NSF – CompTechS Annual Report – Year 2

PART I. **Participants**

Catherine Ayers, Principal Investigator. Catherine is the project director for the NSF ATE funded project, managing the study of CompTechS impacts on student persistence and success in computer related fields.

Susan Malmgren, Co-Principal Investigator. Susan manages the CompTechS program, including student recruitment, industry internships and interaction with employers and computer donations for the campus refurbishing lab. She has refined data collection instruments in conjunction with the PI and evaluators.

Joseph Coelho, Senior Personnel. Joseph is the Computer Lab Instructional Coordinator. He works directly with student interns in the campus refurbishing lab, coaching them in the work of Technical Support. He manages lab systems, scheduling, parts purchasing, physical safety and security of the lab environment.

Chuck Lindauer, Co-Principal Investigator. As the former Dean of Computers, Technology and Information Systems at Foothill College, he provided advisement for student coursework at Foothill College. He retired in 2008.

Andrew LaManque, Senior Personnel. Andrew is the Institutional Researcher at De Anza College. He is providing institutional data on course selection, success and persistence for students who are or have been in the CompTechS program.

William Doherty, Evaluator. Bill provides analysis of some of the data and advisement regarding the direction of the research. As well, he is on the outside evaluation team for the project.

Martha Atkinson, Evaluator. Marti provides analysis of some of the data and advisement regarding data elements needed to answer research questions. As well, he is on the outside evaluation team for the project.

Daniel Dishno, Senior Personnel. Daniel is the Supervisor of the Occupational Institute at De Anza College, which provides the business and operations oversight to the CompTechS program.

Mary Cay Sherman, Community College Faculty, DeAnza College. Mary is an Academic Counselor who works with CalWORKs students and other economically disadvantaged populations on their educational plans.

Mark Sherby, Community College faculty. Mark teaches the A+ Certification course at De Anza College and has developed a Windows Technical Support certificate of which the CompTechS computer refurbishing lab is a hands-on component.

Letha Jeanpierre, Community College Faculty. Letha is Dean over CIS and Computer Applications departments at De Anza College. She has provided advisement for a new certificate program in Windows Technical Support of which the CompTechS computer refurbishing lab will be an element.

Collaborators
The project has had support for internships and for providing free computers to needy students from outside of the project.

- The Associated Student Body at De Anza College has contributed financial support to pay interns in the refurbishing lab.
- Los Altos Women's Club contributes financial support to pay for one female intern in the refurbishing lab.
- The Foothill-De Anza Community College District Foundation is the legal vehicle from which district computers are donated to the CompTechS Refurbishing Lab.

In Year 2 of the project, CompTechS identified colleges that were interested in potentially replicating or adapting the CompTechS program. Comprehensive documentation was provided to these institutions and we will continue to provide research findings to them. An expected next step is to work with one of them in a consultative manner to identify issues and barriers to adapting the program at another institution.

- City College of San Francisco
- Santa Rosa Junior College
- Folsom Lake College
- Fairmont State University
- Louisiana Technical College
- Prince George's Community College

PART II Activities and Findings
Research and Education Activities

EXECUTIVE SUMMARY – Year 2

Internships and Underrepresented Student Persistence in Technical Education

The CompTechS Program in the Occupational Training Institute at Foothill-De Anza Community College District was funded in June 2007 by the Advanced Technological Education Program of the National Science Foundation to study the impact of the program on student success and persistence in the IT field, especially for low income and underrepresented groups.

The CompTechS (Computer Technical Support) program provides about 50 students a year with paid internships in a computer refurbishing lab on the De Anza College campus and also places qualified interns in local industry. Through the hands on experience in

the production environment of the lab, students gain valued hardware skills and clarify career goals.

The computers that the interns refurbish in the lab are acquired through the solicitation of used computers from local companies and the community, providing a socially responsible means of retiring computer equipment. At the same time, the program bridges the "digital divide" by recycling these refurbished computers to disadvantaged students – financial aid recipients, Equal Opportunity Program and Services (EOPS) and CalWorks (public assistance) students.

Major Accomplishments

- 98 students have participated in a CompTechS internship from June 2007 to December 2008 and are in the research cohort for this second year report. Seventy-five percent (75.5%) of the students were from one of the groups we targeted (low income, women and underrepresented minorities). Sixteen students out of the 98 were women, 16%. Fifty-five percent (55%) of our cohort were receiving financial aid as compared to 20% in the rest of the De Anza College population.
- Approximately, 227 disadvantaged students received refurbished computers through the program in the past year.
- Nine companies in Silicon Valley took interns – Hewlett Packard, Cavium Networks, Fujitsu America, Photon Dynamics, Synopsys, Roche Pharmaceuticals, VMWare, Applied Biosystems, Trend Micro and Flextronics-- providing students with valuable skills in information technology.
- Forty-four students completed and exited the program from our research cohort. The data was consistent across completing interviewees that they increased their confidence, feelings of technical competence and readiness for the workplace.
- From June 2007 to December 2008, the persistence is 82% in documented coursework, and up to 89% persistence in the field when self reported employment and transfer are considered.
- The CompTechS program provided a responsible recycling program for employers and the community, and disposal of ewaste.
- Data was collected to answer the six research questions posed for year two and a findings report written. Findings are discussed below.
- A Windows Technical Support certificate was developed in collaboration with the De Anza CIS Department and the CompTechS computer refurbishing lab is a hands-on component of the program. This program was marketed to the County of Santa Clara CalWORKS counselors through a half day presentation and tour of the lab. CalWORKS is a Temporary Assistance to Needy Families program that provides financial support to parents/caregivers. CalWORKS recipients are among the hardest to serve on community college campuses.

The activities proposed for the grant in Year Two have been conducted as proposed. Data from the institutional researcher demonstrates that the targeted outcomes are almost fully achieved.

MAJOR FINDINGS

The research cohort for the year two study were those 98 students who were in the CompTechS program for any period of time between June 2007 and December 2008. The CompTechS program accepts students into the program throughout the year – and students complete the on-campus portion after 144 hours in the refurbishing lab. If they don't go into an industry internship, they then exit the program to make room for others. The 98 students had internships in the campus refurbishing lab or in industry, or both, during this period.

The total unduplicated number in any of our target groups (low income, women, and underrepresented minorities) was 74 students, or 75.5% of the CompTechS student population. Sixteen students out of the 98 were women, 16%. Fifty-five percent (55%) of our research cohort were receiving financial aid as compared to only 20% in the overall De Anza College student population.

HOW DO STUDENTS ASSESS THE VALUE OF THE INTERNSHIPS AND LEARN-BY-DOING METHODOLOGY?

Our year one data indicated that students gave high ratings to their CompTechS experience and outside evaluators corroborated the data through their independent interviews. Comments from a past student survey confirmed the positive impact the program had on their professional goals.

In year two, data was analyzed from:

- Exit surveys and interviews with the 44 students who left/completed the program from June 2007 through December 2008.

  In addition, we decided to explore what CompTechS program features students valued the most. It was thought that this investigation would lead to key features and factors that would contribute to successful replication of the program, when we later focus on dissemination. Data was analyzed from:

- A short pre-survey regarding factors that attracted students to the program, given to new refurbishing lab interns during the application process.
- An online post-survey regarding factors/features that were most valuable to them, given to students who had completed the program.

Some of the results are reported under the question on motivating factors.

Exit Surveys and Interviews

Forty-four students completed the program during project year 1 and 2, and did an exit survey and short interview with the program coordinator. The helpfulness of the campus refurbishing lab and the supportive staff received the highest marks from almost all students.

Best aspects of the program

Consistent with year 1, completers identified the best aspect of the CompTechS program in their exit survey as gaining new skills and knowledge (61% - 27 responses)) and gaining industry experience (23% - 10 responses).

What needs improvement?

As with the first year, patterns of responses regarding what needs improvement were less pronounced, and did not constitute any dissatisfaction with the program. The opportunity to work on more current and advanced equipment; opportunity for more hours; more space in the lab; and more advertising to let students know about the program were responses represented multiple times. As last year, a few answered that nothing needs improvement, and others left the answer blank.

Key Features and Valued Characteristics of the CompTechS Program

In order to quantify the valuable features of the program and establish the *key* features, a new survey was instituted in Fall 2008. Twelve (12) responses from completers rated different factors/features for positive impact and value.

The organization, well defined procedures and supportive atmosphere in the refurbishing lab emerged as key elements that we will need to emphasize when this model is replicated. Distributing refurbished computers to deserving students also is key.

Comments from the exit survey were consistent with the supportive lab atmosphere being an important feature: "Very laid-back atmosphere, great learning environment," "I got to work with some really nice people in a small friendly environment."

In retrospect, the most valuable aspects of CompTechS

In addition to hands-on experience and learning technical skills, students valued the support and coaching from the program staff.

In the survey of former students that completed before June 2007, a predominant theme was the clarification of goals that students realized because of their experience in the CompTechS program. "Well before working for CompTechs I was not really sure about my major but after working there and getting a hands on experience on refurbing used computers I realized that this is what I wanted to do as a major and I decided on pursuing my bachelor's in computer engineering."

Value of Industry Internship

Thirty-five (35) of the 44 completing students had an industry internship. Students who had experienced an industry internship valued the contacts and resume building most (77%), followed by real industry experience and opportunity to learn on the job at 70% each. If the response *Yes!* And *Some* were combine, all three of these items were at 100% -- so highly valued. The opportunity to be hired by the company after the internship was rated low at 30%. It is possible that this would have been rated higher before the industry internship and reflects whether they were hired or not.

WHAT IS THE IMPACT OF THE INTERNSHIP EXPERIENCE ON SUCCESS, PERSISTENCE IN THE MAJOR AND PLANS FOR CAREERS OR TRANSFER?

A primary data source for retention was, and will continue to be, the institutional data on student enrollment and success within Foothill-De Anza CCD. In addition, the institutional researcher at De Anza College licensed a student tracking system that allowed for tracking enrollments for students who completed the program and their studies within FHDA and transferred to four-year public institutions within California. The 98 students who had been in the program from June 2007 through December 2008 were the research cohort for this year two report.

As well as their persistence in computer related courses and technical (STEM) courses, we realized the need to examine students' persistence from quarter to quarter in general education. Students on a degree or transfer track may have quarters without any technical courses. This is especially true of part-time students who take fewer units per quarter.

Because of our special interest in the persistence of target groups of low income students, women and underrepresented minorities, we examined data specific to these groups. Aside from our target group's persistence and success, we looked at the overall CompTechS group, plus a comparison group of De Anza students outside of the CompTechS program.

Persistence

Of the 98 students in the research cohort, in Fall quarter/semester 2008, eighty (80) were enrolled in FHDA, in four-year universities, another community college, or had graduated. So from June 2007 to December 2008, the persistence is 80 out of 98 in coursework, 82%.

For the 18 students whose last documented enrollment was prior to Fall 2008, we made an effort to track their status. From self report, we know four (4) others are working in the field, one of whom was recently laid off. We have learned from two other students that they are finishing degrees at four year institutions though we cannot confirm through an outside source; one other reported being at a community college. *If we consider these seven (7) completers, CompTechS students' persistence in the field is 89%.*

There were no statistically significant differences on the rate of persistence for:

- The target group of 74 students (low income students, women and underrepresented minorities) as compared to the non-target group within CompTechS (primarily white and Chinese men).
- Year one cohort vs Year two cohort
- Industry Internships vs Lab Only experience.
- Financial Aid vs No Aid
- Target Ethnicity vs non-target ethnicity
- Women vs. men. The comparison of males and females yielded a probability very close to the threshold (p=.057). Though there was no statistical difference in male and female persistence, we should follow this next year as it approached a significant difference with male persistence in the field being higher.

Success

Success is defined as a grade of C or better and "pass" on the table below is synonymous with success. In computer related coursework accumulated over the quarters that students were at Foothill-DeAnza after applying to CompTechS, *the CompTechS student success rate was 74% as compared to 67% percent for De Anza students in Computer Information Systems* courses over a comparable timeframe.

The success rate in overall coursework was 80% for the CompTechS student grades. The success rate of CompTechS students was highest in non-technical courses at 85%. Females in the program did slightly better in computer related coursework than their male counterparts. However, the number of courses was smaller for females.

Success rates of selected target populations

Targeted ethnic populations did better for the most part than the overall De Anza Computer Information System success rate of 67% success. However, Hispanics performed the same as the comparison group and African American had significantly lower success rates in computer related courses. However, the African American group accounted for only 3 students, so one needs to be cautious regarding conclusions based on this data.

The target populations for the most part had better success rates in other technical (STEM) courses than in computer-related coursework, and the best success rates in non technical courses. The exception was the Hispanic group, who took only 12 other technical courses over this period with a success rate of 50%, as opposed to having taken 47 computer-related courses with 66% percent success.

Plans for careers and transfer

Data and quotes from the 44 completing students and the past student survey provided insights into impact of the program on career plans and educational goals.

Plans to continue to take classes were extremely high at 98% for CompTechS completers at the time of their exit questionnaire. In reality, 91% of past students (32 students who had been in the CompTechS program before June 2007) had taken courses since completing the program. Those students who planned to complete a four-year degree, or had already completed, was high at 89% of the 44 completers in the research cohort. We will continue to follow transfer after they finish their coursework within Foothill-De Anza Community College District.

Eight completing students reported in their exit survey that they changed goals from the beginning of their time in the program to more clear IT goals, such as the following comment:

- "I do not have anything in mind" to current plan, "Career in IT."

Some changes represented more clarity, like the one below:

- "Learn about CS; get a job anywhere" to current plan, "Job in network security."

Three other students who had started with IT related goals changed their minds.

- From "To become a network engineer" to current plan, "To become a civil engineer. Actually the program exposed me to the IT market, and I got a good idea how IT is in reality."
- One doubted their Computer Science choice by the time they finished the program, because others in the lab were "better" compared to them.

This last response is contrary to the substantial data about increased confidence as a result of the program, but consistent with clarification of goals. Other of the completers reported that they focused their goals more, or confirmed them, "I realized I really like hardware."

The poor economy has impacted recent completers: "…wanted to get entry level networking job, but [I am] going to my old career as a trainer because of current economy and job shortages."

WHAT ARE THE MOTIVATING FACTORS THAT IMPACT ATTRACTION, PERSISTENCE AND SUCCESS?

Factors that Attracted Students to the Program

During the application process, students reported that the opportunity to work with computers and to learn new technical skills were the most prominent attractions to the CompTechS program. The part-time job, though very important to 68% of the respondents, was not as important as most of the other factors. This finding may be significant to other institutions considering adopting the CompTechS model, since an unpaid student internship may be a possibility if other important features are in place.

Student Motivation to Continue

The survey items reported through the valuable program impacts and features surveys also are likely indicators of what features of the program motivated students to continue. The well-organized, structured refurbishing lab emerged as a key feature that motivated students, and the fact they were distributing computers to needy students. As indicated previously, learning and improving skills, relevant hands-on experience, coaching, advice and support were valued by students, thus motivating students to continue.

Refurbishing Lab Practices

An interview with the lab instructional coordinator supported the survey results on valued program characteristics, in which students highly valued the well defined procedures and organized workflow in the refurbishing lab. The lab coordinator yielded some other points that are relevant here.

- Start students on day one on the work that needs to be done… immediately engage them, rather than putting them through an observation period.
- Provide an organized production environment. Have a pre-set series of steps. Having a really well defined structure allows them to know the step they are working on and to concentrate on just that procedure until completion.

- An important first step for an instructor is to set up the procedures, breaking the refurbishing steps into sequential parts. The nature of computer troubleshooting allows for you to break it down into smaller steps.
- Maintain small groups of 4-6 interns in the lab at a time. Assessing personal needs necessitates having a smaller environment. Also, they can feel comfortable speaking up and getting support.
- Don't hesitate to give students a task that they may think is above their skill level. It may be intimidating to them, but also it is a confidence booster. Pair them with a student that may be more competent.

Lab Processes

- In the "production environment" the students do a step in the process, but will rotate over the course of their internship. When they come into the lab, they do the job that needs to be done. Listed on the white board are systems in testing, in progress and those to be picked up, plus special notes about projects.

- An intern is directed to start on systems that are "in testing" because they are closest to completion and you want to get them off the board. The next priority is "in progress": hardware repair, or the software installation/configuration checklist.

- However, the systems for "pick-up" supersede all. This is when a student comes into the lab to pick up their computer. The team needs to understand that this is the public face of all the work they've done. So the system needs to be ready by the time scheduled on the board, and may require the team to scramble to get it completed, prepared/set up for demo/orientation, paperwork ready, etc. It's good to include the interns in distribution of the free computer to needy students – they like to know that their work helps others.

In the interviews that the evaluators had conducted in year one, students mentioned the learning that took place in the low key atmosphere of the lab as motivating them to continue. In response to the question: What helped motivate you to continue, an answer was, "The atmosphere in that lab, because everyone was eager to learn. It was like a home. It was very organized." Feelings of being comfortable in the environment contributed to their success and perhaps their persistence in the field.

DID STUDENTS' ATTITUDES IMPROVE TOWARD COMPUTING FIELDS?

In year one, the most significant improvement reported by students was their feeling of confidence and competence. In interviews conducted by the evaluators, *all* of the interviewees had said their experience in the program increased their level of self confidence. In addition, they felt more confident technically and more ready for the workplace. "Yes – it made me feel more confident, gave me the feel for my field and what it's like."

In year two, the exit survey for completers was adjusted to ask these specific questions in order to have quantitative data. There were 28 respondents and the responses were consistent with year one.
Especially for the underrepresented groups involved, confidence is arguably one of the most important attitudes to impact.

WHAT ARE THE DIFFERENCES IN THE IMPACTS OF THE INDUSTRY INTERNSHIP AS OPPOSED TO THE CAMPUS INTERNSHIP?

To investigate whether there were any differences resulting from the type of programmatic experiences that a student had, we compared group mean differences on a number of measures between those students who had participated only in the campus lab and those students that had been in both the campus lab and in an industry internship. We compared the groups on the following measures:

- Rate of persistence in the field
- Probability of Success (grade of C or better) in a Computer Class
- Probability of Success in a Technical Class
- Probability of Success in any Other Class

Additionally for the 44 students who completed the program and responded to the Exit Survey we examined differences on:

- Perceived Helpfulness of Program to Goals
- Perceived Value of Hands-On Lab experience
- Perceived Value of Paid Internship

The results of the comparison of the two groups using a One-way Analysis of Variance technique produced no statistically significant differences ($p<.05$) on any of the variables. Thus, the results indicate that students that participated in the Campus Lab only versus the Campus Lab & Industry Internship did not influence enrollment patterns or probability of success in their courses. Further, it did not influence the perception of the students on the value of the program.

This finding would seem to be evidence that the program is not differently effective no matter which program component(s) a student participates in.

Differences across student populations

We also looked at a sub question concerning the differential effects or performance across different student populations for the lab only experience and the industry internship. For example, does the industry internship have a different impact for males than females?

With the larger sample size it was possible to perform a two-factor comparison (for example, male vs. female and lab internship vs. industry internship) of the mean performance on:

- Probability of Passing a Computer Class

- Probability of Passing an Other Tech Class (STEM)
- Probability of Passing an Other Class (Non-technical)

The two-factor analysis tests main effects for the two factors and, most importantly for this research issue, the interaction of the two factors. It is the interaction effect that would show that the two program components are acting differently across the groups of the second factor (such as gender).

The results of the two factor analyses mirrored those already reported for Year One and for the Year Two one-factor comparisons. The only analysis that produced a statistically significant interaction was for the different internships by Gender for the probability of passing a non-technical class. Specifically females with industry internships had a higher probability of passing a non-technical class than males with internships, while the reverse was true for the lab only interns. Two notes of caution about this finding: first, there were only 4 females with industry internships who took other non-technical classes; second, there may be a selection bias operating and we really can't tell whether the approach is having a different impact or whether females with better performance are assigned to industry and thus they are more successful in other classes.

In sum, the two factor analyses support the findings from our first year that the internship components are not differentially effective across groups of interest.

HOW DOES THE IMPACT OF THE METHODOLOGY (LEARN-BY-DOING AND INTERNSHIPS) VARY FOR DIFFERENT STUDENT POPULATIONS?

In order to investigate whether there were any differences resulting from student characteristics (gender, ethnicity, financial aid status), we compared group mean differences on a number of measures:

- Persistence in the field
- Probability of Success (grade of C or better) in a Computer Class
- Probability of Success in a Technical Class
- Probability of Success in any Other Class
- Working status on entering the program

Additionally for the 44 students who completed the program and responded to the Exit Survey we examined differences on:

- Perceived helpfulness of the program to goals
- Perceived value of hands-on Lab experience
- Perceived value of paid internship

There were statistically significant differences regarding the probability of success in technical classes (other than computer classes): those receiving financial aid and females did better.

There were no statistically significant differences found between the two gender groups on any other measures. The results suggest participants in the program had very similar experiences regardless of their gender or ethnicity. While the participant's experiences

may be unique to each individual, they are not shaped by their physical characteristics. As we have more persistence data in the coming year and larger numbers of women and targeted underrepresented minority students, we will again look for any significant variance in their rates of persistence.

Year One and Year Two Cohorts

The year one and year two student cohorts did not differ in gender or ethnicity. However, there were more industry internships for the first year cohort. This is likely related to the down economy rather than the students' readiness to be placed, as the nine employers who are participating in the internship program have cut the number of positions.

Skill Level on Entering the CompTechS Program and Impact

Two skill assessments are given to entrants to the CompTechS program, a Hardware Quiz and a Hardware Identification test. These two assessments provide a reading of the skill level of new program participants prior to any programmatic intervention. Students also are evaluated throughout their time in the program by the Lab Instructional Coordinator and, for those placed in industry, by their industry supervisor.

Students who rated low on the pre-assessments tended to stay lower on the lab evaluations relative to those who started higher – they did not change their relative order in terms of performance. However, there were *no statistically significant relationship between score on the pre-assessments and persistence in the field.* Nor was there a relationship to course success, even in computer related courses. Thus, students who rated low in skills upon entering the program were as successful in coursework and persisted at the same rate as the others in the program.

There were some statistically significant relationships between persistence in the computer field and the Lab evaluation score and Employer Evaluations. For the Lab scores, attendance was positively related to persistence. Likewise employer rating of attendance, safety, cooperation and task completion has positive relationships with persistence. Thus students rated higher in these areas had higher rates of persistence

CONCLUSIONS

Student perceptions of the benefits of their experience in the CompTechS program were very positive, whether they were only in the campus based internships in the refurbishing lab, or also in an industry internship. Feelings of being comfortable in the environment, that they were learning technical skills and that the experience was relevant to the workplace made students more engaged – contributing to their success and likely their persistence in the field.

Student persistence in coursework and the field is high at 89%, though it may be too early to draw conclusions with only six quarters of data. CompTechS students' rate of success in computer related coursework is as good, or better, than the rest of the De Anza College population in Computer Information Systems at 74% to 67% respectively. Feelings of confidence and increased competence for students coming out of the program may be contributing factors to persistence.

Since we found no significant differences in the impacts of the industry internship as opposed to the campus internship, there are implications for replication of the program. The on-campus computer refurbishing lab and computer scholarship program are replicable at any campus regardless of the surrounding employer base. That is, even rural campuses can provide the benefits of tech support internships to their students.

Generally the results are the same for the students regardless of their characteristics of gender, ethnicity and for those receiving financial aid. Larger numbers in specific ethnic groups will determine patterns in success and persistence that data suggests at this time. For the few African American students, their involvement in the program has not positively impacted their success rate in coursework. The composite of all target groups had better success in non-technical coursework. CompTechS students had a better success rate in computer related courses than a comparison group of De Anza College students in CIS.

The program has been effective in equipping students with technical skills and also increasing self confidence. Underrepresented groups in the computing fields are persisting, though more data is needed for specific ethnicities. We have begun to understand and document the practices that make this program effective. There is merit in developing a model that identifies those factors that allow the program to be scaled to other environments.

OUTREACH ACTIVITIES

In Year 2 of the ATE project, CompTechS participated in a number of outreach activities, including:

- A presentation at Mid-Pacific Information and Communications Technology (MPICT ATE Center) conference in January 2009 at City College of San Francisco.
- A marketing table and display at the State of the Valley, February 2009, a conference for employers, public institutions and economic development agencies, hosted by the Silicon Valley Leadership Group.
- A showcase and table top display at the October 2008, ATE PI conference in Washington DC.
- A display at the Foothill-De Anza CCD Opening Day for faculty and staff in September 2008, as a means of getting visibility for the program and internal marketing.

Student Recruitment: The most effective recruitment activity for the CompTechS program in the past has been presentations in the classrooms where students are taking computer related courses. This was done on both the De Anza and Foothill College campuses in Fall 2007. A brochure was developed for these presentations and for relevant events such as career fairs. In addition, the program is highlighted in the schedule of classes each quarter.

This year word of mouth yielded the most inquiries about the CompTechS internships. As well, an article in early Fall 2007 in the De Anza student newspaper, La Voz, highlighted advantages of the internships to students and the computer scholarship component of the CompTechS program.

A new outreach initiative aimed at welfare recipients in CalWORKS was implemented in Winter 2008. CalWORKS is a Temporary Assistance to Needy Families program that provides financial support to parents/caregivers while helping them to find jobs. This population is proportionately high in numbers of single mothers, with many not having high school diplomas. This initiative required careful planning since this group needs extra academic support, counseling and services when they arrive at the campus. A presentation to the assessment counselor's for the County of Santa Clara was conducted in January 2008. Students began coursework in Spring quarter 2008 toward a certificate in Windows Technical Support. Students concurrently continued coursework Fall 2008 and went into the CompTechS refurbishing lab as paid interns for a hands-on portion of the program..

Outreach to industry has been consistent to ensure that internship opportunities are maintained and new positions are developed.

PART III Publications and Products

The program website for student information:
http://oti.fhda.edu/comptechs.html

The website geared to the computer donation component of the program:
http://oti.fhda.edu/computer_donation.html

Comprehensive documentation for establishing the CompTechS program at another institution was produced and distributed on a thumb drive for interested colleges.

PART IV Contributions

This program/project is unique in that it provides a technical internship model that can be replicated at every campus regardless of the employer base in the geographic area. The on-campus refurbishing lab provides students the hardware and upgrade experience they need for technical support technician level work. Data suggests that CompTechS program has potential to meet goals of attracting and retaining diverse student groups in computing related fields. Also it is effectively meeting workforce development goals, in that local employers get a cost-effective entry-level labor force and students are provided access to high wage, high-demand careers.

Using the hands-on characteristics of a technical career path curriculum to encourage participation and retention of underrepresented students is an innovative approach. The

traditional CS pipeline only produces some of the successful IT workers, many of whom are self trained or pursue nontraditional educational paths. It is worth understanding nontraditional programs and ways that they can be adapted to integrate and support traditional educational programs.

As well, the program provides needy students computers which have been donated by industry and the community, and refurbished by student interns. Thus the program can serve as a model for other community colleges to close the digital divide and to retire computers in a socially responsible way.