

The CalWomenTech Project: Increasing Recruitment and Retention of Female College Students in Technology Courses

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CalWomenTech Project Results and Strategies

In the CalWomenTech Project funded by the National Science Foundation (NSF), early indicators show that community colleges that proactively recruit women into technology programs will have a significant increase in the percentage of women students in a little over a year's time. Of the four community colleges participating in the CalWomenTech Project's first research group, the two sites that implemented project recruitment strategies within the recommended timelines had an increase in women in their targeted programs of 10% to 15% (n=55, n=36). In addition, a college that was able to complete one of the four strategies before the fall semester (posters) had a smaller increase of 5% (n=25), while the college that did not implement any of the strategies saw a decrease of -3% (n=31). A second group of four community colleges was added later in the project; the 6 to 9 months prior to fall enrollment was not enough lead time for them to implement the major recruitment strategies.

The recruitment strategies were:

- Printing and distributing posters featuring role models in the college's occupational area who were program graduates.
- Creating a website section devoted to recruiting women into the college's targeted program with role model, program, and labor market information and links to women in technology associations.
- Printing and distributing tear-off flyers with program contact information and a link to the website.
- Printing and distributing a tri-fold brochure highlighting role model graduates, and program and labor market information.

The retention strategies implemented by the colleges in the CalWomenTech Project led to a significant net increase in the completion rates of not only females, but also males, in several of the colleges. In fact the two colleges that saw the largest increases in female completion rates, from 81% to 100% (n=24) and from 57% to 100% (n=5), both saw a 20% increase in male retention. Overall, the aggregate baseline retention rates were 76% for women and 77% for men across all eight colleges. Aggregate retention rates have improved and now the female retention rates have surpassed the males at 81% to 79%. All retention strategies were implemented in the classroom right away and did not require significant lead time, so their impacts could be seen in only six to eight months.

The retention strategies that were implemented in the colleges with the biggest leaps in retention included:

- On campus faculty trainings focusing on teaching to female learning styles and integrating female students into the classroom.
- Revising the program's curriculum to be more female friendly. Some changes included using more contextual examples that appeal to women, more collaborative projects, and ensuring female students spent equal time using the equipment in the labs.

CalWomenTech Project Goals

The intent of this NSF initiative is to broaden the participation of girls and women in Science, Technology, Engineering, and Math (STEM) education. In particular, the extension services are to

“provide consulting services to educators and institutions, to enable them to adopt and embed proven gender-inclusive policies and practices in pedagogy, the design of curriculum materials, student support programs, educator, and faculty development (NSF 2004, 4).” The first goal of the CalWomenTech Project is to increase the number of women enrolled and retained in STEM education in the eight selected CalWomenTech community colleges. The second goal is to institutionalize gender equity strategies in each participating college to make sure that the successful recruitment and retention strategies are used beyond the life of the project. The third goal is to illustrate to the California and national community college system that STEM gender equity strategies increase recruitment and retention of women in STEM courses, through both state and national dissemination of the project.

CalWomenTech project activities are organized into two tiers. Tier one involves intensive extension services provided to at least eight CalWomenTech community colleges with technology programs in which women are under-represented. Extension services are provided via CalWomenTech leadership teams made up of eight to ten educators and administrators at each college. Tier two involves making web-based strategies available to the California community college system as a whole, including the eight CalWomenTech community college leadership teams.

Anticipated outcomes include:

- Increased enrollment of women by an average of 10% to 15% in targeted STEM classes.
- A retention rate for females that is comparable to males in targeted classes.
- CalWomenTech recruitment and retention strategies incorporated directly into the college's regular practices.
- Dissemination of successful CalWomenTech strategies statewide and nationally via the mainstream education system.
- Increased focus of the California community college system on recruitment and retention of females into STEM.

<1>CalWomenTech Project Model</1>

IWITTS works with eight community colleges in California to increase the enrollment and retention of females in targeted STEM courses by training the colleges in best practices related to recruitment and retention, helping them develop recruitment and retention strategic plans and then providing supportive training and technical assistance to the colleges as they implement their plans and institutionalize successful strategies.

The CalWomenTech Project embodies two core beliefs of the IWITTS organization. The first is that the vast majority of educators are eager to recruit and retain women in STEM; however, they don't know how and lack the time and resources to figure it out on their own. IWITTS believes that the more off-the-shelf, turnkey solutions can be provided, the faster the colleges will implement the program elements that IWITTS research shows will result in successful outcomes. The second core belief is that change will happen faster and be institutionalized if it is supported from the top down. To this end, IWITTS's focus is not just on STEM instructors, but also includes the key leaders, staff and administrators of the colleges in a variety of functions.

How do these beliefs manifest in the CalWomenTech Project? Each of the eight community college sites in the project were provided with template marketing collateral customized to the college. IWITTS's reasoning was that the college's time was best spent on providing support activities for the classroom. The colleges still needed to provide IWITTS with identified role models and photographs, and distribute the marketing collateral; however, this was much less burdensome than initiating development of

recruitment materials. Community colleges in particular are under-resourced in this area; most do not have a dedicated staff member responsible for marketing.

Similarly, in the classroom, the CalWomenTech Project provides colleges with as many off-the-shelf tools as possible. For example, the Project Learning Library mission is to provide building block technology skills to female (and male) students who may come with less experience than their classmates. One example of a library holding is a CD and workbook on spatial reasoning that NSF research has shown improves retention of women in engineering by teaching them this skill (Sorby 2001). There are also tool identification and use videos and games that teach math skills. Currently, there are 42 items in the Learning Library, a number that is far too small from IWITTS's perspective. IWITTS wishes it had more to offer the community college sites in the project, such as female-friendly technical curriculums that support female learning styles and interests in a specific technical area such as computer networking. However, many of these types of practical resources do not exist. The field of gender equity in STEM has been long on ideas and concepts and short on practical implementation tools. IWITTS hopes to change this by demonstrating that educators will implement strategies that result in positive outcomes when they are given turnkey solutions, and by making the turnkey solutions of the project available to all.

The IWITTS CalWomenTech Project model utilizes a top down leadership team approach that has been used successfully in three of the organization's multi-site national projects. In the CalWomenTech Project each college has a key leader and a co-leader, along with a leadership team of about ten key players. The key leader, in many cases, is the dean that oversees the technology programs, the dean of workforce development, or is the head of the technology department. The co-leader is often a key instructor. The leadership team is made up of the dean or chair of the department of the targeted program, a minimum of two instructors in targeted technology courses (with one being an adjunct instructor when possible) and the director of counseling. Other possible members include the learning center director, tutoring center director, curriculum developer, articulation officer, recruitment director, outreach coordinator, public information officer, an equity/women's center coordinator, a school-to-career director, a research and planning officer, and other key stakeholders.

The leadership team model ensures that the entire college will work together to make sure women are recruited and retained in STEM programs, and that the STEM program will not be expected to take on functions outside of its normal duties. For example, in many of the colleges the public information officer has assisted with distributing a press release about the project, which has resulted in popular press including television coverage in two communities. In most of the colleges, the counselors and the outreach staff (when they exist) are involved in distribution of the posters and flyers and introducing students to the CalWomenTech section of the school website. Having a dean or chair of the department involved facilitates bigger picture changes, such as the introduction of a spatial reasoning course at one of the colleges on an accelerated timeline and the hiring of female lab assistants and creating additional open lab hours at another. The leadership team model also increases the likelihood that the changes that come about as a result of the CalWomenTech Project will be institutionalized and persist beyond the life of the project. While IWITTS has seen positive results based on the individual efforts of an instructor or administrator, those results are usually lost if that person leaves the institution or their responsibilities change. The CalWomenTech Project has successfully weathered the turnover of three key leaders/deans in two years in eight colleges, an indicator that the leadership team model is critical to success in community colleges that often see much turnover in key positions.

<1>CalWomenTech Community College Site Descriptions</1>

Eight California community colleges were selected in a competitive process. The community colleges were brought into the project in two groups of four, with the first cohort of colleges coming on board in June 2006 and the second in January 2008. Colleges had to choose particular programs such as game development and target specific courses in which they wanted to improve the recruitment and retention of female students.

The first four CalWomenTech community colleges and their targeted programs brought on board in June 2006 include:

- City College of San Francisco Computer Networking and Information Technology Program, with a focus on the new Digital Home Integration Technology Certification
- San Diego Mesa College's Geographic Information Systems Program
- Cañada College's new 3-D Animation and Video Game Art Program
- El Camino College's Air Conditioning and Refrigeration Program

The second cohort of colleges and programs, brought on board in January 2008 include:

- Evergreen Valley College's new Hybrid-Alternative Fuel Program
- Irvine Valley College's Electronic Technology Program
- Las Positas College's Welding and Automotive Technology Programs
- San Jose City College's Facilities Maintenance Technology Program

CalWomenTech Project Resources Available to All

A key component of this extension services grant is to bring best practices to the larger education community in addition to the 8 community college sites. Some of the best practices resources available to the larger public are as follow:

- Proven Practices Library: The WomenTech Proven Practices Library brings educators a research-based road map for recruiting and retaining women and girls in the technology classroom by offering journal articles, best-practice case studies, and other classroom resources. The library currently has 88 articles and is divided into twelve program areas: Bridge Courses, Curriculum, Informal Learning, Learning Style, Literature Review, Problem Solving Recruitment, Retention, Spatial Reasoning, Student Support, Women and Games, and Women and Math.
- Webinars and Podcasts Trainings: The CalWomenTech Project hosts free webinars with national experts focused on helping educators recruit and retain women to the technology classroom and podcasts for female technology students. Previous trainings have covered, “Planning Role Model Visits and Field Trips to Inspire Girls in Technology, Science and Engineering” and “Teaching Spatial Reasoning to Improve Retention of Women in Technology.” We also have podcasts for female technology students with topics such as, “Developing Male Allies in Your Male-Dominated Field” and “Time Management Tips for Women in Technology.”
- Learning Library: The CalWomenTech Learning Library provides a list of 42 off-the-shelf tools to help students develop building block skills in technology, such as tool ID videos and spatial reasoning software. These tools target skills females often have less experience with.
- The WomenTech Recruitment Marketing Template Kit & the WomenTech Step-By-Step Web Guide: To enable other schools to replicate the recruitment strategies utilized in the CalWomenTech project, IWITTS created two kits with customizable templates. The recruitment

marketing kit contains samples of real school's brochures, flyers, a PowerPoint presentation and templates for each of these components to allow schools to customize the pieces to their specific programs. Questionnaires and information pages guide schools in finding female role models and collecting the information most important to prospective female students, such as labor market data. The web guide contains a series of fill-in-the blank worksheets and Microsoft Publisher templates instructors and administrators can use to work with a school's web designer to build a Women in Technology section of the school's website.

- WomenTechWorld.Org: WomenTechWorld.org is an online community for female technicians to connect with each other. The website features include over 50 pages of content and biographies of women role models in a range of technology occupations. The site also has several interactive areas designed to facilitate peer support among women in technology, including e-Mentoring, and WomenTech Talk, an online e-mail discussion group for women technicians and female students with over 500 women participating.

About IWITTS

Founded in 1994, the Institute for Women in Trades, Technology and Science (IWITTS) is a national organization working to provide the tools to integrate women into male-dominated careers. IWITTS provides assistance to educational institutions and employers via trainings, publications, products, e-strategies, technical assistance, and research and development. IWITTS also provides support to its secondary audience, women and girls, via its online community www.womentechworld.org. Donna Milgram is the Executive Director of IWITTS and can be contacted at donna_milgram@iwitts.com or 510-749-0200 ext. 101.

<1>References</1>

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