

TEST:UP External Evaluation: Year 1
Evaluator: Shannon K. Gilmartin, Ph.D

Introduction

The Talent Expansion in Science and Technology: An Urban Partnership (TEST:UP) program is a comprehensive, multi-institution collaborative designed to increase student matriculation, persistence, transfer, and degree attainment rates in STEM fields. Funded by a National Science Foundation STEP grant, it is centered at California State University, Fullerton (CSUF) and two community colleges in near proximity: Mt. San Antonio College (Mt. SAC) and Santa Ana College (SAC).

The components of this ambitious project include: one full-time coordinator of STEM Transfer Student Services at CSUF; half-time STEM advisors at the two community colleges; a wide range of programs, events, and support mechanisms to assist STEM students in successful transfer to and degree completion at a four-year institution; Supplemental Instruction (SI) workshops for key STEM courses at all campuses; peer advising; creative outreach to students using different forms of media; outreach to other community colleges in the area; and a teacher intern program (see Appendix A for a summary of TEST:UP's structure and strategies). The objectives are numerous. At the most essential level, TEST:UP strengthens connections between two- and four-year institutions, building a regional community of educators who together help students progress from one stage of postsecondary training to the next. Program components increase student awareness of STEM degree requirements, raise the bar on students' STEM content knowledge, and provide students with social, academic, psychological, and financial support to thrive in STEM educational environments. The intended outcome is a stronger, larger STEM pipeline—bringing more students into STEM majors, moving more students into STEM baccalaureate programs, graduating more students in STEM fields.

Why is this imperative? Historically lower rates of STEM degree attainment among students who comprise rapidly increasing segments of California's population threaten a functional democracy, a productive economy, an equitable society, and scientific innovation. The financial burden on these students is substantial, and for some, the focus and commitment required of the transfer process and baccalaureate degree completion are not easily afforded by socioeconomic realities of day-to-day life. Limited access to educational opportunities can mean lower levels of academic preparation; and science advisors, mentors, peers, and leads can be few

in number. In all, they may start with strong interests so valuable to scientific work, but they do not have the range of resources that traditional “pipeline persisters” do, and many eventually drop out of STEM degree programs, too quickly and too easily. Postsecondary institutions that serve these students must develop new strategies to reverse historical trends and help them to succeed. Simply put, institutions must design and manage transformative initiatives to better develop STEM talent. TEST:UP brings together three such institutions that share this vision.

TEST:UP is looking ahead to its second of three fully-funded years (with the possibility of a two-year extension). In May 2009, I submitted a brief on the topic of SI assessment, timed to inform an all-campus meeting on the issue and help local instructors develop their assessment efforts (see Appendix B). For the current report, I summarize the balance of my observations on TEST:UP’s progress to date, and suggest action points for the next year. I organize this report as follows:

- I. STEM Transfer Student Services and STEM Student Advising (page 3)
- II. Supplemental Instruction (page 8)
- III. Administrative Structures and Processes (page 10)
- IV. Telling TEST:UP’s Story: Thoughts on Overall Assessment (page 12)
- V. Image and Identity: Insights from Recent Research (page 15)
- VI. Summary and Action Points (page 16)

Evaluation Methods

Data for this evaluation primarily draw from year-long conversations with TEST:UP’s P.I., Steven Murray (Dean, CSUF), four Co-Pi.’s, Carol Comeau (Dean, SAC), Larry Redinger (Dean, Mt. SAC), Rochelle Woods (Assistant Dean, CSUF), and Martin Bonsangue (Professor, Mathematics, CSUF), and STEM Transfer Student Services Coordinator Gina Garcia. Data also draw from the many helpful documents, reports, and statistics that I have collected from the project team.

I made two site visits in the past year: the first in October 2008, to meet the entire team and attend the inaugural TEST:UP reception at CSUF; and the second in May 2009, to conduct interviews with TEST:UP’s executive team, meet affiliated faculty, tour SAC and Mt. SAC campuses, and conduct one focus group with SI students at CSUF. My May visit included a wonderful dinner with Steve, Marty, Rochelle, Associate Dean Mark Filowitz, and several CSUF faculty. I was also able to meet with Oscar Flores and Tammy Camacho, the half-time STEM

counselors at Mt. SAC and SAC, respectively. I was fortunate to spend one full day with Gina, who accompanied me to Mt. SAC and SAC meetings, and provided key insight on the day-to-day workings of TEST:UP initiatives. All of these activities were instrumental to my understanding of this program.

I. STEM Transfer Student Services and STEM Student Advising

Over the year, I have been enormously impressed by the great progress made in this component of the grant. TEST:UP hired energetic, devoted staff—one full-time coordinator at CSUF, and two half-time counselors at Mt. SAC and SAC—to launch advising, counseling, and support services for prospective and current STEM majors at the community colleges, prospective STEM transfers at the community colleges, and current STEM transfers at CSUF. Gina and her colleagues developed a unified, cross-campus mission statement for STEM Transfer Student Services (STSS) in January 2009, and modified this statement in June 2009; a mission statement is an excellent way to cohere staff and mobilize resources, and is something I would recommend for SI as well. In July 2009, Gina prepared a report summarizing the Year 1 accomplishments of STSS (see Appendix C). I followed up with Gina by phone to learn more about her findings and develop action items for the upcoming year.

At CSUF, there were fewer STEM transfer students in Spring 2009 as compared to Fall 2008 (154 versus 208). However, a higher percentage of spring transfers participated in CSUF-based STSS activities and services (37% versus 29.8%). This is partly due to an increase in STSS programs and events: during the fall, a total of five workshops, social activities, and awareness events were offered on campus, as compared to 16 in the spring semester.

STSS also schedules academic guidance meetings for CSUF STEM transfers who are not performing well in their first few weeks of classes; about half of these students actually attend their academic meetings with the STSS Coordinator, an attendance rate that Gina says is consistent with similar “early intervention” efforts in previous years. Gina is currently collecting and comparing final semester grades for transfers who attended scheduled meetings versus those who were “no-shows”. This is a useful starting point to assess the effectiveness of these meetings; in the end, the “effect” may not be directly attributable to the meeting per se (e.g., attending a guidance meeting might reflect higher levels of academic motivation, or puts into motion certain study skills required for success), but we are still able to gain some insight into

the role they might play. Perhaps the working question is: to what extent are academic guidance meetings part of a constellation of positive practices that promote student achievement?

The STEM Transfer Scholars program enjoyed a productive first year. As part of the program, students are awarded a \$500.00 book scholarship for participating in an extensive set of activities offered by STSS (page 30, Appendix C). Given the positive experiences described in each scholar's summative essay (one requirement of the scholarship), the program is certainly moving towards its goals. However, too few students may be attending all events and making use of services, completing the (many) Transfer Scholar requirements, and earning the award. For instance, there is a fairly dramatic drop-off in attendance at the peer advisor meetings (another requirement) over the course of the semester. On one hand, this is not necessarily a red flag, Gina explains, as it could signify students simply becoming more comfortable in the CSUF environment. Still, she mentioned that conversations are underway to consider reducing the total monetary amount of the scholarship award and the number of required activities in order to increase student participation.

One question I have: if the scholarship award is reduced, what is the value at which the award no longer becomes substantively helpful? Is there a point at which student interest would stagnate—say, \$100.00? \$150.00? Also, in terms of the hypotheses behind the Transfer Scholars Program, what is more important to persistence among the most critical student groups: the peer advisor meetings and other opportunities for integration into campus life and the STEM community, or the actual book scholarship? Clarifying the rationale should guide revisions to the structure of the program (e.g., if it is theorized that the actual monetary value of the book scholarship is less important to students' STEM retention than is student participation in STSS services and events, then the award should be reduced at a proportionately greater rate than is the activity requirement). I do think it is significant that the book scholarship is one of the few (if not only) TEST:UP components to provide students with direct financial assistance. If changes are made to this particular component, moreover, we will need to treat the Year 1 cohort of Transfer Scholars separately in analysis.

I might suggest as well taking the themes that emerge from the scholars' essays and exploring these in a small random sample of transfer students who did not participate in any STSS event or program, to further delineate impact. How do these other transfer students experience peer networking, opportunities for involvement, and a "welcoming environment" (see

Gina's summary of the scholar essays, July 2009, Appendix C)? What is the baseline experience? What does the "control group" look like, qualitatively?

Gina and I discussed at least three additional STSS areas in need of review: follow-up surveys to students who meet with STSS staff, outreach to students, and outreach to faculty. The surveys yielded a very low response rate in this "pilot" year (at CSUF, SAC, and Mt. SAC), and despite excellent intention and design, may not prove that useful without additional response incentives. Before eliminating them completely, however, I would recommend conversation about other strategies to collect feedback from students on the effectiveness of STSS services; linking STSS visits to outcomes like degree completion does not require the qualitative data from a "user's survey", but there might be other ways to keep the feedback loop going such that STSS can continue to refine and improve its work over time (thus maximizing impact). For instance, a small number of students (n~5-10) might be randomly selected for a short interview about the transfer experience generally, and their STSS visit specifically. Perhaps each student might be offered up to \$10.00 to participate.

As for outreach, Gina and I agreed that it might be "stepped up", to transfer students and to the faculty members who instruct them. Faculty can be flooded with students' requests for procedural information and academic-social-psychological counsel; it would help them to know that they can refer students to STSS for this very type of advice. To this end, STSS should develop an online presence as soon as possible, with interactive FAQs and resources clearly listed.¹ The STSS website must be a near-term priority. Perhaps a small amount of corporate or private funding might be secured to build a cutting-edge website that could serve as a model for other such STEM services elsewhere. In a very quick Google search for "transfer student services", I came across two websites at Rutgers University and University of Maryland, Baltimore County, respectively, that might be instructive (<http://sasundergrad.rutgers.edu/academics/current/transfer/index.html> and <http://www.umbc.edu/ocss/>). And CSUF, of course, has its own "Transfer Student Resources" website: <http://www.fullerton.edu/explore/transfer/resources.htm>. However, all of these sites refer to transfer generally, not STEM transfer specifically. Opportunity is knocking!

Issues Specific to STEM Counseling at Mt. SAC and SAC

¹ STSS is on Facebook, which is a great step in the right direction.

I was able to gather more information about STEM transfer counseling, programming, and advising at CSUF than I was at Mt. SAC and SAC, if only because there are more programs and events up and running at CSUF. However, I enjoyed two fabulous conversations with Oscar and Tammy during my May site visit (and Gina joined me for both). I am happy to hear that they are making excellent inroads at their respective campuses.

Among the main themes that emerged during these conversations (and those with Larry and Carol) was the difficulty of collecting transfer data at community colleges and the need for better tracking systems. We have very limited information on when students transfer, and which institution they transfer to. Addressing this issue will be essential to the overall assessment of the grant—as elaborated below, transfer numbers are a key outcome of TEST:UP and an indicator of its success.

At Mt. SAC, we discussed how the institution’s strong aggregate transfer rate masks important variation by field and student demographic characteristics. Specifically, transfer rates may not be as high in STEM majors and among students from underrepresented racial/ethnic backgrounds. This should help to focus Mt. SAC’s STEM counseling and outreach efforts. We also discussed that faculty at Mt. SAC take a very active role in advising their students. To what extent does faculty advising need to be coordinated with Oscar’s such that students are receiving consistent information about STEM curricular and degree requirements?

At SAC, we touched on the issue of undocumented students and the unique challenge this poses to advising and counseling generally—because of financial aid stipulations, these students often must stay at a two-year college longer than they would if they qualified for financial support. In addition, budget cuts are affecting STEM curricular offerings; and transfer to a four-year institution may not be the intention of many students, given economic factors and the role of the private sector in demand for associate’s degrees. All of these “variables” must be taken into account when we assess the scope and efficacy of STEM counseling at this and other two-year TEST:UP campuses.

We should still work towards coherence and currency in message, however. During our recent July phone conversation, Gina relayed that she had convened a STEM counselor training session for Oscar and Tammy at CSUF, to build cross-campus community, share information, hear from CSUF STEM faculty, and streamline counseling efforts. I am thrilled that she put this together, and hope that this is systematized going forward. It is important that counselors are

equipped with the “latest and greatest” information about STEM majors, degrees, careers, and pathways, and that they communicate this information to students in ways that broadly accord with TEST:UP’s mission. Perhaps it goes without saying, but if there is an opportunity for transfer in a STEM field, counselors need to act on this. TEST:UP is very specifically designed for STEM success.

I might also suggest that the counselors and coordinator create a “Sample STEM Advising Plan” during one of their training, or “in-service”, sessions. In this exercise, the coordinator would present three “cases”—three hypothetical STEM students in different academic, socioeconomic, and social-psychological circumstances. Cases should describe students for whom counseling would literally mean the difference between leaving and staying in STEM. Each person (inclusive of the coordinator) would then describe how they would advise these students (conversationally—this would not be a written exercise). In sharing their approaches with one another, they would co-develop a counseling strategy for each case, and simultaneously build their own knowledge base. This would help to integrate counseling efforts overall, and enhance data integrity too, i.e., the more similar STEM counseling is at each campus, the more we can be sure of what we are measuring, and the stronger our impact will be.

Specific Recommendations for STSS:

- *Identify the best ratio of award numbers to dollar amounts for book scholarships in order to maximize student involvement*
- *Identify the STSS “control group”, and conduct qualitative analyses to understand/report on their experiences*
- *Before eliminating STSS “user’s surveys”, identify and implement other feedback mechanisms such that this service can continue to improve its practice*
- *Develop and launch the STSS website*
- *Establish how transfer data will be collected at Mt. SAC and SAC*
- *Coordinate STEM advising/counseling across campuses; ensure that counselors have continued TEST:UP and professional development training sessions; track counselors’ processes and progress*

II. Supplemental Instruction (SI)

SI workshops at SAC, Mt. SAC, and CSUF are a cornerstone of TEST:UP, and directly address the academic preparation dimension of STEM transfer and persistence. The executive team and affiliated faculty have drawn from a solid literature base on the effectiveness of SI to design and oversee workshops for STEM courses at each campus. I am very pleased that CSUF faculty Kathy Lewis and Nicole Engelke attended an SI training program at the University of Missouri; they also developed a comprehensive “Leader’s Guide to Supplemental Instruction” for their student coordinators, in which they outline “best practices” and provide sample lesson plans and tips. I hope that a version of this guide will be distributed to colleagues at Mt. SAC and SAC.

My May 2009 brief was devoted to the issue of SI assessment. Much progress has been made in this area over the year; Marty, Bill House, and Sean Walker (CSUF), Kathy Walker (SAC), and others have worked hard to track and analyze the impact of supplemental instruction on their students’ performance. All preliminary data are positive, and I am excited that so many wonderful faculty are not simply invested in SI’s success, but committed to rigorous measurement. In my brief, I outlined a few key assessment principles, emphasizing the importance of controlling for students’ prior achievement to evaluate “net” impact (which many TEST:UP faculty have already been doing). I also suggested ways to identify SI’s effect on the critical “middle third” of students, or those whom we would expect/hope to benefit most from supplemental instruction.²

As I noted in the brief, there are three additional SI areas in need of review:

At this point, there are a few issues for consideration, including: (1) the format of and assessment plan for SIs at Mt SAC are not yet clear; (2) SIs at Santa Ana may not be reaching important groups (i.e., students who have already declared a STEM major and

² The “middle third” refers to a distribution of student scores on a key achievement index, such as combined grade point average and test scores (or an achievement/resource index, in keeping with TEST:UP’s presumed target population—this index might include, for example, family income or financial need). It might be hypothesized that students at the top third of this distribution do not need targeted intervention like SI, and students at the bottom third need much more than SI (though can still benefit). Students in the middle third, however, might consistently gain from SI—co-curricular strategies such as this could make the extra difference to their persistence. This is a educational research question as much as an evaluative one, and really gets at the heart of TEST:UP philosophy and programming. I hope we can zero in on this framework in the upcoming year, and apply it to both SI and STSS. Are these middle-third students in fact the “most critical student group”, having strong interests but few resources, at risk of dropping out “too quickly and too easily” if not for TEST:UP? Are we actually reaching these students, and improving their outcomes?

who are potential transfers); and (3) design and assessment of SIs at CSUF vary by department, precluding “apples-to-apples” comparisons. The purpose of this evaluation brief is to suggest strategies for stronger assessment of SI impact on student development and project goals. Related SI issues—interdepartmental coordination at CSUF, TEST:UP progress at Mt SAC, and the SI student population at Santa Ana—will be addressed further in a forthcoming Year 1 Evaluation Report (August 2009).

To each of these issues: it is my understanding that SI has been up and running at Mt. SAC for some time, with great faculty investment. However, I am not sure how TEST:UP fits into Mt. SAC’s SI program, and I have not learned of assessment efforts there to date. I would like to see integration between TEST:UP and Mt. SAC more clearly in the upcoming year, and understand how SI impact is being evaluated. Which mechanisms are in place to conduct these kinds of analyses at Mt. SAC? More generally, how does TEST:UP work with, elaborate, and improve upon existing curricular and co-curricular structures and practices at this campus?³

Carol kindly responded to an email that I sent in May requesting more information about the SAC STEM courses that have SI workshops. She writes that SI is currently in place for Biology 109, a gateway course that serves “general education students with diverse career goals” (personal communication, May 11, 2009). Students who participate in SI for this course are “then targeted for recruitment into STEM majors”. I think it is smart to use SI as a recruitment tool, given that we want to increase the number of STEM majors (see “Telling TEST:UP’s Story”, below). However, I would also like to see SI in more advanced STEM courses at SAC, as a means to enhance students’ academic performance and eligibility for transfer to a four-year institution. The focus needs to be as much on transfer as it is on major, and SI should play into both of these objectives.

At CSUF, SI design “varies by department” (see CSUF’s SI summary report dated April 17, 2009). There is no doubt that it must—SI formats should be adapted to the unique curriculum, requirements, and needs of a department in order to be most effective. Nonetheless, I would encourage greater interdepartmental conversation about SI “ways and means”, and movement towards greater standardization of assessment, e.g., a mutually agreed upon set of controls, comparable outcomes across departments, and so on. TEST:UP will require this kind of coherence in order to tell its story most persuasively.

³ I was very impressed by Mt. SAC’s state-of-the-art science facilities and physical infrastructure for STEM scholarship. This context holds much promise for STEM student success.

After my May site visit, faculty with SI experience at each TEST:UP campus met to share ideas and findings. I think this type of cross-campus interaction is incredibly important, and trust that this meeting was informative for all. As suggested earlier, an SI mission statement might solidify purpose and fuse efforts further. I also note that the focus group I conducted with CSUF SI students during my site visit was quite lively and helpful⁴; one takeaway was that students who participate in SI do not want it to be required of all students—they appreciate the opportunity to interact closely with like-minded peers who really care about doing well (i.e., it “weeds out” people who don’t contribute). They pointed out that office hours and other traditional forms of “extra” support are not as effective as SI is, one reason being that they feel much more comfortable asking questions in a peer-based, peer-supervised, small-group setting. These experiences and opinions need to be reconciled with the overarching goals of SI for TEST:UP. Are these students telling us that we are getting closer to where we want to be?

Specific Recommendations for SI:

- *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?*
- *Relatedly: clarify and expand SI at Mt SAC and SAC (to address both matriculation and transfer); integrate SI assessment methods at CSUF (common controls and dependent variables, etc.); ensure that faculty at all institutions continue to meet and share ideas/findings from their SI initiatives*

III. Administrative Structures and Processes

Every large-scale grant like TEST:UP requires passionate executive committee members who believe in the grant, make time for the grant, and contribute to ongoing conversation and assessment of the grant. Certainly TEST:UP has assembled this group! To fully capitalize on enthusiasm and expertise of the executive team, I might recommend regular PI meetings, perhaps

⁴ It is my understanding that all of these students were participants in a SI workshop for a Math course. Not all students were Math majors, however.

on a quarterly basis. Action plans can be proposed and developed in these meetings. Another idea is to have Steve send out a “TEST:UP Executive Update” email at the start of each semester, in which he summarizes basic indicators of progress and challenge, and invites others to share any new or useful data points.

Affiliated faculty are also critical to this initiative—without their mentorship of students, their dedicated high-level STEM instruction, and their willingness to implement program components like SI, the grant simply would not succeed. It is worth thinking about the existing incentives and rewards for faculty participation. To what extent is faculty buy-in a challenge? How can we restructure program components or principles to increase faculty involvement? How can we help faculty to work with each other, cross-department and cross-campus, and learn from each other (one possible outcome being more coordinated pedagogy and assessment efforts)? The intellectual and scholarly dividends must be made explicit. Faculty should be encouraged to collaborate on research manuscripts and conference/visual/media presentations using TEST:UP data. These types of activities can heighten visibility and lead to follow-up grants, building a scholarship, funding, and resource base even in a severe economic climate.

TEST:UP’s first year has demonstrated how integral the STEM Transfer Student Services Coordinator is to the health and success of the grant. Gina is perhaps closest to the entire transfer component, and her context, explanations, commitment, and know-how were essential to my own understanding of TEST:UP’s accomplishments. In addition to her transfer work, she arranged team meetings and training sessions, and oversaw other aspects of grant administration. Enrolling in a doctoral program in Higher Education at University of California, Los Angeles in the fall, Gina leaves TEST:UP with an excellent foundation on which to build over the next two years. I look forward to meeting the new coordinator and learning about continued progress. I might also suggest that all logistical aspects of TEST:UP management (setting up meetings for the executive team and so on) shift to the Dean’s Office at CSUF, thus allowing the new coordinator to focus on the transfer arm of this grant exclusively. Maintaining momentum in this area will be crucial.

Specific Recommendations for Administrative Structures and Processes:

- | |
|---|
| <ul style="list-style-type: none">• <i>Schedule regular executive team meetings to report on progress, challenges, and outcomes</i> |
|---|

- *Incentivize faculty participation and coordination; encourage faculty research and conference presentations using TEST:UP data*
- *Centralize grant management at CSUF's Dean's Office*

IV. Telling TEST:UP's Story: Thoughts on Overall Assessment

Key to sound assessment is first identifying the outcome—what indicates success? What are we trying to have an impact on? We must also identify the baseline for this outcome—where did we start? Finally, we analyze the effect of our program interventions on our outcome, taking into account the baseline. Has there been measurable change in the outcome since the project began? Can we “control” for other variables that might explain increases in STEM degrees, in order to make more definitive statements about TEST:UP's unique value-add?⁵

Ultimately, I'd like to clearly see how TEST:UP has changed the structures of STEM education, and the cultures of STEM education, and how these dimensions—separate but interdependent—together make a difference to STEM degree attainment. This could be a useful framework to tell TEST:UP's “story” to a broader audience, i.e., how has it changed STEM education structurally and culturally, with what net effect on student success?

I also hope that we might be able to identify how TEST:UP's interventions have changed the very knowledge base of STEM itself. This is akin to Londa Schiebinger's framework for “gendered innovations”, i.e., how inclusion of women in science has changed the structures, cultures, and results of science (see Schiebinger's volume *Gendered Innovations in Science and Engineering*, Stanford University Press, 2008). Applied here, to what extent does improving transfer and degree attainment rates—diversifying the STEM community—have an effect on our scientific findings, insights, and axioms? Are students from a broader range of socioeconomic and educational backgrounds bringing new questions, perspectives, and experiences to bear on old scientific problems? Have new teaching and research collaborations emerged as a result of TEST:UP, leading to fundamentally new understandings of a particular scientific area?

Assessment Specifics

⁵ This macro-assessment rationale is closely related to micro-assessment of programmatic impact on student development, persistence, and success. The two work together to tell the full story of the project.

In May 2009, Steve forwarded to me the Year 1 NSF TEST:UP report. The desired outcomes for the program are enumerated in this report. Once all program components are up and running, TEST:UP aims for, on an annual basis: 1) a five percent increase in the number of new STEM majors at Mt. SAC and SAC, 2) an increase of 25 students per community college who earn their associate's degree or transfer to a four-year institution in STEM, 3) an increase of 40 transfer students at CSUF who go on to earn STEM bachelor's degrees, and 4) an increase of 40 STEM bachelor's degrees at CSUF in total. The report notes that California's education budget cuts will require recalculation of these targets, given that CSUF will be admitting fewer students and will be scaling back on STEM curricula and resources (as will SAC and Mt. SAC).

I have a few questions and comments about these targets (reflecting many conversations I've had with the TEST:UP team over the first year):

- There are four main indicators of impact: 1) STEM majors at community colleges, 2) STEM degrees/transfers at community colleges, 3) transfer students who eventually complete STEM degrees at CSUF, and 4) total STEM degrees at CSUF. What are the actual baseline numbers for each indicator? For instance, how many students currently (pre-TEST:UP) earn a STEM associate's degree at each community college in any given year? How many CSUF students earn STEM bachelor's degrees annually? What is the average persistence rate in CSUF's STEM baccalaureate program, among first-time, full-time freshmen and among transfer students?⁶
- Who is collecting and housing these baseline data? What do we have to compare these numbers to (e.g., national statistics, data from other community college districts)?
- How will Mt. SAC and SAC identify the number of transfer students to four-year institutions each year? Which data capture mechanisms are in place to do this? Which steps must be taken to implement better data collection methods?
- To show progress, will data for each indicator be collected, stored, analyzed, and reported on a yearly basis? For how many years? Who will oversee this process?

⁶ As evidenced throughout this report, my assumption is that TEST:UP aims for absolute and proportional change on each of these indicators, i.e., increases in numbers of STEM majors, transfers, and baccalaureates, and increases in rates of matriculation, transfer, and degree completion. Going forward, we will need to specify and document how rates are calculated. For example, how are STEM transfer rates computed? How are STEM persistence rates computed? And so on. Calculations need to be standardized across institutions.

- How will TEST:UP program participation data be linked to these outcomes? What is the analytic plan to assess impact? How will we know that STEM Transfer Student Services, for example, has increased the likelihood of bachelor's degree completion among CSUF's transfer student population? How will we know that SI workshops and STEM counselors at SAC and Mt. SAC have improved STEM transfer rates at these schools? How will we know that we are improving outcomes among critical student groups?
- How will targets be recalculated to account for potentially severe budget cuts? What are the new targets?
- What are the top three challenges to this assessment overall? How can we address those challenges?

Storage and analyses of basic pipeline numbers might be centralized. Mt. SAC and SAC, for example, would collect, organize, and analyze their degree and transfer data, and then send to a point person at CSUF for integration into a larger TEST:UP dataset (or suite of datasets). All descriptive data should be disaggregated by gender, race/ethnicity, first-generation status, and other critical demographic characteristics (as available) to demonstrate TEST:UP's impact on pipeline diversity.

I should note that Gina has started to compile CSUF transfer data for Year 1 (just as STEM faculty have started to compile SI data), working with the IR office to quantify the number of STEM transfers in Fall 2008 and Spring 2009, the distribution of STEM transfers across schools/departments, and the number of transfer students who have made use of STSS services. (She has also tabulated participation rates for specific STSS events and academic guidance meetings, as described earlier.) Continuing to collect and organize these types of data will be critical for TEST:UP assessment, with the goal to address questions like “How has STEM Transfer Student Services influenced STEM degree completion among the CSUF transfer student population? Are certain STSS components or (sets of) practices more effective than are others?” These data can also be merged with larger datasets to analyze effectiveness of STSS in the context of a full cohort; data must include a record for each student, with variables like enrollment status, gender and race/ethnicity, and transfer status and STSS history (e.g., 1=non-transfer STEM major, 2=transfer STEM major, no STSS participation, 3=transfer STEM major, STSS participation). Creating datasets like this pave the way for more complex persistence models that might be presented in future research papers.

Specific Recommendations for Overall Assessment:

- *Address all forementioned questions about numbers and rates—without strong quantitative data, cleanly collected, securely stored, and rigorously analyzed, the success of this grant cannot be measured or assessed. **I would like to see baseline numbers at each campus in the next few months, as well as an initial TEST:UP dataset that can be exported for statistical analysis (working deadline=January 2010).***

V. Image and Identity: Insights from Recent Research

New data on engineering student persistence suggest that senior engineering majors with stronger leadership, business, and social self-concepts are less likely to consider professional engineering work than are their peers with more “traditional” engineering skills and self-concepts (Center for the Advancement of Engineering Education, TR-09-02 , “Exploring the Engineering Student Experience: Findings from the Academic Pathways of People Learning Engineering Survey [APPLES]”, a forthcoming report that I have co-authored). Problem is, the future of engineering requires both skills, both types of students. This is sparking an industry-wide conversation on the types of engineering curricula and activities that might better speak to the imaginations and identities of undergraduates most likely to leave, without losing those who are most likely to stay.

To what extent can emerging literature such as this inform TEST:UP efforts to recruit a broader range of students into STEM degree programs at four- and two-year campuses? That is, TEST:UP is necessarily focused on improving academic preparedness and commitment among students, offering course and time management advice, supplemental instruction, book scholarships, community-building activities, psychological support, and so on. It might be worthwhile to think about students’ imaginations, creative lives, and ways of understanding themselves as well—what they see as being their strongest skills, how they see these skills “fitting in” to dominant images of STEM work, and how we can correct dissonance through innovative pedagogy, curricula, and counseling, seeking out examples that demonstrate how vivid and diverse STEM work really can be. The point is to strengthen students’ sense of

connectedness to the academic and social communities of their college campuses and to the very nature of STEM. We would strengthen, in other words, integration and identification.

It is likely that efforts towards this end are already underway. TEST:UP's affiliated faculty and counselors are undoubtedly thinking about issues of science self-concept and identity, and the challenge to STEM retention when students begin to see themselves as having interests, abilities, and goals that they feel do not "belong" in (what they know of) science, math, and engineering domains (for instance, students who begin to feel as if their leadership, business, and interpersonal skills would be better leveraged in another field, with greater pay-off). We cannot expect to retain all of these students. But as a science community on the whole, we must consider how we might collectively re-envision science for students, in conjunction with other academic and industry efforts to reform and reinvigorate the very practices, traditions, and images that define our work. This will help us to better engage a more broadly talented group of undergraduates who might otherwise feel disconnected from STEM, and train (and promote) the type of modern scientist and engineer that our state, national, and global workforce needs more than ever.

In the upcoming year, I would like to learn more from TEST:UP affiliated faculty and counselors about this issue of science identity, and what they see as being top factors in STEM attrition above and beyond financial strain, lower levels of academic preparation, and limited academic and social integration.

Specific Recommendations for Image and Identity:
--

- | |
|---|
| <ul style="list-style-type: none">• <i>Discuss the full range of barriers to students' STEM persistence, and think about how TEST:UP might better (or best) address this full range</i> |
|---|

VI. Summary and Action Points

In all, I am incredibly inspired by the dedication of the entire TEST:UP team and the achievements of this grant in its first year. SI is positioned to make a substantial difference to student performance, and STSS provides the practical, social, and psychological support that students need to persist through their degree programs. Building on the specific

recommendations for each component/theme throughout the report, I have a few general points and questions for each campus as we look ahead towards the next year:

Mt. SAC: I would like to see their TEST:UP rationale and implementation plan more clearly. How will they capitalize on TEST:UP resources to strengthen and improve STEM education and transfer at their campus? How will they measure their impact?

SAC: I would like to see more expansive implementation in Year 2. I would also like to learn how they are managing the toughest challenges to achieve TEST:UP goals. How are they addressing recruitment into the major and successful transfer to a four-year institution in the face of these challenges?

CSUF: I would like to see more interdepartmental coordination and conversation in the upcoming year, as well as progress in collecting the matriculation, transfer, and degree data we need to assess TEST:UP's impact (this is essential, and applies to community colleges as well). I would like to learn how TEST:UP services and programs will be linked to these outcomes. Finally, I'd like to see if the "middle third" is being served by SI and STSS, presuming that this group of students is indeed our target population. Are we developing STEM talent among students otherwise lost to the pipeline due to inadequate or insufficient resources? Are we reaching the students we hope to reach? I would encourage faculty and staff to continue to produce briefs and presentations on their progress and findings, as these are excellent materials to share with colleagues, stakeholders, and constituents, and can inform research manuscripts down the line.

To summarize related action items, it will be important to continue to coordinate STEM transfer student counseling across campuses. It is vital that CSUF remains highly visible at Mt. SAC and SAC, and that staff and faculty from Mt. SAC and SAC come to CSUF for regular meetings and information-sharing. We need to expand existing SI and STSS assessment mechanisms. The sooner we can revise targets in the face of projected declines in enrollments and resources, the better. And we need to continuously reflect on what we are learning about this process—obstacles, catalysts, and new insights into a pipeline that we ourselves have a hand in re-shaping.

In the years to come, I hope that we can clearly convey the implications of TEST:UP for research and policy in STEM education. Based on our findings, which policies might be developed or refined? What are fruitful new research directions?

This evaluation has not covered the teacher intern component of TEST:UP because it is scheduled for launch in fall 2009. I have not heard much about this component, and would like to learn more. Who is overseeing this? How will it be implemented? What are the barriers to successful implementation, and how will these barriers be addressed? Does it make sense to include this component in the face of extreme budgetary constraints?

Which brings me to my last point: the California budget. Much of what I have discussed and recommended throughout this report may need to be modified and adjusted according to the economic outlook for California's postsecondary education system. This is a macro issue with immediate ramifications for TEST:UP, as a recent article in the San Francisco Chronicle makes clear:

One protester, sophomore Adriana Quiquivix, had been studying nursing at San Francisco State University. But all of the chemistry and lab classes she needed were full, semester after semester, she said.

"So I signed up for the second session of summer school - and they canceled that!" she said.

Finally, she switched to liberal studies.

(Nanette Asimov, "Students protest as CSU raises fees by 20%", Wednesday July 22, 2009, accessed through www.sfgate.com)

I know that good, thoughtful conversations will ensue over the next months about how to cut back on program components without compromising terrific progress and critical goals. This would be an important time to tap into the intellectual power of TEST:UP's internal and external advisory committees to think through inventive, resourceful solutions.

Although I pose a few questions for thought and action points for the future, make no mistake: this is a STEP grant that has had a truly successful first year. All of the players have brought passion and know-how to the project, and students are already reaping the benefits—one

need only read Transfer Scholars' essays, or sit down with students in a SI workshop to see this. I would like to commend Steve in particular. He has provided the vision, leadership, enthusiasm, and generosity of spirit that a complex, ambitious project like TEST:UP needs most of all. He has been a fabulous steward of a winning partnership. As a result, TEST:UP is well on its way to show how different types of institutions with shared values and goals can work together in a coordinated, innovative way, all to improve access, persistence, and equity in science, mathematics, engineering, and technology education.

APPENDIX A. FINAL TEST:UP SUMMARY SHEET

**TEST:UP -Talent Expansion in Science and Technology: An
Urban Partnership**

California State University Fullerton, Mount San Antonio College, Santa Ana College

Program

National Science Foundation - Science, Technology, Engineering, and Mathematics Talent
Expansion Program (STEP): Total Award: \$2,500,000 over Five Years

Current: \$1,489,979 for Three Years

Contingent: \$1,010,021 for Years Four and Five

Overall Goals

Increase the number of STEM transfers to four-year universities and colleges

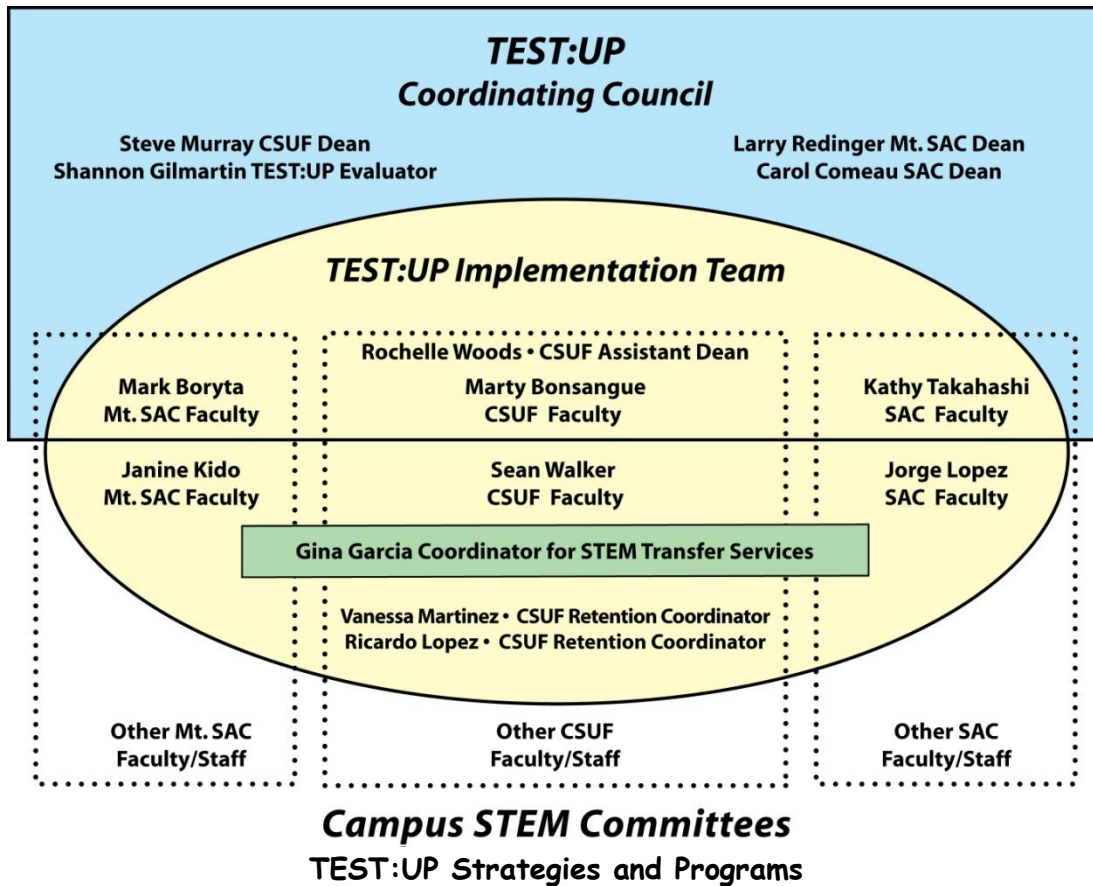
Increase the number of STEM AA degrees and baccalaureates

Focus

Enhance STEM academic advisement and student engagement

Increase student success in entry-level mathematics and the science courses

Administrative Structure



Strategy 1: Improve counseling, guidance and mentoring opportunities and improve information and knowledge of STEM careers for Mount San Antonio College and Santa Ana College STEM students and potential STEM students

Coordinator for STEM Transfer Student Services (Cal State Fullerton):
Full-Time CSUF Position; Travel to partner colleges to provide advisement for STEM students, work with faculty and half-time counselors to implement study campaigns, assist with students at risk, and organize presentations and events

STEM Counselors/Advisors (Mount San Antonio College and Santa Ana College): Half Time Counselors/Advisers at each college; provide advisement for STEM students, work with faculty and CSUF Coordinator for STEM Transfer Student Services to implement study campaigns, assist students at risk, and organize presentations and events

Web Sites and Video Presentations (Mount San Antonio College and Santa Ana College): Improve web site information content and linkages to STEM academic programs, articulations with four-year institutions, events, career tracks, internships, and research opportunities

Strategy 2: Develop support networks, including facilities and programs to develop learning communities, for STEM students at Mount San Antonio College, Santa Ana College, and Cal State Fullerton

Peer Group Program for Transfers (Cal State Fullerton): Hiring of peer advisers as peer mentors to oversee learning communities made up of incoming CSUF transfer students majoring in mathematics, the sciences, and other STEM fields; special orientation and advisement events for these new CSUF transfer students

Faculty Mentoring Programs (Mount San Antonio College and Santa Ana College): Mentoring of non-STEM majors with promise or interest in mathematics, the sciences, and STEM careers; visits to research labs, career days, professional seminar presentations

Science Resource and Study Centers (Mount San Antonio College and Santa Ana College): development and improvement of science resource and study centers, including tutoring, access to specimens, books, maps, computer resources

Strategy 3. Improve student engagement and learning in pivotal mathematics and science introductory discipline courses

Development and Implementation of Supplementary Instruction (Academic Excellence) Workshops (Mount San Antonio College and Santa Ana College; Cal State Fullerton): implement Supplementary Instruction workshops associated with selected, key math and science courses using peer facilitators; work to establish a regional collaborative to provide a forum for discussing approaches and determine best practices that improve student success in these courses

Tutoring Programs (Mount San Antonio College and Santa Ana College): using peer tutors, expand tutoring programs and homework assistance in improved science resource and study centers; work with faculty, the Coordinator for STEM Transfer Student Services, and Counselors to encourage students to seek tutoring assistance

Strategy 4. Develop a teaching intern program to improve the pedagogical and mentoring skills of Cal State Fullerton math and science graduate students interested in community college teaching careers

Teaching Intern Program (Cal State Fullerton, Mount San Antonio College, and Santa Ana College): place two Cal State graduate teaching interns each year with faculty mentors at both Mount San Antonio College and Santa Ana College where they will be hired as part-time faculty and given teaching assignments or serve as workshop facilitators; with additional funding, interns will spend time advising, counseling, and serving as mentors to students

Internal Advisory Committees

California State University, Fullerton

Dr. Ephraim Smith (Vice President, Academic Affairs) - Chair
Dr. Silas Abrego (Associate Vice President, Student Affairs)
Dr. Edgar Trotter (Acting Associate Vice President, Undergraduate Programs)
Dr. Paul De Land (Chair, Department of Mathematics)
Dr. Susamma Barua (Associate Dean, College of Engineering and Computer Science)
Dr. Robert Koch (Chair, Department of Biological Science)

Mount San Antonio College

Dr. Virginia Burley (Vice President, Instruction) - Chair
Dr. Debbie Borocho (Dean of Instruction)
Thomas Mauch (Associate Dean, Counseling)
Meghan Chen (Director, Learning Assistance)
Matt Munro (Mathematics)
Dr. Cindy Shannon (Biology)
Dr. Kenny Huang (Chemistry)

Santa Ana College

Dr. Norman Fujimoto (Vice President, Academic Affairs) - Chair
Dr. Micki Bryant (Dean of Counseling)
Jubal Hampton (Chair, Department of Biology)
Dr. Ted Yamada (Chair, Department of Chemistry)
Dr. Cher Carrera (Chair, Department of Mathematics)
Yolanda Mugica (Counselor and Coordinator, MESA)

APPENDIX B: MAY 2009 BRIEF ON SI ASSESSMENT

TEST:UP Evaluation Year 1 Evaluation Brief: SI Assessment S. Gilmartin May 12, 2009

Per meetings with the TEST:UP team in early May 2009, SI (Supplemental Instruction) courses are up and running at all campuses (CSUF, Mt SAC, and Santa Ana). Faculty, staff, and students have set the foundation for SI success. At this point, there are a few issues for consideration, including: (1) the format of and assessment plan for SIs at Mt SAC are not yet clear; (2) SIs at Santa Ana may not be reaching important groups (i.e., students who have already declared a STEM major and who are potential transfers); and (3) design and assessment of SIs at CSUF vary by department, precluding “apples-to-apples” comparisons. The purpose of this evaluation brief is to suggest strategies for stronger assessment of SI impact on student development and project goals. Related SI issues—interdepartmental coordination at CSUF, TEST:UP progress at Mt SAC, and the SI student population at Santa Ana—will be addressed further in a forthcoming Year 1 Evaluation Report (August 2009).

“Big Picture” SI Assessment Questions at CSUF

Over the course of my three-day site visit, I was so impressed by the collective faculty effort to implement SI courses in STEM, and to understand and quantify their effectiveness. I was also impressed by the enthusiasm of SI student participants and leaders in the Mathematics department (per my focus group on May 6). To build on this momentum and make a persuasive case for success, stronger and more coordinated assessment of SI across Biology, Mathematics, and Chemistry is needed. Below are several points to consider in strengthening and refining SI assessment.

Whom does SI serve? Is the current SI student population in line with TEST:UP objectives?

In a wrap-up meeting with Steve Murray, Mark Filowitz, Rochelle Woods, and Gina Garcia on May 6, we talked about the possibility that non-mandatory supplemental instruction benefits the “top third” of students only, or those high-achieving, highly involved students who are most likely to enroll in SI courses/workshops. This misses the group of students who are the “real” targets of intervention—the “middle third” who might be more likely to persist with extra academic support, but are otherwise at higher risk for STEM dropout. These are the students whom we need to engage, in other words, if we are to increase the number of STEM baccalaureates, and it is of concern if supplemental instruction does not find its way to them.

Thus emerges two baseline hypotheses: (H1) Middle-third students have a higher rate of drop-out and (H2) SIs, in current format, do not reach many of them. To substantiate these hypotheses, we need to conduct three baseline analyses. First, we need to operationalize “top”, “middle”, and “bottom” thirds (heretofore referred to as “third status”). Who falls into these thirds? How do we define “third status”? Second, we need to show, using historical data, that middle-third students have a higher rate of STEM dropout than do top-third students. Finally, we need to demonstrate that SIs are predominantly, disproportionately comprised of top-third students.

Given that H1 and H2 are confirmed⁷, why would this merit our concern? Why do we “care” that SIs do not reach a high-potential but at-risk group? Here we arrive at the third and fourth hypotheses (grounded in preliminary TEST:UP data): (H3) SIs have a positive effect on student performance, (H4) especially among those students at the middle third. To substantiate these hypotheses, and meet the overall goals of TEST:UP, we would then conduct the following:

What is the effect of SI on student performance? (analyses underway)

This requires examining a course or set of courses where a (sizable) portion of students have elected to enroll in SI. The sample for the analysis is comprised of all students in the course. Controlling for students’ background characteristics, we would assess the extent to which SI participation has a unique effect on an important outcome measure, such as final grade. Stated differently, are there net effects of SI on performance after accounting for other student characteristics that influence both SI participation and final grade? Background characteristics include incoming GPA, performance on a “pre-test” at the beginning of class, major, gender, underrepresented racial/ethnic minority status, financial aid status, and/or “third status”⁸.

Does the effect of SI on student performance depend on “third status”?

This involves controlling for all main effects above and creating a series of interaction terms between SI and “third status” (recoded into two binary variables with one reference group). Of course, if SIs enroll a disproportionately small number of middle- and bottom-third students (as might be found in our first set of analyses), then we do not have an optimal design to test for interaction effects (we have low statistical power, in other words, to detect interactions—for robust analysis, we want an equal number of students in each “third” group participating in the SI). However, as long as there is a “statistically reasonable” number of students from each group in the SI, we can proceed with the analysis cautiously, and consider our findings to be suggestive. Ideally, we would find that the regression slope for SI is particularly steep and positive for students in the middle third!

What helps to explain the positive effect of SI on performance?

Here is where both qualitative and quantitative data come into play. Among SI participants, what are the top predictors of grades (assuming some residual variability in final grade among these students, and testing variable measures of SI workshop experiences, such as number of workshops attended, number of worksheets completed, and so on)? What do students say about their SI participation? (Based on my one focus group, at least five themes emerged that can help to explain the positive effects.) What do students who did not participate in SI say about the course—and factors that stood in the way of their SI participation?

And then, based on all of these data, we can make stronger inferences about SI impact generally; who benefits from SI in its current form, and how; if and how SI serves students whom we are most interested in for the purposes of TEST:UP; and what we might do differently to broaden its scope and impact (e.g., design experimental variations of supplemental instruction to better reach the middle third). This is a proposed baseline assessment. The story goes something like this (pending confirmation of all

⁷ Perhaps these analyses have already been conducted in some form. Let us think about how to leverage previous work. Let us also think about how we might interpret the possibility of finding that middle-third students are neither more nor less likely to persist through STEM, and/or that they are neither more nor less likely to enroll in SI.

⁸ “Third status” may well derive from incoming GPA, for example, depending on how we choose to operationalize this variable. Of course, if GPA is used to define “third status”, it would be excluded from the list of covariates.

hypotheses): We have SI, and it has a positive effect, but it is not fully reaching a critical group, despite having a particularly strong and positive impact on the performance of this group—thus, we need to think about tweaking SI administration further.

Of course, we are ultimately interested in student persistence to the baccalaureate—student performance in a given course acts as our proxy in these early years of the grant. In forthcoming years, we will be able to link SI to degree attainment (assuming that SI participation is fed into student records), both directly and indirectly (e.g., through grades).

I realize that there is some variability in the design and administration of SIs across departments at CSUF. Establishing or mapping out this variability would be helpful to me and to others who are learning about these efforts. Of course, this variability adds “noise” to the data. However, more important to rigorous assessment at this point is making sure that Biology, Math, and Chemistry SI assessment efforts use essentially the same controls and the same outcome measures, and ask the same research questions. This will strengthen comparability and inferences about SI effects, and will require continued conversation between Steve Murray, Sean Walker, Marty Bonsangue, Ed Sullivan, and the entire team. Bravo to a fabulous inaugural year!

Assessment of SI at Mt SAC and Santa Ana

At Santa Ana, I was encouraged that assessment efforts of their SI are underway—Kathy Walker is using “first exam grades” as a control for her analysis of SI impact, given that SI was not implemented until the latter weeks of the class. This is an excellent start.

At Mt SAC, information about their SIs—format, administration, enrollment, assessment—is not yet available.

I look forward to learning more about all of these efforts following the larger meeting at Santa Ana this week and going forward. Data access will be different at the community colleges, which will necessarily affect the breadth of analyses, but the same principles apply: in order to evaluate SI impact, we need to control for students’ prior achievement and interests. Moreover, we must assess the extent to which SI is reaching students whom we are targeting as part of TEST:UP goals; and if, per our hypotheses, SI is making a particularly strong and positive difference for students in this “middle third” group.

APPENDIX C. STSS SUMMARY DOCUMENTS

STEM Transfer Student Services
California State University, Fullerton
National Science Foundation STEP Grant
Year 1 Report
 Fall 2008-Spring 2009

OVERVIEW

The STEM Transfer Student Services (STSS) program at California State University, Fullerton (CSUF) was developed in fall 2008 in order to fulfill the goals of the National Science Foundation STEP grant. Specifically, the program focuses on two of the four main strategies established to fulfill the grant's objectives. First, the program is designed to improve counseling, guidance, and mentoring opportunities for STEM transfer students. Second, the program is designed to develop support networks that will facilitate a sense of belonging and foster communities of learning for STEM transfer students. These strategies are implemented by the coordinator and peer advisors for the program. The following mission statement was developed in January 2009 and modified in June 2009 in order to clarify the program's vision and purpose:

STEM Transfer Student Services provides guidance and transitional support to science, technology, engineering and mathematics (STEM) community college transfer students who plan to attend or who are currently attending California State University, Fullerton. Our main goals are: (1) to increase the number of transfer students majoring in and graduating from STEM disciplines; (2) to strengthen our students' academic achievements; and (3) to increase their involvement within the university. These goals are achieved through student peer advising, workshops, social events, awareness events, and academic assistance at California State University, Fullerton and at the community college level.

The programmatic efforts of STEM Transfer Student Services are geared towards a distinct population of students who successfully transferred and enrolled in one of ten majors housed within the College of Natural Sciences and Mathematics and the College of Engineering and Computer Science. The total number of students served in the first year is listed below. Student involvement in the program is determined by participation in academic guidance meetings initiated by the coordinator, participation in mentoring meetings initiated by the peer advisors, or participation in events sponsored by STEM Transfer Student Services.

	<u>Fall 2008</u>	<u>Spring 2009</u>
STEM Transfer Students:	208	154
Percent NSM (total):	53.4% (111)	49.4% (76)
Percent ECS (total):	43.3% (90)	42.2% (65)
Percent Changed Majors (total):	3.3% (7)	8.4 % (13)

Document # 3

Students Involved in STSS:	62	57
Percent Involvement:	29.8%	37%

ACADEMIC GUIDANCE

STEM Transfer Student Services takes a proactive approach to assist transfer students who face academic difficulties in their first semester on campus. In order to provide academic support and guidance to students who may not initiate contact with the program, mid-semester grade evaluations are sent to the professors of every first semester transfer student. One-on-one meetings are then scheduled with the Coordinator for STEM Transfer Student Services for all students who display early warning signs of academic difficulties. During the meetings, the coordinator provides academic, personal, and psychological guidance to students based on the individual needs of the student. The coordinator also refers students to faculty members, support programs on campus, and tutoring services, as needed. Below is a summary of the number of

	<u>Fall 2008</u>	<u>Spring 2009</u>
Meetings Scheduled:	56	44
Meetings Attended:	26	24
Percent Attended:	46.4%	54.5%

meetings scheduled with students each semester and the actual number of attended meetings. Students are not required to attend the academic guidance meetings, but are highly encouraged.

STEM TRANSFER SCHOLARS

The goal of the STEM Transfer Scholars program is to assist STEM transfer students with their transition to CSUF and to make them aware of support programs and resources on campus. The program provides students with the tools and advice needed in order to be successful in their major and to explore academic and career options within that major. The program also encourages transfer students to get involved on campus or in the community. Peer Advisors work with students to fulfill the requirements of the scholarship including attendance to at least one social activity, one educational workshop, and one awareness event sponsored by STEM Transfer Student Services. Students must also meet with their peer advisor at least three times per semester and complete eight hours of community service or join one student organization. Once the requirements have been completed, eligible students must submit an essay discussing the advantages and opportunities afforded to them through the STEM Transfer Scholars program.

In fall 2008, six students completed the requirements for the STEM Transfer Scholars program and were each awarded a \$500 book scholarship. In spring 2009, seven students completed the requirements for the Scholars program; six were awarded \$500 book scholarships.

PEER MENTORSHIP

Having been transfer students themselves, peer advisors for the STEM Transfer Student Services program are trained and qualified to serve the community college transfer student population by answering questions, offering peer support, and providing resources to ensure the academic success of transfer students. At least three personalized, one-on-one meetings are offered throughout the semester for transfer students interested in discussing academic goals, study habits, scholarship opportunities, career development, major exploration, student organizations, and community service involvement. Student involvement with peer advisors is listed below.

	<u>Fall 2008</u>	<u>Spring 2009</u>
Total Meeting Participation:	57	56
1st Meeting Participation:	39	29
2nd Meeting Participation:	10	17
3rd Meeting Participation:	8	10

WORKSHOPS

Workshops offered by STEM Transfer Student Services focus on enhancing the academic and professional success of STEM transfer students. Through a variety of workshops, STEM transfer students learn valuable skills necessary to achieve their bachelor's degrees as well as succeed in future careers.

In fall 2008, two workshops were offered: Learning Styles and Resume Writing.

In spring 2009, four workshops were offered: Learning Styles, Resume Writing, Library Research Skills, and Mock Interviews.

	<u>Fall 2008</u>	<u>Spring 2009</u>
Workshop Attendees:	12	32

SOCIAL ACTIVITIES

STEM Transfer Student Services coordinates social events in order to provide a welcoming and supportive environment for transfer students as they transition. Transferring to an unfamiliar environment may be an overwhelming experience; by providing a comfortable atmosphere, the success of transfer students may be enhanced. Through sporting events, food and dessert socials, and other activities, transfer students are able to build a network with other transfer students to add to their web of support and comfort.

In fall 2008, two social events were offered: Nacho Social and Soccer Game Social

In spring 2008, four social events were offered: Chocolate Social, Bowling Social, Baseball Game Social, and Tennis Match Social.

	<u>Fall 2008</u>	<u>Spring 2009</u>
Social Event Attendees:	15	56

AWARENESS EVENTS

Awareness events are programs that address and highlight current issues such as hunger, health, and conservation. Transfer students who participate in awareness events offered by the STEM Transfer Student Services will become more well-rounded citizens at CSUF.

In fall 2008, one awareness event was held: Hunger and Homelessness Community Service. In spring 2008, four awareness events were held: Natural Conservation Event, Relay for Life, Health Disparities Presentation, and Workshop on the English Writing Proficiency Exam.

	<u>Fall 2008</u>	<u>Spring 2009</u>
Awareness Event Attendees:	3	18

STEM Transfer Student Services *Qualitative Summary-STEM Transfer Scholars*

The goal of the STEM Transfer Scholars program is to assist STEM transfer students with their transition to CSUF and to make them aware of support programs and resources on campus. The program provides students with the tools and advice needed in order to be successful in their major and to explore academic and career options within that major. The program also encourages transfer students to get involved on campus or in the community. Peer Advisors work with students to fulfill the requirements of the scholarship including attendance to at least one social activity, one educational workshop, and one awareness event sponsored by STEM Transfer Student Services. Students must also meet with their peer advisor at least three times per semester and complete eight hours of community service or join one student organization. Once the requirements have been completed, eligible students must submit an essay discussing the advantages and opportunities afforded to them through the STEM Transfer Scholars program.

In fall 2008, six students submitted scholarship essays and in spring 2009, seven students submitted essays. From the essays, there were several themes that emerged.

Workshops

Workshops offered by STEM Transfer Student Services focus on enhancing the academic and professional success of STEM transfer students. Through a variety of workshops, STEM transfer students learn valuable skills necessary to achieve their bachelor's degrees as well as succeed in future careers. Scholars found the workshops particularly helpful.

"The workshops made available by the STEM program were helpful in either improving study skills or improving resumes." --Teddy Truc

"At first I was unaware that there was help provided to us students when building a resume, but after this workshop I was very glad to hear that the student services [are] always there to help with our resumes and get us prepared for future interviews." -- Shams Khoram

"I went to the [library research survival skills] workshop; I wouldn't have gone if it weren't a requirement for STEM in all honesty. I learned so much, I thought it was awesome how now we, as students, don't have to travel up and down the state to retrieve resources, now our resources can come to us." --Sital Patel

"Also, through a workshop I learned what my learning styles were. I found out that I was an auditory, visual, applied, spatial, social and a creative learner. Then I was able to find out how I should study and take notes, like record lectures, this helped me in my first semester and in the future." --Brittini Moroyoqui

Peer Networking

STEM Transfer Student Services promotes peer networking by sponsoring social events that provide a welcoming environment for transfer students. Through sporting events, food and dessert socials, and other activities, transfer students are able to build a supportive network with other transfer students who are facing similar transitional issues. Through participation in the program, Scholars enhanced their social skills and took advantage of networking opportunities.

"This was important to me not only to give something back to the community, but to network with other students in related majors." --Matthew Smith

"I have learned that it is very easy to make friends with students and staff, which is a great way of networking that can help me throughout my years at Cal State Fullerton." --Shams Khoram

"While participating in the program...I also learned that other transfer students were experiencing the same things I was in my first semester; things like, struggling to juggle study time, family time, and work. It just somehow made attending Cal State Fullerton easier once I realized I was not the only one trying to balance multiple tasks." --Robert Leeper

"...participating in the STEM Transfer Student Services program has helped me develop [social] skills..." -Kenny Duong

Welcoming Environment for Smooth Transition

Peer advisors for the STEM Transfer Student Services program are trained and qualified to serve the community college transfer student population by answering questions, offering peer support, and providing resources to ensure the academic success of transfer students. The peer advisors' main goal is to provide a smooth transition for students. Many of the Scholars expressed their satisfaction with the supportive environment provided by the program.

"To future students of Cal State Fullerton, I'd have to encourage them to join the STEM program. It made me feel at home here and definitely helped me get comfortable with my new environment." --Sital Patel

"Being involved in the STEM Transfer Student Services program at Cal State Fullerton has helped me in my transition from community college to a Cal State." --Randall Holmes

"The STEM center pointed me in the right direction and always had its doors open for any questions." --Matthew Smith

"When I was approached to take part in the STEM Transfer program I was thrilled because despite my previous college experience, I still felt lost and very much alone in a big campus. With the help of my peer advisor, my concerns and questions were slowly addressed and answered." --Angelica Valle

Involvement

The STEM Transfer Student Services program encourages students to get involved on campus or in the community. As a requirement for the scholarship program, students must complete eight hours of community service or join one student organization. Many of the scholars found their involvement to be beneficial in their first semester on campus.

"STEM Transfer Student Services program has made me want to become more involved with CSUF [rather than] just being a commuter to the school" --Randall Holmes

"[STEM Transfer Student Services] has gotten me to volunteer some of my time to help a cause." --Randall Holmes

"...being involved made my transition easy and comfortable." --Brittini Moroyoqui

"I also joined a club at CSUF which is called Vietnamese Student Association (VSA). Being involved with VSA was a fun and useful experience for me because I [got] to meet many new friends. I was a loner when I first attended CSUF, but not anymore." --Kenny Doung

"Volunteering at the Anaheim Hills Oak Canyon Nature Center was a fun and rewarding experience. I volunteered 8 hours and enjoyed every minute of it." --Robert Leeper

Academic Assistance

Through one-on-one meetings, peer advisors offer academic support to transfer students. The meetings are personally designed to meet the needs of each individual student and may focus on study habits and academic skill development. Additionally, Scholars must earn a 2.5 GPA in their first semester on campus so their peer advisor encourages them to make school a priority.

"If you need help with study tips or habits, the STEM Transfer Student Services program can help." --Heather May

"[STEM Transfer Student Services] reinforced the idea that school is my priority." -- Randall Holmes

"During my first semester I had someone monitor my progress monthly. This motivated me even more to increase my grade point average." --Matthew Smith

"From this first meeting, I was informed of student services that I didn't even think to ask about...I actually started to feel excited about school again. Knowing that these services were offered is one thing, utilizing them is another. I started picking at the brain of the microbiology tutor in the Opportunity Center." --Sital Patel

Summary

As evidenced by the personal quotations of scholarship recipients from fall 2008 and spring 2009, the STEM Transfer Scholars program has been beneficial to students for a variety of reasons. Although the number of students who submit the essay in order to earn the scholarship is limited, the actual number of students utilizing the services offered by STEM Transfer Student Services is higher. During the 2008-2009 academic year, approximately 30% of the first-time transfer students entering STEM majors participated in one or more programs sponsored by STEM Transfer Student Services. For the 2009-2010 academic year, the goal is to increase participation in the scholarship program and in other programs sponsored by STEM Transfer Student Services.

Evaluator Biography

Shannon K. Gilmartin, Ph.D., is Director of SKG Analysis, a research consulting firm. Her current clients include the Office of the Vice Provost and Office of Student Affairs at the California Institute of Technology; the Department of Psychology at University of California, Los Angeles; the School of Pharmacy at University of Southern California; 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 and the Michelle R. Clayman Institute for Gender Research at Stanford University; the Dean's Office at the Stanford University School of Medicine; the University of Alaska, Fairbanks; and Project Kaleidoscope/The Keck Foundation. Areas of expertise and interest include educational equity and workforce development; institutional performance and program assessment; and the structure, culture, and future of the science and engineering talent pipeline in the United States

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, and has published in *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*. Most recently, 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.