

Project Description (15 pages)

Proposal Title: BPC-DP Partners in Computing (PIC)

Overview

Computer science (CS) faculty at Sacramento City College (SCC) and Sacramento State University, (Sacramento State) share a concern with employers in the Sacramento region: low enrollments in computer science programs mean few students are choosing computer science and computer engineering careers. Enrollments in traditional CS programs in the Sacramento region have declined over the past six years within the Los Rios Community College District (LRCCD), and within Sacramento State. This problem is compounded by additional factors: a significant proportion of current computer science students do not complete their degree in computer science and/or computer science students are mostly white or male students. Within SCC, 60% of those students who declare a computer science major do not complete their degree in computer science. At Sacramento State, 40% of computer science majors drop out of computer science in the first two years. The Sacramento regional area is very diverse in ethnicity and we do not see students in computer science with that same degree of diversity. According to the most recent demographic data, over half of all K-12 students in the Sacramento region are nonwhite, and 45.5% of 2004 graduates are students of color. SCC is a highly diverse, inner-city urban community college, with a population of students that are much more diverse than is the greater Sacramento metropolitan area. The student population at SCC is composed demographically of 56.7% of students who report themselves in categories of African American, Asian, Filipino, Latino, Native American and Pacific Islander, and 34.8% Caucasian with 8.4% not reporting and other, and 37% are first-generation college students. Many of the middle and high schools that feed into SCC share these demographic realities. Women in computer science at our SCC and Sacramento State number less than 10% of those in the program, despite the fact that at least 50% of students at the K-12 and postsecondary level are female and more than half of total graduates are female.

Locally, the Sacramento region is seeing a new wave of technology companies moving to the area to take advantage of an entirely new set of competitive advantages: strong educational and research institutions, proximity to the San Francisco Bay area, and emerging venture capital network, premier sites and facilities, and a ready-trained workforce (Sacramento Area Commerce and Trade Organization, *2006-07 Economic Profile*). Sacramento ranked 16th on Popular Science's "top tech cities" list, based on 36 technology indicators. Since the mid-1980's, the Sacramento Region's economy has been one with a large technology influence. Seven of the ten largest manufacturers in the region are involved in research and development and the production of high technology items. These companies include Intel Corporation, Hewlett-Packard, DST Output, Aerojet/Gencorp, NEC Electronics America, Apple Corp and Agilent Technologies. This region is also the location for the California Department of Technology Services, the center for all the State of California's information Technology needs. The need for computer or information technology professionals is expected to continue to grow in the region over the coming years as business, government, and most other sectors increase their use of IT and high-tech devices, and as a large number of the State's IT workforce will retire in the next several years. The California Employment Development Department projects that, in the next five years, an average of 793 openings annually will be available in computer related occupations in the region.¹

The Information Technology Managers Academy (ITMA) recognizes this need and has proposed a partial, yet viable means to facilitate the filling of these vacancies. ITMA is developing an Intern Program. This program will allow students from accredited colleges and universities to serve in an internship position with the State of California. Upon completion of a Bachelor's degree and successful completion of the internship program, students will automatically move into permanent state employment. ITMA recognizes that this program is different from current means of hiring employees, but feels that this avenue will provide executives with a tool to reverse increasing vacancy rates. PIC students will become some of these interns.

The SCC Partners In Computing (PIC) Project will **focus on the community college** while demonstrating multiple strategies to address the retention and academic success of computer science students while also addressing recruitment and outreach to female, disabled and minority students under-represented in the Computer Science field.

¹ This includes the following occupations: CS scientists, programmers, support specialists, systems analysts, database administrators, and systems and data communication analysts.

Student Retention and Success. Researchers have identified many reasons that impact the success of college students. Among these, they cite, financial reasons, personal issues, inability to connect or find a place on college campus, not being involved/engaged in activities, and lack of academic preparation or family support [(Braxton, Milem, Sullivan (2000), Tinto, Goodsell (1994), Astin (1993), Pascarella, Terenzini (1991), Silverman, Casazza (1999)]. Reports (Chandler, 2000, Levey, Blanco & Jones, 1998; AACC, 1997; Lempinen, 1998) have identified what are believed to be effective responses to the problem of low minority student success in college including: 1. An institution-wide commitment to minority student success; 2. Effective efforts to strengthen community linkages; 3. Increased access through focused recruitment, admissions, and financial aid practices; 4. Comprehensive, systematic and integrated academic and student support services; 5. Assessment, course placement, and student progress reporting systems; 6. Good student data and on-going program evaluation; 7. Campus climate infused with value for diversity; and 8. A multicultural curriculum.

These effective responses will be integrated into the design of the Broadening Computing program. The PIC project will also focus on providing students with increased access in the form of financial aid.

Financial Aid. Given the demography of the Sacramento Region, it is not surprising that despite the relatively low costs of enrolling at a California community college, a significant percentage of Sacramento City College students have great difficulty in covering the cost of books and supplies, transportation, and the associated room and board expenditures. In comparison with other higher education institutions, the cost of enrollment fees is a bargain at \$20 per unit, and students eligible for Federal financial aid pay even less (their enrollment fees are paid by a state funded Board of Governors Grant Waiver). District figures used for financial aid eligibility determinations, minus enrollment fees, indicate another \$6,888 per year is needed to attend as a full-time student living at home with parents. The figure for those living independently rises to \$12,116. The following table shows that nearly two thirds of SCC students work while pursuing their educational endeavors:

Hours Employed	Fall 2008	
Less than half time	3,831	14.9%
Half time or more	12,205	28.0%
Full time	4,988	19.3%
Unemployed	4,592	17.8%
Not seeking	5,139	19.9%
Unknown	21	00.1%

For many low-income and minority students, enrollment and persistence decisions are driven by the availability of financial aid. Low-income and minority students who receive grants generally are more likely to persist than those who receive loans. However, given the rising costs of attending college, it is unlikely that low-income students will be able to receive bachelor's degrees without any loan aid. At the same time, the research also suggests that the shifts in aid from grants to loans and from need-based to merit-based programs adversely affect both enrollment and persistence for minority students. **Reversing these shifts may be needed.** SCC PIC program plans to pay stipends to needy students who agree not to work off campus, and who continue to pass 12 or more units of transferable courses each semester. The bulk of the money for these stipends will come from our industry partners who will sponsor one student and create one summer internship for one year. There are 500 companies in the greater Sacramento region who depend upon computer science graduates to keep their company strong and effective. The PIC advisory board will work with CEO's and CIO's of 30 to 60 local companies to sponsor a student. Larger companies may be able to sponsor more than one student and may be able to provide more than one summer internship. Smaller companies might join and sponsor a student between two companies.

Comprehensive and Integrated Academic and Student Support. SCC currently offers a wide range of academic and student support services aimed help students learn how to solve their own personal issues without having to drop out of college to do so. Our PIC mentoring program will assist students to adjust to college, become part of the SCC college "family", use time and money wisely, prepare for class and tests, learn to write college essays, solve transportation and child care issues, and deal with health issues so that by the end of our two years of mentoring, they will continue to be successful students when they transfer to a four year university.

Project Goals and Outcomes

CS faculty and leadership at Sacramento City College established a committee to grapple with the following questions:

- How do we partner with business and industry and our local middle and high schools to develop a pipeline of diverse and future IT talent?
- What are the most productive strategies for recruiting female, disabled and minority high school students?
- What efforts will have the most impact on reversing the trend of low enrollments/graduation rates of community college computing majors, particularly for women and minority students?

As a result, they have identified collaborative and innovate strategies for a program to address these needs.

Resources from the NSF Broadening Participation in Computing (BPC) will be used to develop **Partners in Computing (PIC)** - an effort designed to

- strategically identify and recruit students in the target groups, who are strong in mathematical skills, into the PIC program;
- support academic study in computing for women and underrepresented populations by bridging the variety of community college support services that are available;
- expand/tailor existing services to the specific needs of women and underrepresented students.
- provide stipends to students who agree to work only on campus during fall and spring semesters.

Through PIC, the SCC Computer Science department will work in collaboration with the Sacramento City USD Career and Technical Preparation department to disseminate information about stem careers to students, parents, guidance counselors, and teachers. This project will focus on students **sooner**, and create an environment that addresses college **affordability, engagement** and **success**. The overarching goal of this demonstration project is to ensure the continuance and success of underrepresented and female students in computer science coursework so that they complete their community college preparation and transfer to a four year institution to complete their BS degree. The SCC Partner in Computing program will take an integrated approach by bundling community college and partner resources to ensure seamless support for recruited students. These will include mentoring, tutoring in academic subjects, financial, social and academic support, encouragement, career counseling, and training in time management and budget management. This will ensure a financially stable environment for students leading to fuller opportunity to engage in their academic coursework and explore applications to real work internship experiences.

Success: Create a profile of interventions that positively affect the retention and success of those in the computing discipline. This project is meant to advance individuals and society while enhancing the sciences by promoting a diversified, expanded work force. It is the intent of SCC to create an exemplary model for other colleges, districts, regions and states to consider.

The PIC activities will take place over the first three-years as follows:

Year 1: Project Director convenes Advisory Committee, articulation meetings and curriculum review, develop agreements, plan and schedule yearly activities among partners. and develop and schedule professional development activities. Recruit initial cohort of graduating HS students and families. SCC Outreach team help students fill out FAFSA forms by March 1 for next fall. Recruit mentors. Recruit HS juniors to take first two programming classes in their senior year. Support those HS juniors until they graduate and enter the PIC program at SCC. Assessment of existing programs/services, and creation of collateral such as plan/map, and agreements between partners. Plan for inspirational speakers every month. Students arrive on SCC campus in fall 2010. Work with Internship Program director at Sac State and SCC Work Experience Coordinator to prepare summer internships for all PIC students. Place students in those internships by May 2011. Provide SCCC counselors to assist with enrollment for second semester transfer courses. Continue to share information and recruit by speaking at Sacramento City USD student and parent events, advertising, YouTube videos and more. Advisory Committee meets monthly for first semester then quarterly. Student tracking system initialized and students are entered into the tracking system. Start SCC back-to-school potluck dinner tradition for all PIC families, faculty, and advisory panel.

Year 2: Continue activities from Year 1 plus recruit second cohort of graduating HS students and families targeting students who have completed a computer science course at SCC. Advisory Committee meets on a biannual basis to review objectives and implementation as well as plan second year recruitment and paid summer internships for Year

1 students. -Prepare matriculated students for transfer to Sacramento State or other four year institution, including a secure paid summer internship.

Year 3: Prepare additional matriculated students for transfer in either Sacramento State or other four year institution in semester 1 or 2 of their third year at SCC. Continue to support year one and two PIC students and recruit year 3 students. Continue to recruit candidates through Sacramento City USD partnership activities. Advisory Committee members and external evaluator continue to monitor progress of students through all required coursework. Ensure sustainability of program by sharing positive results of mentoring, supporting and recruiting efforts with SCC administration and leaders in the STEM equity pipeline. Possibly, modify grant to be an Alliance Grant with SCUSD, SCC, UCD, and CSUS.

Years 3-6: Have a potluck BBQ to celebrate conferring of A.S. and B.S. degrees and job attainment with all partners including families and industry partners. Invite graduates to speak to potential new students at the high schools where they graduated and to recruit others into the PIC program. Do this every year!

Outreach & Awakening Plan

Even though this demonstration grant is focused on Community college, we realize that the plan really starts well before then. As a result, faculty engaged in PIC will work with Sacramento City Unified School District (SCUSD) career and technical education preparation (CTE), counseling, and staff to arrange the most strategic times to speak to the students at their middle and high schools. For the past 5 years, this has been happening on a more casual basis with a few of the faculty from SCC. Our plan is to expand the number of schools we reach (to all SCUSD middle and high schools) and target the best ways to reach those students and their parents. Studies show that students, particularly girls, decide in middle school that math and science are not for them. Whether this decision is based on difficulty with the coursework or social pressures, a large percentage of girls take only the math and science courses required for graduation in high school. This is also true of many minority students. Therefore it is imperative that students and their parents have an early introduction to the importance of STEM subjects and a full understanding of the career opportunities available to students that pursue this area of academia.

Eight years ago, **Sacramento City Unified School District** divided all of the high schools into themed small learning communities (SLC), small high schools or academies. Students choose an SLC at the end of eighth grade. After five years, it became apparent that engineering and computer science themed SLCs had a lower than average enrollment of girls and minorities. For the last three years the SCUSD Career Technical Preparation Department has been developing “Career Adventures” that introduce standards-aligned, math and science lab experiences that supplement the middle school curriculum. For example, students study science concepts using fuel cell car kits or math concepts while designing and building teen centers to scale. These activities show students how they might use their math and science knowledge in the real world. As part of the adventure, local engineers also participate in the classroom, helping students to develop critical thinking skills and introducing them to various engineering careers. This structure is already in place and is the perfect place for PIC to focus their initial outreach efforts. By developing a math or science standards-aligned adventure focusing on computer programming knowledge, skills and abilities, PIC will gain access to middle school students, teachers and parents. Middle school students will be better informed when choosing an SLC and therefore more likely to choose a STEM focused SLC.

At the high school level, PIC will support SLC speaker days. Speakers will reflect the high school students and will include women and minorities. This will help the high school students to vision themselves in the computer field and to further understand the many careers available to them. It will also expand their access to a caring community of adults.

Students in SCUSD are required to complete a senior project for graduation. This process starts in the ninth grade as students begin to learn the inquiry process and develop small “practice” projects. PIC staff will be excellent project mentors for students, guiding them through a project and motivating students to excel. This would give PIC staff direct access to high school students and teachers and create a bond with high school students that might last four years culminating with a senior project. These relationships will encourage the high school students to delve deeper in the computing field and spark interest into taking SCC Computer Information Science and Computer Programming courses. This will also lead to high school students joining PIC upon graduation.

Most SCUSD students have never been to a college campus. This year the CTP Department began taking middle school students to CSUS to visit various engineering labs. The students were given an opportunity to complete simple projects, tour the campus and eat at the student union. This day generated great enthusiasm, and students began visioning a future that included an emphasis on STEM subjects. By taking high school students to City College, PIC will expand students' future perspective, diminish the fear associated with attending a new school, and provide a safety net for the transition from high school to post-secondary education.

By the end of ninth grade, we will have met with those students and their parents to tell them what they need to do now to have a successful career in a STEM area. By tenth grade we want them to be able to tell us about the courses they are taking and what STEM fields they are considering having as a career. When we meet with their parents, they should be able to tell us why it is so important for their sons and daughters to take math and science classes at every grade level in school. Tell all students and their parents that college is affordable to everyone.

In high school, encourage these students to continue taking math and science classes every semester and to seek outside help the minute they have a problem with it. Encourage their small learning community teachers to offer free student tutoring sessions where the top students tutor those in need. Use students in California Scholarship Federation (CSF) to tutor those who need help. Continue to speak to students and their parents extolling the value of math and science in their lives. Tell them that college is affordable for all students and share with students the best parts of becoming a computer scientist.

Recruitment Plan

Use college instructors to spend time at targeted high schools (that feed to SCC) to encourage students to apply for PIC by fall of their junior year. Invite those students to take two computer classes at SCC during their senior year of high school. Show them how they can get both high school and college credit for those SCC classes. Help them enroll in the SCC classes and discuss transportation to the SCC campus using the free bus and light rail passes that all SCC students receive. Use those 2 classes to connect with these students and to share the adventure that is the constantly changing field of computer science. Encourage them to share with other students at their high schools because they can be our best recruiters.

SCUSD has a huge Career and Technical Preparation (CTP) program whose team members speak to all students in the district. Arrange to send a PIC representative to be part of the team speaking to students. Continue to speak at Career Days, Engineering week and parent visit nights to make sure that each student and their parents get the message about the need for graduates in STEM fields and in computer science. Work with small learning community lead teachers in math and science at those schools to identify and prepare targeted students to enter the PIC program in the summer after high school graduation. Targeted students are those who are in under-represented minority ethnic and social groups, including women, disabled, foster children, and the economically challenged. In addition, they have excellent abilities in math and they enjoy working with computers. Ideally, these students should enter their senior year of high school knowing that they have a spot in the PIC program for the following fall semester. By their senior year, we should be able to have many of those students attend SCC to take the first Computer Information Science Course (CISC course), the first computer programming course (CISP), and calculus. This will probably happen to the second year cohorts. If we hear that we have the grant by Nov 2009, we can target seniors who will graduate from HS in June 2010. We can offer them the 2 computer courses at SCC in their final semester of HS. Then, when they arrive at SCC in fall 2010, they will know that they like computer science; want to be in PIC and want to earn a degree in computer science. At the same time (Nov 2009), we can target juniors at their high schools and ask them to apply to be part of PIC for the next year of high school. They will have a full year to take those 2 key computer science classes and decide if they want to join PIC and earn a BS degree in computer science or computer engineering after high school graduation in June 2011.

Implementation Plan

Background on the Center for Science Excellence model. The Center for Science Excellence (CSE) began in 1996 with a generous grant from the Army Research Office in the United States Department of Defense. Over 600 Contra Costa College students with a major in a science, math, computers or technology field have moved through this program in its first ten years. The goals of the program are to provide students with strong academic support; enhance their academic experience; prepare students for seamless transfer to universities and increase the number of students in STEM fields. (PIC goals include those goals in the computer science area and more). Program outcomes have yielded higher GPA's and higher retention rates for program participants when compared to nonparticipating

students. Program completers who transfer to a 4-year institution typically complete their BS degree in their field within 2.5 years.

The PIC Project will consist of key activities modeled after the San Pablo California Center for Science Excellence with additional activities in the area of recruitment and financial aid: Those activities include a faculty mentor for each student; mentoring groups that meet each week; tutoring provided to students who need tutoring to be successful; using second and third year students to tutor and work in the computer lab; paying a stipend each month to those who continue to be successful in the program; a chance for students to become "attached" to a faculty member who knows them well; and a live connection to the college for each student.

Outreach and Recruitment. In addition to these strategies, the PIC Project will employ multiple strategies for student outreach, including: Select targeted schools where more than 35% of students qualify for a free lunch and have high populations of non-traditional students. Provide inspirational speakers to those schools and connect with students, faculty and parents to recruit those students into PIC. Continue to attend those schools on parent nights, career days and engineering week to make sure that both students and their parents get the message about the need for students to take math and science all the way through high school. Continue to tell them about the wonderful job opportunities that await them in all STEM fields and extend a special outreach to those families who have never been exposed to college. Sponsor Saturday events where high school students and parents are bused to our college to see what college is like and find out how they can benefit from attending college. Include "College, Making it Happen" held at Sac State each year for students from grades 6 to 8 and their parents where they would be the first family member to go to college. It will also include the Expanding Your Horizons Conference (EYH) for sixth through eighth grade girls and their parents to consider STEM fields and learn "hands on" what careers in STEM fields are really like. In the future, as PIC grows into an alliance, expand this outreach to include more colleges and business leaders who take steps to motivate students to gravitate to STEM fields.

Mentoring—Mentoring will be provided to current computer science students through a special mentoring group with a 1:10 faculty mentor: student ratio. Through this mentor group students will be required to complete an additional 9 hours a week of logged study time. This mentoring time also provides the forum for monthly speaker presentations on a computer science related topic; and in depth tutoring in all required fields where PIC students need assistance. This mentoring group will include all the elements of support that students need to be a successful college student. Topics will include: college success, identification of learning styles, resume writing, preparing for college exams, time management, personal finance, finding transportation solutions, child care solutions, soft skills on the job, and personal knowledge of each student in the group by the mentor. Emphasis will be placed on problem solving so that barriers do not dissuade a student from continuing their work towards a BS degree in computer science. This mentoring group will connect students to the college community and foster a greater sense of belonging and connectedness to the college. This will result in greater retention and success.

Tutoring – SCC already has many excellent tutoring programs that these students can benefit from. RISE, Beacon, MESA, computer and math lab tutors already exist on the SCC campus. Our small group mentoring program will allow us to connect our PIC students to the tutoring that will be best for each student. Currently, students must take the initiative to get the type of tutoring they need when they need it. With PIC, we will be able to schedule appropriate tutoring for students before the students realize that they need help, because the mentors will really connect with and know their students. In addition, we can utilize our advanced PIC students as tutors for more beginning students.

Student Support: The key to providing student support in PIC will be a weekly mentoring session with one of four faculty mentors: Sandy Feder, Amy Zannakis, and Tim Wei. These faculty mentors are all computer science majors who teach programming in the department of computer information science. They have all taken calculus, physics and computer programming classes as they earned their bachelors and masters degrees. They all understand how rigorous the computer science program will be and they will be looking for students who are not "catching on" to a topic as soon as the student is able to express confusion. They will be connecting the student to one of the many groups who tutor on the SCC campus (RISE, EOPS, MESA,) They will make it easy for the student to schedule tutoring appointments by phoning the group in advance and letting both parties know exactly where the academic tutors can help. The faculty mentors know that the trick to keeping students moving forward is to catch problems when they are just starting to be problems.

At the start of the first year at SCC, students will be taking a college success course. This course helps students learn what resources exist on campus to help with what types of problems. It gives them tips on managing time so that they use their campus time wisely. It helps students make the transition from high school to college by focusing on what changes to expect and how to do well in the new environment. It changes those "lost on a college campus" feelings to a feeling of competency and understanding of how to proceed. It gives them the confidence to ask questions of an instructor, instead of hiding their confusion.

In addition to academic support, the weekly group mentoring sessions will target life skills support. Those target items can be: child care (SCC has a child care center), transportation (SCC issues a free bus pass and light rail pass to each student each semester), money issues (stipends to support students, EOPS free books) family problems (SCC has a counseling center and PIC will have our own counselor), and time scheduling problems (mentor and team will help solve these). The weekly mentoring sessions will be a place where those students can put what they have learned into action and help each other focus on the solution to problems. It will also be the place where students can "feel at home" and make a solid connection to the SCC campus and to a faculty member in their department. PIC plans to have these mentors share their progress each week in the mentoring sessions. That will allow mentoring team members and mentors to assist them to discover that they can figure out how to solve their adult problems. This will bring the mentor teams closer together and connect each student to his/her mentor. These campus connections are crucial to keeping all PIC students in the program. PIC plans to lose less than 10% of our students due to life problems.

The weekly mentoring sessions will also help students choose the correct sequence of course to take to complete their degree transfer requirements. The PIC counselor will attend mentoring sessions when it is time to do planning or enrollment into classes. Counselor Richard Erlich has taken the time to really understand computer science and its courses, as well as learn the transfer requirements for most local four year university degree programs in computer science. He will be the perfect guest visitor to mentoring sessions because he can give students good advice about the sequence of courses to be taken. PIC plans to have 100% of students take each required course (offered by SCC) prior to transferring. Currently, some courses have low enrollments and are cancelled. That leaves students unable to take all their required courses at SCC. With the influx of 30 to 50 additional students, we will have enough students to offer all classes so the students are fully prepared to matriculate to a four year university. Counselor Erlich will attend each mentoring group at the correct time to physically enroll students in courses for the upcoming semester.

Another major advantage to these mentor groups is that they will all be offered on the same day and time. That will allow SCC faculty and our industry partners to schedule speakers on that day and time. PIC will schedule at least four speakers each sixteen week semester. Some speakers will be provided by our industry partners and some will be chosen by PIC mentors. Each speaker will bring a dynamic view of computer science, business, industry, or life to the PIC students. PIC teams will write letters to their former high schools to encourage them to attend the speaker events. Community members, high school students, SCC and Los Rios College (American River College, Folsom Lake College, and Cosumnes River College) students will all be invited to these speaker events.

Career and academic exploration activities—Field trips to local four-year universities or computer related businesses and a lecture series will help PIC students remain focused on their degree goals, foster greater engagement in their college-going experience, and a stronger commitment to their educational objectives. Each summer, these students will have paid internships in a computer field. As their computer abilities grow, the internships will become more like a "real job". This will allow students to test some of the different fields within computer science and to explore potential careers.

Financial aid—In an effort to make college more affordable, financial incentives (\$100 to \$1000 / month) will be provided to economically disadvantaged students with the condition that they will not work more than ten hours a week while in the program. (The reality, at CSE - Contra Costa College, is that many of the students do work twenty-five to thirty hours a week and are not able to take a full college load each semester. Most take longer than three years to matriculate to a four year university) SCC would like to learn from that experience at CSE at Contra Costa College and request that PIC students to not work outside of college. It is our belief that we can get a greater percentage of students accessing financial aid and loan resources, and thus shortening the time to degree and the attainment of employment. We will encourage "earning a degree" as their only "job" and provide a financial

incentive for them to participate. This will create enthusiasm for high school counselors and small learning community faculty to make referrals to PIC from the feeder high schools.

Family support – Another piece of supporting students is helping their families to support them. Before fall semester begins, we will hold a BBQ at SCC where SCC mentors and business professionals get to meet the new students and their families. This meeting will allow each mentor group to meet and share with families how their students are being "groomed for success". PIC wants parents to be proud of their young adults and to continue to provide a place for them to live, meals to eat, and emotional support. We want parents to know that these students will have to spend lots of time on their college courses and that they can help by providing encouragement, love and support. They will be investing themselves in the future of these students. When they matriculate to a four year university, we want them to be proud. When they earn a BS degree, when want them to cheer! When they become engineers, computer scientists, teachers, researchers, and business people, we want them to share their stories with everyone they meet. PIC wants them to know that we are also committed to this future for their children. We want to know them, so that they can feel comfortable communicating with us. Parents are part of the picture. BBQ details: PIC mentors and industry partners purchase BBQ meats and veggies to BBQ. Families provide potluck salads, desserts to share. This starts the students feeling like we are now extended family.

Creative/Strategic Actions – This project is strategic and creative in that it brings together all of the disparate programs that have heretofore operated separately and apart from one another. Students will be provided with a pipeline of student oriented and instructional support that will yield greater numbers of students declaring an interest in the computing field as early as middle school (grades six to eight). Over time these students will continue through high school support services that will result in their academic preparation for community college or university level coursework. At SCC they will begin with our College Success Course. Opportunities for dual enrollment in the beginning programming courses will be provided and time to degree shortened. Collaboration with business and industry partners will allow students an opportunity to participate in a summer bridge program emphasizing the computing major and career exploration activities. Internships and mentorship opportunities will foster great college engagement; and financial incentives will make college affordable. In this way we focus on students sooner, and create an environment that addresses college affordability, engagement and success.

SCC Computer Science Curricular Offerings: The college itself also offers opportunities for continued growth through its varied curricular offerings. SCC offers day, evening and weekend classes in more than 60 fields of study to prepare students for transfer to four-year institutions and/or for completion of an Associate in Arts degree. Students also attend to prepare for employment, retrain, or maintain skills in more than 30 occupational fields including 8 degrees and 17 certificates in the department of computer science.

Dissemination: Dissemination at the regional level will occur through presentations at the North/Far North Regional Consortium, which consists of 14 community colleges in northern California, that meet on a regular basis to discuss curriculum, workforce development, and other issues. Dissemination will also take place through conferences such as CCCAOE (California Community Colleges Association for Occupational Education), the STEM pipeline team, the Association for Computing Machinery, Los Rios Community College District Convergence Conference (emphasizing STEM development), and JSPAC (Joint Special Populations Advisory Council), as well as through our business and industry councils such as Linking Education and Economic Development (LEED) and our local chambers of commerce. Train the trainer sessions can be held to assist other Community college faculty to use the PIC techniques with their STEM students, The Sacramento Bee and KCRA television station can be used to share the story of PIC and stories of students who graduate as a result of PIC. They are always interested in events that shape our community and these stories will come to the attention of the public, through the local media.

Our students who graduate with a BS in computer science or computer engineering will be participating in outreach, recruitment, and program delivery at their own middle and high schools. These graduates will take the message to their younger siblings and neighbors about the possibilities in their own futures. They will be our best advertizing plan! We will ask the local newspaper to feature the stories of some PIC graduates.

We will run a contest to have computer science students develop a short video for YouTube that will feature a particular career as a computer scientist and be entertaining for young students to watch and enjoy. We will give small prizes to winning entries and post all of them on YouTube. Ideally, students will pass the link on to their

friends, who will pass the link on to their friends. The more we portray computers scientists as "cool" and involved in interesting work, the more students will be inclined to consider computer science for themselves. This is one way to reach the students of **today**, and we will use it to reach them.

A website will also be developed which will house information on the project, information on the workgroups, and timelines, all evidentiary materials and products of the project. There will be a blog where everyone can share their thoughts about PIC. A message board will allow groups to share drafts of curriculum, collaborate, and give feedback to one another's curriculum development efforts. The web site will aid in replication efforts across other educational entities and will serve as a public place for posting notices and as a user-friendly interface with the public. In this way the college plans to enhance the state's ability to develop a competitive workforce by sharing best practices which integrate academic and technical curricula.

Roles and Responsibilities of Sacramento City College – Partners in Computing

(See below for explanation of Column A)

A	Recruitment	Measure/Analysis	Timeline	Responsible
1, 2	Strategically create outreach & awakening to recruit target students, strong in mathematical skills, into the PIC program	Numbers of students with CS majors each fall	All year	PI & PIC Mentors
	SCC Support Services	Measure/Analysis	Timeline	Responsible
1, 2	Provide stipends to students who agree to work only on campus during fall and spring semesters.	Student feedback	monthly	PI & team
1 - 4	90% of students continuing in PIC at SCC will be placed in paid summer internships after their first year of college.	SCC project placement records	May	Proj Dir, PI, PIC mentors, Bus partners
1, 2	100% of targeted students receive the supports needed to ensure their retention, including: comprehensive assessment, Summer Bridge, mentoring (BEACON, RISE, and MESA), stipend/work experience/internships, and expanded computer lab hours.	80% of PIC will complete the SCC CS program and transfer to CSUS in two and a half years or less.	Aug Jan, June	PD, PI, PIC mentors SCC CS Counselor
1, 2	100% of targeted students will enroll and attend the SCC PIC mentoring team groups which includes mentoring, soft skills, career counseling, advising and career exploration	100% enrollment, 90% attendance.	Aug, Jan, June	PD, PI, PIC mentors Counselor
1, 2, 5	Increase retention by ensuring that each student (a) completes transfer classes with a C or better and (b) transfers to the CSUS Computer Science major program (or another comparable program).	SCC Research Office, cohort transcript report. Student survey/focus group during mandatory mentoring, follow-up survey	Jan/June Fall/Spring semester Jan/June	PD, PI, PIC mentors SCC CS Counselor, CSUS Counselor
	Partnerships	Measure/Analysis	Timeline	Responsible
1, 2, 3, 4, 5	SCC CS Project Director will confer with partners to initiate annual program plan based on the external evaluator report. (a) Counselors – curricular considerations and specific CSUS advising requirements. (b) Faculty – curricular considerations, secondary student participation, and opportunities for site visits/job shadowing with industry/business partners. (c) Business partner marketing: relevance, job openings, partnerships/gateway, types of work	Grant institutions provide data to external evaluator. . External evaluator initiates and reports on additional measures as necessary to confirm progress.	Bi-annual	PD, PI, PIC mentors, SCUSD Internal Evaluator Advisory team • LEED • Intel

	Sustainability	Measure/Analysis	Timeline	Responsible
1, 2, 3, 4 5	Expand/tailor existing services to the specific needs of women and underrepresented students. Support academic study in computing for women and underrepresented populations by bridging the variety of community college support services that are available. 90% of underrepresented women and minorities who plan to transfer to CSUS will either attend college or be placed in paid summer internships the summer before they transfer.	Project internship placement records Follow up survey Industry partners will continue to support students with internships and financial aid. New partners added yearly	May each year	PD, PI, PIC Mentors LEED, Business Partners

Column A

1. Increase in females in computing 2. Increase in number of underrepresented persons in computing 3. Decrease in regional vacancies in computing-related positions 4. Increase in quality of computing jobs for entry-level students 5. Increase in graduates in computer science who are women and other under-represented minorities

4. Partnership Plan

All public sectors of Sacramento City education are involved in this effort: Sacramento City Unified School District, Sacramento City College and Sacramento State University. UC Davis is also involved as part of the external evaluation which will be described later. Industry in the greater Sacramento Region will be involved using LEED (Linking Education with Economic Development), Aerojet and Intel employees as part of our advisory committee. Local feeder middle/high school partners and our neighboring transfer university will be actively involved through a number of activities and strategic planning efforts. The capacity of these sectors in our region is described below.

Efforts to reverse the low enrollments in college-level computing majors, particularly women and minority students will begin in partnership with Sacramento City Unified School District (SCUSD). SCUSD is a large urban district of 49,355 students, serving the core of California’s state capital. Sixty-one elementary schools, seven K-8 schools, eight middle schools, ten comprehensive high schools, three specialized charter high schools, and five adult schools serve this ethnically diverse, inner city student population proportionally represented by: Asian/Pacific, 20%; Latinos, 32%; African Americans, 21%; Alaska Native/American Indian less than 1%; and Whites 21%. Close to one-third of students are English learners. This EL population speaks 46 languages, and large numbers come from Latin America, Eastern Europe, and South East Asia. The predominant languages spoken are Cantonese, Hmong, Lao, Mien, Spanish, Russian, and Vietnamese. Poverty is a problem with 67% of all students eligible for the Free/Reduced Lunch Program. Many students face difficult socio-economic challenges in public education. (Based on California Department of Education, DATAQUEST, 2006-2007)

In the past seven years, Sacramento City USD has gained national attention and accolades for academic reform efforts (Time Magazine, 2005). The Carnegie E21 Initiative, Federal Smaller Learning Community grants, and GATES small high school funding have lead the district’s efforts in massive high school reforms emphasizing small learning communities, theme based curriculum, and rigorous standards.

Readiness for and access to post-secondary education is significantly lacking for many under-represented minority and female students, particularly for African American and Hispanic students, and English Learners in this district. The situation is intensified by the lack of family support and lack of targeting toward academic achievement and post-secondary goals. Research documents that minority and socio-economically disadvantaged families typically have little understanding of the college-going process. A survey report by the University of Southern California’s Tomás Rivera Policy Institute (January 2004) found that most Latino families do not know that there is financial aid available for college, leading to the assumption that college is an impossible goal to achieve, regardless of student performance. To foster a college going culture, the district now administers the PSAT to all 11th grade students. The CSU Early Access to College assessment exam is also administered to provide juniors with an assessment of their college preparatory English language arts and math skills. Enrollment in AP coursework is expanding and dual credit (courses that count for both high school and college) is emerging as an option. The school district actively develops and is expanding collaborations with post-secondary partners, which provide onsite services such as additional skill assessment and presentations relative to college affordability and financial aid. The district was recently awarded a Smaller Learning Communities grant for \$6.8 million dollars to establish a rigorous and relevant

learning environment, catch 9th and 10th grade students up to grade level, and prepare them for college. This grant includes a strong college going component. The district has also committed to a Multiple Pathways approach and has recently completed a rigorous review of the pathways approach.

Sacramento City secondary schools are well positioned to partner with Sacramento City College in the Partners in Computing effort. Six district wide career majors have been established in the large comprehensive high schools and small high schools are career themed. Interest in careers in computer sciences can be nurtured and students with this interest, identified here. The career majors are stewarded by an Educational Entrepreneur who works with local business partners and the schools in development of the career pathways. The Educational Liaison for the Association for Career and Technical Education has visited programs all over the United States praises Sac-City and has "found none that have achieved the level of integration with local partners that Sacramento City has." That makes SCUSD the perfect beginning partner for PIC.

Early identification of qualifying students and families will be provided through high school counselors, and small learning community lead teachers. Students will be encouraged to apply for the PIC program in their junior year. PIC will utilize faculty and administration at these schools to select the students who are accepted into the PIC program at SCC. These students will receive help to complete their FAFSA documents before the March deadline. At that point, the student's financial needs will be assessed through the Federal Financial aid program. Students who have financial needs will also be eligible to receive a California state BOG grant that pays their college fees. We will target these students to receive additional stipends from the PIC program.

A menu of activities will be provided for entire classrooms and selected students and families with high interest in the PIC program. This will include field trips to the SCC or CSUS Computer Science department with co-teaching demonstrations and completion of a mini-lesson in the lab; summer bridge classes (college success) on the SCC campus; work-experience, dual-credit courses, and early college opportunities in preparation for the major. To ensure enrollment of eligible seniors in the Computer Science program, the SCC Computer Science counselor will work with students and families to submit early applications to FAFSA and SCC as a precondition for enrollment in the transition summer bridge program and subsequent participation in internships with industry partners.

At the other end of the educational pipeline Sacramento State expects to welcome up to 100% of the transfer students from Sacramento City College into their program and provide them with the support necessary to ensure a successful completion of a Bachelor of Science degree in Computer Science. Sacramento State's Computer Science Department is one of the oldest and largest computer science programs in the CSU system. Their baccalaureate and masters programs have educated computer professionals since 1969. The university is committed to preserving program quality and impact and continually takes a close look at the future of undergraduate computer science education, especially in our region.

As an eager partner, Sacramento State University's College of Engineering and Computer Science is prepared to:

1. Provide a Project Director, Dr Du Zhang, department chairman of Computer Science
2. Participate in the Advisory Committee meetings
3. Work with SCC to identify which General Education, and science classes must be taken after transfer and which should be taken before transfer.
4. Notify Sacramento City College of any computer science speakers, Open House, special STEM / computer science oriented events so that students from SCC can attend.
5. Accept 100% of the CS transfer students who complete the prerequisite classes to transfer to the College of Engineering and Computer Science.
6. Encourage the Sac State Financial Aid Office to provide staff to assist students in qualifying for financial aid in a timely manner before transferring from SCC to Sac State.

Roles and Responsibilities of PI and Senior Personnel.

Project Director: *Dr Du Zhang, Department Chairman, CSUS Computer Science* The Project Director is responsible for supervision of the project including managing the budget, recruiting and selecting participants, assuring quality control for all proposed activities, assisting with program evaluation, and writing reports. Other responsibilities of the Project Director include ensuring that all fiscal and accounting procedures by LRCCD and the NSF are followed, and communicating regularly with program officers and keep compliance personnel updated on changes in grant management or fiscal issues.

Principal Investigator: *Sandy Feder, Computer Science; Senior Personnel:* *Amy Zannakis, Professor, Department Chair, Computer Science Department; Michael Dixon, Professor, Computer Science Department, Tim Wei, Computer Science Department,* The members of the faculty are responsible for implementation of proposed activities within their divisions, including organizing the development and establishment of curriculum, participating in industry discussions, selecting computer science speakers for PIC monthly events, monitoring progress, and assessing faculty needs, delays, and challenges. They will also actively engage in outreach/recruitment efforts at the middle and high schools and serve as mentors to the computing major students.

Advisory Committee. For the past several years, the PI has been engaging in conversations with various educational and industry experts that have ultimately resulted in the convening of an advisory committee that first met in Spring 2007. The purpose of this committee was to assess the impact of low enrollments in computing disciplines and how a concerted effort on the part of the partners could reverse this trend. This group was primarily responsible for the identification of the resources available in each of the participating sectors of education and describing the role of business and industry in this effort; the result of which was the **Partners in Computing** proposal. The group consists of the following active educational partners: Sacramento City College, Los Rios CCD Planning Office, Sacramento City Unified School District, West Campus High School, new Tech High School, School of Engineering and Sciences, Sacramento State University. Additional resource/research support has been and will be provided by: LEED, Intel, STEM equity pipeline, and the University of California, Davis. All Sacramento City USD high schools are interested in participating in the pipeline.

This group will continue to serve as the advisory body for this demonstration project over the next few years. Advisory group members will be prime candidates for participation in staff development and training opportunities. The advisory group will meet biannually to review progress and to provide information on student internships, apprenticeships, job shadowing, and training opportunities for PIC students.

Evaluation Plan

The evaluation will be based on a continuous improvement evaluation design in which data are collected and analyzed on a biannual basis, and used to improve project performance and address sustainability. The evaluation will include both formative and summative components, collecting both qualitative and quantitative data.

Awakening plan:

In year one of PIC, we will speak to high school juniors and give them a chance to apply for PIC when they graduate from high school. This will occur at 100% of SCUSD high schools. In addition, PIC mentors, partners and our industry leaders will speak to entering freshmen and their parents at 50% of the SCUSD high schools. We will tell them how important math and science are to students today, and share the wonderful opportunities that await those who persist in math and science classes. By sophomore year, we will speak to 50% of the SCUSD high school sophomores about STEM careers and computer science. We will have sign-in sheets to gather information about the numbers of students and parents who attend these sessions. We will also have a place where parents and students can share what they learned and ask questions to clarify what they heard.

Enrollment and Persistence:

Before PIC starts we will collect the following data by year for the last 3 years:

- Number of students with stated CS major: percentage and number males/females, numbers by race, and numbers with disability
- For midyears, we will collect number of those students who persist to the next semester courses
- Number of students who completed the CS Transfer Degree: percentage and number males/females, numbers by race, numbers with disability

Once we have the first PIC fall students, we will collect those same numbers including both PIC and regular students in the CS degree programs.

- By February we will collect the number of those students who persist to the next semester courses.
- In the mentoring groups, we will ask for feedback about the quality of instruction in their courses and what they would like to see added to a course.

- Each semester, we will collect the numbers who return for more classes in the next semester and those who graduate with a CS transfer major.
- PIC will transfer 80% of our students to a four year university within three years of starting college in the SCC PIC program. Each year that PIC continues, PIC will have a higher percentage of students who transfer.

Graduation and four year university enrollment:

- For those who graduate, we will gather information about where they transfer (80% of our transfer students currently choose Sac State), when they earn their degree, and in what field.
- We will count a BS degree in any STEM field within 5 years as success. We will keep track of those students through email and invite them to come back to join our family at a year-end celebration. PIC plans to graduate 80% of all students in the PIC program with a degree in a STEM field within five years. We want over 70% of these degrees to be in computer science or computer engineering.
- For those who do not complete the degree in a STEM field, we will collect and record the information about why they did not complete. That will help give us feedback about areas where improvement is needed.

Internships:

PIC plans to provide paid summer internships to 100% of our students who are completing 12 or more units each semester with grades of "C" or better. PIC faculty will work with LEED members, our industry panel, and our advisory board to find student internships for all PIC students. If students are not advanced enough to work in computer science the summer between their freshman and sophomore year, they may be placed in an unpaid internship in an office environment. We plan to provide all students with a summer learning experience. If students need to take college classes during the summer, they may take a part-time internship for that summer. Students will fill out a survey about each internship experience they have. It will allow us to determine what kinds of internships are good for students at what stage in their academic development.

Formative evaluation questions will include: (1) to what degree has the project been implemented as planned? (2) What evidence documents student, parent, teachers, faculty, and business partner's participation in the various components of the program? (3) What evidence documents opportunities for feedback and actual feedback provided by secondary students, parents, teachers, faculty, college students, and business partners? (4) What evidence documents the degree to which the project is on target for the achievement of project objectives? (5) What evidence documents the development of capacity at the partner institutions to sustain the program after the federal funding period?

Summative evaluation questions will address: 1) To what degree are the grant objectives achieved; and, 2) To what extent will we modify the plan to achieve the stated result.

The measures to be used to determine achievement of objectives and the person(s) responsible for collecting the information are stated in the implementation plan. These designees will share the collected data including summary information with the external evaluator. The external evaluator will meet bi-annually with the Advisory Committee to review the results, lead discussion on revisions to the implementation plan, and report to partners. An annual report will be prepared by the Project Director and External Evaluator at the end of each school year.

All necessary parent and student permission forms, including permission to access certain student records and follow academic progress, will be submitted to the Sacramento State University Committee for the Protection of Human Subjects. Surveys and focus group protocols will also be submitted. IRB approval will be obtained prior to receipt of funding.

Parents and students will be asked to complete evaluation forms to measure the effectiveness and relevance of individual program activities (parent workshops, school presentations, field trips, etc.) Throughout the duration of the project and the evaluator will use this information to assist with formative evaluation activities.

The external evaluation of the PIC program will be overseen by Dr. Nina Amenta, Professor of Computer Science at UC Davis and Vice-Chair of the Computer Science Department. This faculty member has over 25 years of experience in Computer Science, both in industry and academia. She holds a Ph.D. in Computer Science from the University of California at Berkeley, and was the recipient of an NSF CAREER award and an Alfred P. Sloan Foundation Fellowship, and is currently a UC Davis Chancellors Fellow. Professor Amenta is an alumna of the Re-

entry Program in Computer Science, an innovative diversity program at UC Berkeley. She has been deeply involved for the past year with the introductory CS curriculum at UC Davis, attempting to make the field more appealing to incoming students. She has extensive experience evaluating grant proposals. She has served several times on NSF Panels and has also been a site visitor for an NSF evaluation of a large ITR grant. She is a clear writer, who will be able to produce reports that are easy to understand by a broad range of stakeholders.

Sustainability: The control of this project is coming from this partnership formed in 2007. Once the project is initiated, it will still be controlled by the partners on the advisory team. Once the funding has ended, it will still be controlled by the partners on the advisory team. With over 500 high tech companies in the greater Sacramento region, this advisory team still needs to link to education to provide the brainpower to drive these industries. The entire team is responsible for the success of this project. Since this will not change when the grant funding is over, the reasons to continue and expand PIC will remain.

The Sacramento community and SCC recognize that workforce training and economic development go hand in hand, and that the partnerships between education, business, and industry are essential if our region is to prosper. To that end, business and industry have been willing to provide financial support to this endeavor to train future employees and to provide internships for students in computer science fields. Given the ever-changing workforce, the college has established an advisory committee comprised of key industry partners that offer state of the art equipment and resources, as well the expertise to keep pushing the college to remain flexible and open to new program development. The Advisory Committee will be instrumental in providing input on the types of skills that are needed at their worksites, and helping to shape the content of future curriculum development to meet these needs. It is this community effort that will bring about the expansion of the program into other STEM fields and will keep this program going long after the grant ends. These local businesses will be committing their resources and time, into these future employees. When the grant ends they will still need employees of all types and will still sponsor our students in all the STEM fields.

The graduates that come from the PIC program will enlighten more businesses in the region so that they, too, will want to participate in future efforts. Between the efforts of industry and the educational system, this program will continue to expand and will spread to other educational areas and other regions of the country. The more people become involved in the implementation of this plan, the easier it will be to spread the plan. As industry sees the quantity and quality of graduates, they will insist on doing the same thing in other communities so that they are not "left out" of the picture. They will be more than willing to help make college affordable for a few key students each year. Communities would rather spend money on helping young people become successful middle class citizens than on putting them on welfare or into the "justice system". PIC will make "yes, we can" possible in the Sacramento Region. Those who see the results produced by the PIC program will want to spread this program over the rest of the country. We will help them see how they can achieve the same results we expect to have.

The Partners in Computing project will receive about \$200,000 per year from NSF. In the first year, if PIC has 30 students, the money to pay those students will be approximately \$10,000 each or a total of \$300,000. In the second year, there will be about 60 students so that cost will be about \$600,000 to pay stipends to students. In year three, there may be 15 students who need half of the year at SCC to complete their transfer requirements, plus 30 students in their first year and 30 students in their second year. So, 75 students will have us raising \$750,000 to pay stipends to all the students. So, each year the amount of funds spent will be relatively small from the grant and relatively large from our local businesses. The grant money will be funding faculty release time to mentor students weekly and to keep PIC functioning. Until now, any faculty who spent time speaking to middle or high school students, or holding workshops for students, have done so on their own time. PIC will be an opportunity for more faculty members to be learning how to reach potential students and to get in the habit of accepting offers to speak to younger students. The more faculty members who do so, the easier it becomes to get the job done by sharing the tasks with more people.

It is totally feasible that once the entire campus takes on these standards, the faculty will want to keep the new status quo because it works. College faculty in STEM fields cut their industry salaries in half to become teachers, because they want to make a difference. They also became teachers because they want to think for themselves. These same human beings are hoping to make life better to those whom they teach. If faculty see a method of teaching, where the majority of students actually learn what is being taught; and earn those degrees they declare are their goals; college faculty will work to make those methods available to all. Once PIC students matriculate to four year

universities, the faculty at those schools will become more involved. Sacramento State University will be releasing at least one person from part of his load to be the project director of this project. This grant is being written as a demonstration program. Our goal is to demonstrate methods that will work in a community college, just as we have heard from Contra Costa Center for Science Excellence. Our goal is to show that we can consistently help students graduate in four to five years in a STEM field. Our goal is to show that we can do this with women and under-represented minorities.

SCC has STEM programs that lead to degrees in physics, mathematics, chemistry, biology, engineering and nursing. Our plan is to share the results of PIC with all those STEM fields in SCC and the Los Rios District (the second largest district in California). If all the departments with STEM programs join us and start speaking to our feeder middle and high schools, the job will be much smaller for each person involved. It could become a job that everyone does once or twice a year because it is so rewarding. Mentoring students in small teams with faculty mentors, may become the standard of how we assist all our STEM students as they move toward BS degrees in their respective fields. Providing free tutoring, college success classes and building one on one relationships between students and faculty may become standard behavior in all community colleges in the state.

Paying stipends to students who are willing to go to college and earn a degree in a STEM field, may become a normal part of the business plan for all industries in the state. Possibly, the federal government may decide to fully fund BS and MS degrees in the fields where we have a critical need. Right now, that critical need is in all the STEM fields. Is this just dreaming? PIC partners do not think so. We see that the "race to space" funded wonderful and inexpensive college opportunities for the "Baby Boomers". Those degrees helped California and the United States become a leader in research, technology, aerospace, manufacturing, and engineering. As a nation, it is time for us to "pay it forward". We should be spending money to help under-represented minorities and women earn degrees in STEM fields. The baby boomers should be taking the time to ensure that the next generation is as well prepared as the previous generations.

In PIC, we believe that is why we became teachers. That is why the Contra Costa Center for Science Excellence shared their story and why we listened. That is why we decided to adopt and improve their plan. That is why community college professors are willing to wait two additional years to celebrate the BS degrees earned by our students. That is why we built PIC out of a partnership of educators and business leaders from the Sacramento region. The business leaders are there to make sure this project continues because employees are the heart of their businesses. College faculty will want this to continue because it will be effective. All the PIC partners will keep this running long after the grant is over.

Broader Impacts: As these PIC students graduate from college with a BS degree in computer science or computer engineering, their communities will have positive role models to speak to others in the same community. These PIC students will have come from a place where their parents often did not graduate from high school or attend college. They will be the shining example of the success that America promises. They will become the teachers, research associates, computer scientists, engineers and college professors of the future. Their siblings, neighbors and community will see what a difference they can make. They will help recruit from their high schools and they will tell future students, that it is possible to move a student from feeling that there is no place for her / him to make a difference in this city/country/world, to a powerful place of being able to support their family and make an impact on this world. It is our job to start this action and help the leaders of tomorrow take their places in industry and education.

PIC brings a chance to take people who are weighted down with poverty and to bring them into the middle class. All it takes is one successful student from a family, one successful student from a religious group, one successful student who has immigrated to tell the people they know: "I succeeded and you can, too. This is how..." As these PIC students enter industry, new fields can open up that may not have been there previously because of cultural differences. Sacramento is a very diverse community and all our people deserve a chance to make a difference because of that diversity. This grant will be the start of a major change in computer science from Caucasian and Asian males to women, immigrants and the full diversity that this city can offer. We are part of a four college system and a STEM pipeline group in Northern California and United States. As part of this group, this project will spread to other colleges and other STEM disciplines. Our commitment is to make this happen in the greater Sacramento region where diversity is the key.