a Biology Study Center, and strengthen counseling and mentoring services. Events such as film screenings on science-related topics have been offered, with great student turnout and feedback. These efforts raise the visibility of STEM on campus, and show off how much faculty are invested in the success of STEM students. They are designed to give current and potential STEM majors an “identity”, to reinforce their sense of belonging in these fields and improve their access to academic support and information. Over time, it will be important to explore how this environment promotes not only community and identity, but student persistence in STEM fields.

4. A fourth accomplishment: TEST:UP is seeing improvement in the transfer student experience at CSUF. Cathy Fernandez-Weston points to the increase in foot traffic at her office as evidence; building on the tracking efforts of her predecessor Gina Garcia, Cathy is in the process of logging this foot traffic and documenting how more and more transfer students are seeking her out and coming to her office for advice, aware of STSS and the support it can provide. Cathy notes an increase in the number of students who are applying to the STEM

Transfer Scholar program as well: this year, 34 students applied, and 12 were awarded scholarships, as compared with last year's 13 applicants (and 12 awards).

The "Early Warning System", designed to a) identify transfer students in CNSM who are at risk of academic probation early in the semester and b) counsel them on effective course-taking and study strategies, has been moved from a very laborious paper-and-pencil format to a more efficient electronic platform. Cathy's preliminary assessment efforts indicate that of the students who participate in Early Warning counseling (it is a voluntary system), only a small number actually end up on probation. Cathy is working to build up these assessment efforts to be able to examine impact, e.g., analyzing the rate of academic probation among "at risk" transfer students who did not visit STSS for focused counseling, although there are challenges to collecting these data (as discussed on page 7).

5. A fifth program success is the development of new survey instruments designed to measure STEM students' experiences pre- and post-transfer (i.e., at two- and four-year institutions). At the time of this report, these surveys are being finalized and piloted, and administration plans are being hammered out for each TEST:UP campus. Cathy and Ricardo Lopez led the survey initiative, consulting several existing surveys of community college students and relevant literature in designing the questions. The resulting instruments cover multiple aspects of the STEM transfer process from the students' perspective, including: self-assessed confidence in and awareness of STEM curricular requirements pre- and post-transfer; catalysts and challenges to the transfer process; intended STEM major and highest degree planned; level of preparation in science and math prior to transfer; and evaluation of STEM advising networks and supports. These instruments can be used for both research and evaluation purposes, and ultimately shared with other campuses.

The instruments, set to officially launch in Fall 2010, are part of larger TEST:UP data collection efforts described in full below.

### ***Challenges/Areas of Concern***

1. Transitions in leadership were cited as a possible challenge. The fact that TEST:UP PI/Co-PIs at all three campuses are moving to new roles, bringing in new leadership, and/or sharing leadership in new ways brings a bit of complexity to the table, eliciting questions about continuity. However, it is also clear that the influx of new ideas and perspectives will be a great

opportunity for TEST:UP to gain momentum. Moreover, as one interviewee explained, changes in leadership are inevitable in long-term grants, and the “greatest measure” of a program’s success is its ability to “withstand” these changes. It will be critical to keep a continuous flow of information going, to and from former executive team members, current team members, advisory board members, and staff and faculty on the ground; and conversations must seamlessly continue on goals, progress, and metrics at and across each campus. These conversations must be transparent and participatory.

Other transitions in TEST:UP positions are happening as well, i.e., it is not only leadership at the top that is shifting (e.g., Assistant Professor Nicole Engelke is assuming responsibility for SI oversight in CSUF’s Math department, taking over for Kathy Lewis). This is also to be expected, as parameters of each component and faculty and staff commitments evolve. The challenges can be obvious and not so obvious—but the key is to take these transitions as opportunities to build momentum towards project goals.

2. Preparing for the Year 3 review was noted as a challenge (or more precisely, a major task ahead), purely from the perspective of being able to marshal all of the available and relevant data, bringing these data together in one place, integrating various perspectives and voices into a cohesive narrative, and producing the requisite documents. It was advised that conversations begin now about what this will look like (i.e., the process and the final product); it’s essential to get a game plan going early, and build the team accordingly.

3. Others cited the challenge of institutionalizing components like SI at CSUF once TEST:UP and related funding end (to date, Chris Renne’s Project GPS2 grant has been partially subsidizing costs of SI). While one interviewee explained that the prospects for institutionalizing “look better and better”, he emphasized that “making the case” depends on showing the institutional cost-savings associated with having SI workshops (i.e., SI participation improves pass rates and reduces course-taking repetition, moving students more quickly and efficiently through degree programs). Others noted that efforts to institutionalize SI might benefit from:

- having a dedicated and/or permanent physical space for workshops and leaders;
- working with and leveraging existing and related campus services (e.g., CSUF’s Learning Resource Center); and

- thinking towards an appointment of an SI Director (75-100% time)—this person would help to synthesize SI across departments, and raise SI’s visibility at the college and university levels.<sup>5</sup>

However, it was stressed that the current department-by-department structure of SI does not undermine its positive impact, nor the assessment of its impact; Marty and Sean have enjoyed a productive and powerful research and assessment collaboration that brings data from all departments together and analyzes workshop efficacy. I discuss possible next steps for this collaboration—including further conversation with SI faculty at SAC—below.

4. A fourth challenge is lack of or limited access to key transfer student data that could facilitate TEST:UP’s internal and external evaluation activities. This includes academic probation data that Cathy must collect in order to evaluate the effectiveness of the Early Warning System (these data are not available and distributed in any kind of regular, systematic way for CNSM). This is a structural issue confronting not only TEST:UP, but all educational programs and interventions that could benefit from such information. It is an extremely complex issue as well, i.e., resolving the need for program data with concerns and regulations surrounding students’ privacy, and disconnects between long-standing institutional data mechanisms and “on the ground” assessment efforts. How will TEST:UP help to bridge the disconnects? What will be its contribution in terms of improving college- or institution-level data capture and delivery?

5. Budgetary cuts at the state and institutional levels (and re-mapping of regional service areas) have left some questioning whether students are being prepared “for naught”. This is a rather extreme way of putting it (and my own literary spin), but the idea is that TEST:UP is bolstering advising for potential transfer students just at the time that they may not be able to enter CSUF due to enrollment caps and re-mapping. Similarly, as one interviewee noted, it is often the many things that students are being counseled to do to increase their preparedness that are being cut back (e.g., remedial courses and co-curricular support programs at both two- and four-year campuses). This essential contradiction, beyond TEST:UP’s control, will be critical to follow—it is yet unclear how this tension will translate into metrics and outcomes that are most

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<sup>5</sup> Adrianna Kezar at University of Southern California has authored many insightful pieces on institutionalizing change. One representative article that may be of interest: Kezar, A. (2007). Tools for a time and place: Phased leadership strategies for advancing campus diversity. *Review of Higher Education*, 30(4), 413-439.

important to TEST:UP. Numeric targets are being reconsidered as I write this.<sup>6</sup> The “Pre-Transfer STEM Student Survey” includes questions about students’ perceptions of these types of systemic challenges, so we will have more information to work with in the upcoming year.

### **Looking Ahead: Ideas and Plans for Years 3-4+**

The TEST:UP team should plan to discuss each of the above challenges as part of its strategic planning for Year 3 and beyond. Based on my many conversations with TEST:UP faculty and staff, as well as document review and quantitative data analysis, I offer the following additional thoughts, questions, and recommendations for the program.

#### ***Teacher Training Component***

There is great excitement surrounding the launch of this fourth component of the grant. Two individuals who recently earned their Master’s degrees at CSUF in Math have been selected to teach at SAC (thanks to vision and efforts by Co-PI Marty Bonsangue); these individuals will take on two classes each. Cathy Fernandez-Weston has wisely started evaluation efforts, in collaboration with Marty. I would recommend that these efforts at least partly focus on TEST:UP teachers’ experiences as they compare with those among a group as close to a “control” as possible, and/or track how these teachers bring something to the two-year environment that would not be possible otherwise. I look forward to following the progression of this program component, understanding the challenges and catalysts involved, and developing models for other two- and four-year institutional partnerships of this kind. This clearly has potential to add to TEST:UP’s story of “coordination and collaboration”.

#### ***STSS Coordinator***

This role continues to be critical. Cathy is an essential link between three unique campuses; she facilitates multiple initiatives, keeps tabs on progress at different sites, designs and executes internal assessments, bridges gaps or lags in communication across sites, fields inquiries from students at each institution, and more. Cathy must be apprised of most every

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<sup>6</sup> At the time of the proposal, TEST:UP projected x-percent increases in the numbers of STEM matriculants, transfers, and degrees as a result of its interventions and initiatives (percentage-increase varied by indicator).

program development at each campus, and be able to communicate these developments to teams at other campuses quickly/as needed. I wonder how to “protect” this role over time. Which mechanisms are in place to sustain a pivotal “shortstop” position such as this one?

For instance: Could this position benefit from having sustained administrative and analytic support? Should the Coordinator meet with the PI on a weekly or monthly basis? Should the Coordinator have an “all-hands” meeting with the TEST:UP STEM counselors at the community colleges on a monthly basis? Should the Coordinator prepare minutes for the rest of the team on program progress on a monthly basis (to streamline communication)? Does Cathy have the appropriate technologies to help her conduct this kind of work (e.g., even small things like Bluetooth, Skype, Google docs, enough “minutes” on her CSUF cell phone plan)? To what extent does the position offer support for key professional development activities (e.g., “coverage” and funding to attend networking conferences, data analysis and writing workshops, etc.)? Running STSS is like running a small service business—frameworks and procedures must be in place to help it grow.

### ***Supplemental Instruction***

To capitalize on SI’s success and take it to the next level, I offer the following seven suggestions:

1. Make sure that next year’s International Conference on Supplemental Instruction is on Sean Walker’s and Marty’s calendars, and mark proposal deadlines. CSUF should present their data on SI at this conference to continue to raise the profile of these efforts and have broad impact. The TEST:UP institutional configuration (two- and four-year institutional partnership) is unique and could be used as a fresh angle for the conference. Involve Kathy Takahashi at SAC and others in proposals and presentations as SAC’s SI data are collected and integrated into the overall effort (see #4 below).
2. In reading through the abstracts from the 2010 International SI conference, one issue that caught my eye is demographic variation in SI participation. Do the CSUF SI data show gender, racial/ethnic, and other kinds of differences in SI participation rates and outcomes? What is this story? This “pipeline dimension” would be important to probe

and of great interest to the larger STEM community (especially NSF, NAS, and other major funding agencies, institutes, and clearinghouses).

3. The experiences and outcomes of SI leaders is a “high potential” research topic. How can these be measured and tracked? To what extent can SI student leadership be analyzed at the same time as the teacher training component is analyzed, the idea being to produce a larger report on the full range of TEST:UP’s teacher impacts/implications? (It’s possible that some version of this idea might be useful for the Year 3 comprehensive review, i.e., demonstrating how TEST:UP has improved (a) the student experience, (b) the teaching experience, (c) administrative processes, and (d) institutional/college-level cultures and practices—for each, drawing from multiple TEST:UP “interventions” to tell the story.)
4. I recommend establishing regular meetings between CSUF and SAC to review SI data together (even a biannual meeting would suffice). The long-term and overall success of TEST:UP lies in collaborative ties that improve practice at each site. TEST:UP institutions must share their expertise and challenges with one another, in service of one another. One idea presented to me was the possibility of recruiting CSUF students to be SI leaders at SAC (thus helping to address the limited-leader-supply issue). In principle, this sounds fantastic, and is consistent with the grant’s objectives. In practice, is it possible? What might stand in the way, and how can barriers be overcome?

I note that in last year’s evaluation report, I made the following recommendation: *“Develop a cross-campus mission statement and coordinated assessment framework for SI; each institution must also determine which groups of students are benefitting from SI, and which groups are missing from the SI population. How does this align with TEST:UP goals?... Ensure that faculty at all institutions continue to meet and share ideas/findings from their SI initiatives.”* This recommendation still stands.<sup>7</sup>

5. Budget shifts: going forward, will more proportionately more TEST:UP funds go to SI, and proportionately less to other aspects that are yielding smaller returns? What are these other aspects/what is the specific rationale given TEST:UP’s mission? Over

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<sup>7</sup> One major theme from last year’s report was the importance of understanding if and how SI improved outcomes for the “middle third” of students (see report for definition/discussion of “middle third”). To date, I have not seen data that directly address this issue – have Marty and Sean used this analytic framework to analyze their results?

the past few months, I have heard a lot of “if’s” surrounding the budget. It will be important to make decisions on these questions even in the next few weeks, to clarify uncertainty. See also #7—to justify continued investment, research needs to be ramped up to link SI to longer-term student outcomes.

6. To really make SI a “slam dunk” at CSUF, we will need to more fully engage the Chemistry department (Biology and Math are already well up to speed). What can be done to facilitate this process? How can we ignite these efforts—would having an SI Director at CNSM help?
7. It will be critical to start linking SI participation/course outcomes to longer-term student outcomes like persistence in the major and degree completion. This is at the heart of TEST:UP’s plan, i.e., improving academic supports to increase STEM retention. How can we move on building this dataset? Is this as straightforward (I say cautiously!) as putting together a preliminary variable list and sending to the IR office for CNSM?

### ***TEST:UP Metrics and Data Collection/Analysis Efforts***

To this all-important data issue, we need to continue to hammer out the metrics that will be used to show TEST:UP progress and impact. In addition to ongoing SI assessment, the following initiatives are underway:

The “Pre-Transfer STEM Student Survey” and “Post-Transfer STEM Student Survey”. As noted earlier, the first administration of these surveys is planned for Fall 2010. Participating institutions include CSUF, SAC, Mt SAC, and Citrus College. Logistics of survey administration will vary from campus to campus (e.g., online versus paper-and-pencil, identification of target population and sample, etc.); at the time of this report, these details are being worked out. These surveys will be anonymous, so they cannot be linked to other data sources on campuses, but the data will provide a comprehensive look into students’ transfer preparedness, transfer experiences, and transfer outcomes. The survey data also will allow us to directly assess TEST:UP impact, as questions ask respondents to indicate if (and how often) they have interacted with the STSS Coordinator. Do these students have more knowledge of the transfer process than do other students who may intend to transfer but have not accessed support services?

The number of students participating in these surveys has the potential to be large, even in this first year, and the instruments are long. Building the dataset will require careful data cleaning and coding, and may be complicated by the fact that data will be collected via two mediums (online and paper). TEST:UP needs to build its capacity to process these and other data projects. The scope of Cathy's role means that she cannot serve as the "nuts and bolts" data person, although she can direct and work with a support analyst. For more extensive quantitative work, it might be worth engaging Sean and Marty, among others. I am happy to consult on these analyses as needed.

Transcript analyses. Based at CSUF, this project involves a retrospective analysis of transcripts for all incoming transfer students in CNSM over the past several years. Specific details of the project are being discussed (e.g., time span, inclusion of engineering and computer science, etc.). The objective is to identify trends in transfer student preparedness by the time they arrive at CSUF, thereby informing support services at both CSUF and two-year institutions. This also appears to be quite a large—and extremely valuable—data project. Does the TEST:UP team have the appropriate human and technical resources in place to manage and execute this work?

Internal STSS assessment/"Quality Assurance". Cathy oversees several internal assessment activities, including:

- "How would you rate your visit?" questionnaires to students who make use of STSS services, as well as general logging of foot traffic and participation in STSS events.
- Analysis of the Early Warning System, addressing such questions as: To what extent are faculty and students responding positively to this system? What is the rate of participation among CNSM faculty? How can all faculty be incentivized to participate? How can academic probation data be collected more systematically? To what extent are these mechanisms helping transfer students to succeed?
- Analysis of the Transfer Scholar program, which includes ongoing check-in with student applicants and review of their scholarship essays.
- The "Academic Assessment Form", which is given to transfer students who visit STSS, in effort to learn more about their background, their current interests and goals, and what they need to develop working action plans.

Cathy relays that STEM counselors at Mt SAC and SAC also conduct assessments of their services, although there needs to be more coordination and integration of such efforts. I have not yet seen much data for the community college STEM counseling component (the “Pre-Transfer Survey” will greatly help to estimate participation and impact). Ultimately, Cathy will need to bring all of these STSS data together and report out as a singular, integrated unit; and these data need to be merged with larger student datasets to determine the relationship between TEST:UP practices and key program outcomes.

Matriculation into STEM majors, transfer rates, course passing rates, degree completion rates. These data are among the most important indicators of TEST:UP impact. So far, I have seen enrollment and degree completion data for STEM fields at CSUF for the academic year 2008-09. These numbers were submitted to NSF as part of TEST:UP annual reporting in June 2010; I took the numbers and examined variations in enrollment/degrees by gender, underrepresented racial/ethnic minority (URM) status, and field, and compared these to national estimates. Calculations indicate that women comprise about 39 percent of STEM majors at CSUF (excluding psychology), and 37 percent of STEM degrees (this compares with about 37% nationally); and URM students comprise about 34 percent of STEM majors, but 20 percent of degrees (this compares with about 14% nationally).<sup>8</sup> These findings merit follow-up work both inside and outside of TEST:UP. For instance, how can we improve the persistence of URM students in STEM—and is there a way for TEST:UP to “shine” in this area? Also, women appear to be particularly underrepresented in computer science at CSUF according to this one snapshot (3% of CS degrees in 2009, as compared with about 19% nationally); although this is not a focal point of TEST:UP, is there a way in which TEST:UP could speak to such issues and make inroads? (Notably, the representation of women varies by field at CSUF—in a few other STEM majors, gender ratios match or exceed national estimates.)

What I would like to see next is: 1) similar data going back 4-5 years, plus data for the 2009-10 academic year, to help identify trends in enrollment, degree completion, and representation; and 2) all data disaggregated by transfer status (i.e., transfer student v FTFT

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<sup>8</sup> TABLE C-5. *Bachelor's degrees, by field and sex: 1998–2007*, SOURCE: National Science Foundation, Division of Science Resources Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 1998–2007. TABLE 4. *Bachelor's degrees awarded, by field, citizenship, and race/ethnicity of recipients: 1997–2006*, SOURCE: Tabulated by National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. <http://www.nsf.gov/statistics/>

student). It will be crucial to trace enrollment and degree completion trends before, during, and after the TEST:UP funding period, and if we can identify positive trends among transfer students in particular.

Of course, on the basis of these metrics alone (declared majors, degrees), we will not be able to parse out the role of TEST:UP versus the role of other factors, but they will give us a sense of trends moving in positive directions, set the stage for inferences, and lead the way towards a more comprehensive dataset that includes longitudinal enrollment, course-taking, and degree data for individual students, which should then be merged with SI and STSS data pending identifiers. Also, aggregate raw increases in STEM enrollments and degrees are at risk given system-wide budget cuts, enrollment caps, and so forth, meaning it is possible that target numbers will not be reached. (This ties back to the point about preparing students for transfer when there are more limited opportunities than ever.) However, we can still make impact on persistence and degree completion rates, i.e., fewer students may be coming in, but we can retain them at higher rates given the constellation of support services that TEST:UP has built. Moreover, there is evidence to suggest that more incoming students (FTFT and transfer) are selecting STEM majors (particularly in the biological sciences), perhaps offsetting some of the loss due to cuts and caps. We need to track all of these dynamics carefully.

In conversations with Mark Filowitz, I was introduced to Chris Renne's GPS2 project, which appears to be collecting many types of data that could be helpful to TEST:UP as well, e.g., basic transfer counts by CNSM field from SAC and Fullerton College. Collaboration with Chris would seem to be synergistic and productive. Should Chris advise on data collection efforts for the Year 3 review?

Ongoing efforts to collect enrollment and degree data at TEST:UP's two-year institutions need to be supported and expanded. I have not yet seen the numbers submitted by SAC and Mt SAC to the NSF. What is the status with STEM enrollments at these campuses (barring access to transfer information, which community colleges do not yet systematically track)?

Finally, it is unclear how CSUF's College of Engineering and Computer Science (ECS) is fitting into TEST:UP at this point, which renders analysis of undergraduate enrollment and degree data for these departments inconclusive. To what extent are ECS faculty participating in TEST:UP? How has TEST:UP's scope become more refined since the proposal, and what does this mean from the perspective of program assessment? What should we be looking at?

## Conclusions

In this report, I have reviewed TEST:UP's many components, and provided a picture of where things stand as we look ahead to Year 3. I have summarized thoughts and feedback from the TEST:UP team in terms of program highlights and challenges, and offered a few additional questions and suggestions for improving practice. I also note that TEST:UP websites are up and running at each of the three core campuses, which is excellent news and provides space to highlight program accomplishments, share research, build networks, and so on. See:

- CSUF TEST:UP: <http://testup.fullerton.edu/>
- SAC TEST:UP:  
[http://www.sac.edu/faculty\\_staff/academic\\_progs/departments/biology/single\\_testup/testup.htm](http://www.sac.edu/faculty_staff/academic_progs/departments/biology/single_testup/testup.htm)
- Mt SAC TEST:UP: <http://www.mtsac.edu/instruction/sciences/stem/>

To distill what I think are the most important fronts to move on for Year 3:

**\*Build the data collection, analysis, and writing team(s) for the Year 3 review.** Map out the themes, the metrics, and the visuals. Name individuals at each campus who will be involved. Secure “nuts and bolts” analytic support. This will facilitate TEST:UP's broader data efforts as well. These efforts need to be a priority—TEST:UP is predicated on quantitative metrics and measurable results.

**\*Build the TEST:UP research base.** Administer the pre/post transfer student survey instruments. Push for collaboration with IR offices to build necessary datasets. Collect, present, and publish data. Attend national conferences, sponsor TEST:UP symposia and workshops, post slides and proceedings to the TEST:UP websites, and work on engaging other campuses around the country in TEST:UP questions. Start thinking about tools for practitioners that can be developed and disseminated as a result of TEST:UP research, in order to widen the program's impact (e.g., the “Pre-Transfer STEM Student Survey”, an interactive “SI for STEM Majors Assessment Toolkit”, detailed job descriptions of key TEST:UP positions, a beta-version STSS interactive website, etc.).

**\*Take transitions in leadership as opportunities to build momentum and accelerate progress.** Last year, I recommended “*regular executive team meetings to report on progress, challenges, and outcomes*”—this will be even more important going forward, as new participants come into TEST:UP and are brought up to speed on its many dimensions. TEST:UP leadership must benchmark TEST:UP’s progress, centralize and coordinate its research and assessment activities, and identify/resolve gaps between theory and practice.

**\*Increase the participation of Mt SAC in TEST:UP.** It has been difficult to ascertain the progress cycle at Mt SAC due to the limited flow of information. In order to assess the full impact of TEST:UP, it will be essential to have Mt SAC participate in the evaluation activities as well as all TEST:UP events. I look forward to learning more about Mt SAC’s achievements in the upcoming year.

At the end of Year 2, it is clear that TEST:UP is expanding services and support for transfer students, and for STEM students more generally. **Now it is time to refine scope and practices, measure impact more comprehensively, and share and publish findings in peer-reviewed forums and practitioner communities. “Best practices” need to be identified, and discussion of how these are to be institutionalized needs to happen.** This is a major charge—but one that is entirely achievable given the heart, commitment, and expertise of the TEST:UP team.

In closing, a warm “thank you” to the many TEST:UP team members who participated in this evaluation, to those who make TEST:UP such a success, and to those who are transitioning out of their former roles and entering new positions. I am profoundly appreciative of Steve Murray’s leadership throughout the first two years of this grant. His vision is at the very heart of TEST:UP. Without Steve, we would not have this incredible opportunity to learn about and improve the STEM transfer student experience—truly one of the most important social and educational questions today. I look forward to following TEST:UP’s achievements in the months and years to come.

## Appendix I. TEST:UP Year 2 External Evaluation: Interview Protocol Summer 2010

### TEST:UP Year 2 External Evaluation Interview Protocol Summer 2010

#### I. TEST:UP Co-PIs at SAC and Mt SAC

*Carol Comeau, SAC*

*Larry Redinger, Mt SAC* **NOTE: LR WAS UNAVAILABLE FOR INTERVIEW—YEAR 2 EVALUATION REPORT DOES NOT INCLUDE MT SAC CO-PI FEEDBACK**

#### Part 1: Assessment and Research Methods

We are developing a survey instrument to be administered to STEM students at all participating TEST:UP campuses, as a way to assess our efforts and begin to build an research base. Ideally, we would like to draw a random sample of STEM students at your campus, and administer the survey online to these students. However, I realize that there are several logistical barriers to doing this, so I'm hoping we could brainstorm about options.

1. How do you define "STEM students" at your campus? Students formally enrolled in AS programs in STEM fields? Enrollment in STEM classes?
  - a. Relatedly: What are the metrics you will use to show your success for TEST:UP?
2. Is there a way of drawing a random sample of these STEM students at your campus? One alternative we have been thinking about is visiting all of your STEM classes (or a subset – such as your Math classes), collecting email addresses for students, and drawing a random sample from these lists. Is this feasible? Do you already have email addresses for these students on record?
3. We will share the instrument with you (and seek your feedback) as we get closer to stabilizing it (currently, it is in very drafty form). Generally, the questions range from demographics, to degree and transfer goals, to academic experiences in math and science at students' current college, to their math- and science-advising experiences at their college. Are there particular areas that you see as being incredibly important to probe/gather information on? From the perspective of the TEST:UP project, which kinds of survey data would be helpful to you?

#### Part 2: Overall Evaluation

4. TEST:UP has many facets. It lists four major objectives: improve counseling and mentoring, strengthen support networks, improve student learning, and develop a teaching intern program. Keeping in mind that the fourth is only just "lifting off", where do you see your college as making the greatest progress in terms of these four objectives?
  - a. Which specific strategies or practices have been most effective? What are your top three "best TEST:UP practices" at your campus?
  - b. How have you assessed your impact and effectiveness? How do you "know" these work?
5. Which areas/objectives have proven to be more difficult?
  - a. What have been top three barriers to your campus's progress in this grant?

6. Looking ahead to Years 3 and 4 of TEST:UP, what do you see as being the most important issues to address in order to realize our collective project goals? What are the most pressing questions for this grant at this point?
7. How can we best address these questions? How do we troubleshoot and problem-solve? What needs to happen?

## II. TEST:UP Co-PIs/Incoming PI at CSUF

***Mark Filowitz, CSUF***

***Rochelle Woods, CSUF***

***Martin Bonsangue, CSUF***

1. TEST:UP has many facets. It lists four major objectives: improve counseling and mentoring, strengthen support networks, improve student learning, and develop a teaching intern program. Keeping in mind that the fourth is only just “lifting off”, where do you see your college as making the greatest progress in terms of these four objectives?
  - a. Which specific strategies or practices have been most effective? What are your top three “best TEST:UP practices” at your campus?
  - b. How have you assessed your impact and effectiveness? How do you “know” these work?
2. Which areas/objectives have proven to be more difficult?
  - a. What have been top three barriers to your campus’s progress in this grant?
3. Looking ahead to Years 3 and 4 of TEST:UP, what do you see as being the most important issues to address in order to realize our collective project goals? What are the most pressing questions for this grant at this point?
4. How can we best address these questions? How do we troubleshoot and problem-solve? What needs to happen?

**Questions to Sean Walker, Kathy Takahashi, and Cathy Fernandez-Weston were informal and, in Cathy’s case, ongoing.**

## Appendix II. Evaluator Biography

Shannon K. Gilmartin, Ph.D., is Director of SKG Analysis, a research consulting firm, and Consulting Assistant Professor at Stanford University's School of Engineering. Her current clients include the Office of the Vice Provost and Office of Student Affairs at the California Institute of Technology; the Anita Borg Institute for Women and Technology; the College of Natural Sciences and Mathematics at California State University, Fullerton; the Center for Advancement of Engineering Education, the Office of the Vice Provost for Graduate Education, and the Michelle R. Clayman Institute for Gender Research at Stanford University; the University of Alaska, Fairbanks; and Project Kaleidoscope/The Keck Foundation. Her expertise and interests focus on education and workforce development in science and engineering fields.

Shannon received her B.A. at Stanford University and her M.A. and Ph.D. at UCLA, and held two postdoctoral research appointments at the California Institute of Technology and Stanford University before starting her own consulting practice. She has taught classes at UCLA in gender, psychology, and education. Her publications appear in *Academe*, *The Journal of Higher Education*, *Research in Higher Education*, *Journal of Women and Minorities in Science and Engineering*, *Journal of Research on Science Teaching*, *Journal of Research on Adolescence*, *Men and Masculinities*, and *The Journal of the First-Year Experience and Students in Transition*. She is the co-author of a major report on couple hiring in the academy, *Dual-Career Academic Couples: What Universities Need to Know*, published by the Michelle R. Clayman Institute for Gender Research; as well as *Climbing the Technical Ladder: Obstacles and Solutions for Mid-Level Women in Technology*, published by the Anita Borg Institute for Women and Technology and the Michelle R. Clayman Institute for Gender Research. She is also co-author of the forthcoming *Exploring the Engineering Student Experience: Findings from the Academic Pathways of People Learning Engineering Survey (APPLES)*, published by the Center for Advancement of Engineering Education, Stanford University.