

isisHawaii: The power of One+One brings girls into the science and engineering pipeline

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Abstract – In 2002, isisHawaii, a Hawaii-based nonprofit women’s organization, launched a Web-driven mentoring program called “One+One.” Originally developed to help women network with other women in various fields, the program eventually refocused to begin mentoring support much earlier in the educational process, targeting pre-college female students seeking professional careers not traditionally selected by girls. Currently, the One+One program encourages and supports public high school junior and senior girls who want to expand their Science, Technology, Engineering and Math (STEM) interests into higher education skill sets and career pursuits.

Studies have suggested that intervention programs are especially necessary at the high school level to attract and retain more women in math-based academic programs and professions (Campbell, p.15). Partnered with Women in Technology (WIT), a statewide workforce development project to encourage women in STEM fields, isisHawaii developed a pilot program at Mililani High School on the island of Oahu in spring 2003. Participating students were matched online with active local professionals in the STEM fields. Evaluation showed that the girls not only gained increased confidence and focus, they also gained valuable college and career guidance. Mentors benefited by being able to “give back” to the community despite busy professional and personal schedules.

isisHawaii successfully expanded the program in fall of 2004 to include five Oahu high schools: Mililani High, Moanalua High, Kaimuki High, Kahuku High and Farrington High. A year later, the first statewide efforts extended the program to the island of Maui. More online services were added at this time, including career development, professional development, and college preparatory guidance. Before this initiative, no other workforce program in Hawaii had been created with the scope, industry clout and resources to reach young women during those all-important middle and high school years when they first begin to form their career goals.

This paper will discuss how isisHawaii and WIT effectively built upon available eMentoring program models, including presidential award-winning MentorNet, to develop community-based, culturally appropriate and cost-effective programming that would have positive career implications for Hawaii’s girls and young women. As it follows the One+One program from inception through its first three years, the paper presents survey highlights, anecdotal evidence, multi-year tracking and revisions/enhancements that produced successful results.

The Women in Technology Project is the primary fiscal sponsor for the isisHawaii startup program. WIT is funded in part by the U.S. Departments of Labor and Agriculture as a national pilot and demonstration project.

Background

Today, critical shortages in the nation's science, technology, engineering, and math (STEM) workforce have generated substantial interest from government and industry leaders to increase the recruitment and retention of women, and other underrepresented groups in STEM education and employment (McSherry, 2005).

“At a time when we face a shortage of skilled STEM workers who are U.S. citizens, women provide an untapped national resource to fill the workforce pipeline,” acknowledged U.S. Senator Dan Inouye (2004) in his floor statement to the Senate.

According to the U.S. Department of Labor's Bureau of Labor Statistics published in 2000, the ten fastest growing jobs through 2010 are in the technology and medical fields, with eight of the ten in the STEM fields, i.e., Systems Analyst, Database Administrator, Desktop Publisher, Network Systems and Data Communications Analyst, Network and Systems Administrator, Systems Software Engineer, Support Specialist, Software Application Engineers.

Concurrently, the Hawaii Department of Labor and Industrial Relations reported in 2002, that three of the top ten fastest growing Hawaii jobs from 2000 to 2010 will be in Information Technology. The State is also experiencing an expansion in the hi-tech sector with many emerging companies employing Info Tech professionals and Engineers, involved with Research and Development of new technologies with both military and medical applications.

While this is a boon for the STEM sectors, the statistics for women in STEM education and careers nationwide remain staggeringly low:

- From 1996-2002, the Information Technology Association reported the percentage of women among IT professionals barely increased from 25% to 25.3% (“Women in Tech,” 2003).
- Women now earn about 57% of all undergraduate degrees but are awarded only 22% of the diplomas in computer science and engineering (“New Gender Gap,” 2003).
- While women account for 50% of the total U.S. labor workforce, they comprise less than 10% of all U.S. Engineers and less than 30% of all U.S. Scientists (Kurtz, 2003).
- Women at the University of Hawaii represented 55% of the total undergraduate student body, yet only 25% of the female students graduated with Information/Computer Science degrees, and only 20% with Engineering degrees in 2002 (Maui Economic Development Board, 2004).

From the elementary school level, girls consistently match or surpass boys' achievements in science and mathematics as measured by scholastic aptitude tests, achievement tests and classroom grades. Yet, by the end of high school, most girls have lost confidence in their academic abilities and are less likely to engage in careers requiring high levels of math, science or technology (“Shortchanging Girls,” p.5).

Further, research shows that the system unintentionally amplifies the problem by stressing competitive – rather than cooperative – learning, by presenting texts and lessons devoid of women role models and reinforcing negative stereotypes about girls’ abilities. Society often does the same, steering girls away from math and science careers with false assumptions about girls not being “abstract thinkers” and who lack technical skill. A loss of confidence follows and increases as the student advances, ultimately resulting in the female student choosing another course of study entirely (“Shortchanging Girls,” p.15).

Helping a student to sustain their interest in STEM education and careers requires greater depth than traditional career counseling and formal instructions from teachers. In recent years, a successful strategy in workforce development has been to connect aspiring students with mentors—a supportive, non-judgmental and positive relationship that helps to foster and sustain a student’s interest and growth. Female students in particular, have a greater chance of succeeding in a non-traditional STEM career with the benefit of communicating directly with a female professional who experienced the same challenges and opportunities.

Mentors and role models play a key role in reinforcing positive feedback and encouragement for aspiring young female students. The process is especially important in light of recent estimates that women and other underrepresented minority groups pursuing STEM-related education must increase from under 25% today to 75% in the next 40 years, to meet future demands for scientists and engineers (Women in Engineering Professional Advocates Network, 2003).

The WIT Oahu/isisHawaii collaboration

The Women in Technology Project (WIT) was created in 2000 by the Maui Economic Development Board (MEDB) to address the under representation of women in the emerging hi-tech industry encompassing the fields of Science, Technology, Engineering and Math. Federally funded by the U.S. Department of Labor as a workforce development project, WIT has expanded its program to other islands including Molokai, Lanai, Hawaii Island, Kauai and in the summer of 2003, established a presence on Oahu.

WIT has been recognized as the statewide leader in the support of online eMentoring programs for Hawaii-based female students interested in STEM careers through such nationally-based programs as GEM-SET online for female high school juniors and seniors, and MentorNet for female college students. However, many Hawaii students stated in their evaluation reports that they would like further access to female professionals in the state. Conversely, female professionals who have participated in the national MentorNet program, have asked for a more direct way to support Hawaii’s students.

While the learning experiences of GEM-SET and MentorNet provided strong models for Hawaii female students, it became apparent that mentoring opportunities were needed at pre-college levels. In 2003, WIT began an extraordinarily successful partnership with isisHawaii, using the organization’s already successful e-mentoring model to reach local females at the pivotal high school level and address the need to develop leadership and empowerment through education and mentorship.

Established in November 2002, isisHawaii began as an independent non-profit organization dedicated to provide women in Hawaii, ages 15 and over, with online mentoring and networking resources. When it first started, this online community functioned primarily as a networking resource for women. Within 6 months, more than 50 members were registered.

Using its foundation of working professionals and networked women, isisHawaii then created its One+One mentoring program to aid in career and professional skill development targeting the critical transition from school to workforce. The individual interests and skills of a young woman were matched with a professional's career and life experiences—thus customizing the online mentoring relationship.

By utilizing online technology as a method of connecting young women with working professionals, the experience established an online community of supportive role models for young women to communicate with while benefiting from a mentoring relationship. Online communications were most often preferred by most working professionals who wished to volunteer as mentors, and found the online option convenient as it overcame the challenges of time and distance.

The partnership between the Women in Technology Project's Oahu Division and isisHawaii capitalizes on the synergy of local and national mentoring approaches. It further provides a platform for access to resources and community awareness of opportunities emerging in Hawaii's hi-tech sector.

The pilot program

In October 2003, WIT Oahu and isisHawaii asked a central Oahu public high school -- Mililani High (MHS) -- to participate in the One+One pilot program. In addition to an online mentoring program for young women interested in STEM, MHS would be provided with a variety of hands-on, team-oriented, real-world applications projects, in-person mentoring support and online e-mentoring support. WIT Oahu and isisHawaii also teamed to present several Hawaii-based businesses with this mentoring concept, stressing the need for active women professionals to volunteer as mentors and role models for students.

The WIT Oahu and isisHawaii partnership began by working closely with educators and employers to identify needs and coordinate recruiting efforts. By involving both educators and employers at the start, the resulting program model could better respond to developing student skills, assisting educators with supplemental educational programs and identifying industry trends from employers looking for potential job candidates.

At the same time the student recruitment was going on, WIT Oahu/isisHawaii recruited and screen qualified mentors from private industry to access female STEM professionals in the Engineering and Information Technology Divisions for the online eMentoring program, as well as for female mentors to provide on-site guidance in the variety of school projects.

Mentors were recruited on a voluntary basis, with isisHawaii often tapping into corporate diversity initiatives and outreach programs. These professionals provided guidance and encouragement to participating students on one of two levels: 1) as virtual mentors, or eMentors,

through isisHawaii's One+One Program; 2) as on-site mentors to participate in campus-based projects and activities involving computer science or engineering applications.

It is important to note that the One+One Program is not merely a system-supported email communications device, but a dynamic Web-based environment designed to help mentoring partnerships set, track and update specific goals. By leveraging technology in this way, active professionals are more inclined to volunteer as mentors, since this virtual relationship can take place at the participant's convenience and does not depend on a physical commitment.

Program support was developed to assist everyone involved. The goal was to create a program that was in demand and recognized as a value-added learning experience.

- On-site workshops – WIT and isisHawaii conducted presentations and workshops on campus to help mentors, students, parents and faculty understand the process and what can be expected from the program.
- Online seminars/workshops – A professional consultant, who coaches executives on developing their leadership and team-building skills, hosted an online video training guide for mentors on the isisHawaii website. This guide consisted of a series of short video clips answering anticipated questions that mentors may have about getting their relationships off the ground.
- Online articles – All match-ups for the pilot project was forwarded an email message with links to articles on the site regarding mentor/student responsibilities, netiquette, potential first discussion topics, expectations, troubleshooting contact information, etc.

WIT Oahu/isisHawaii put together specific questions for student and mentor applicants to facilitate the pairings for the one-on-one online mentoring relationship. Workshops were scheduled for students, parents, faculty and mentors to assist with initiating the eMentoring process. With online mentoring support, students established their own individual expectations in the areas of goal-setting, professional skill development and career development. Performance evaluation and self-assessment reports measured student and mentor progress at the completion of the test pilot.

Program expansion

In fall 2004, WIT Oahu/isisHawaii successfully expanded the One+One program to include five Oahu schools: Mililani High, Moanalua High, Kaimuki High, Kahuku High and Farrington High. Additional online services now included career development, professional development, and college preparatory guidance.

With WIT funding, a statewide expansion effort in Spring 2005 brought isisHawaii's One+One program to interested high schools on the island of Maui. Two high schools – Baldwin and Lahainaluna – participated in the pilot program. Of the eight students who signed up, five with interests ranging from Marine Biology to Aeronautical Engineering were matched with STEM mentors.

Evaluation

Six different Oahu high schools completed the June 2005 One+One session. Certificates of Completion and custom-designed Hawaii lapel pins were given to those who completed and returned their evaluations.

- For young women who actively participated in mentoring partnerships, expectations were met, if not, exceeded. Students gained confidence, learned more about their STEM interests and made valuable personal connections with industry professionals. Most mentoring partners who responded will continue their e-relationships beyond the One+One Program.

Some comments from students:

“I liked the fact that I was paired with someone (who) had so much of the same interests. I was impressed with every new fact I learned about her...because the person she described...is almost a mirror image of me.”

“I learned about many of the good West Coast technology and healthcare colleges along with the type of person I needed to be to succeed in specific careers.”

“I had such a terrific time learning what kind of person she was and some of her different experiences before she became such an important figure in biotechnology here. I found out that we have a lot of things in common, and I was particularly excited when I found out that she was a varsity cheerleader in AP chem. and English when she was in high school – just like me!”

“I liked the many opportunities available in the program such as the workshops, mentors, etc. Along with all the access to the many technology articles that were submitted.”

- Mentors found the program to be a very convenient way to “give back” to their communities. Good working relationships were established with student mentees with sometimes less than one email exchange per week. Mentors expressed interest in volunteering for school guest-speaking engagements and more offline, face-to-face activities.

Some comments from mentors:

“I thought this was a great opportunity to engage with the student. I would have liked the opportunity to show the student my work environment or at least meet my mentee once.”

“We worked on understanding the different science opportunities as well as college atmosphere and location. During the course of our discussions, I learned the high-school student’s environmental stressors and tried to “listen” to their concerns and relate these concerns with my own experiences. This gave us an opportunity to look at future goals and establish a process for these goals.”

“(I) provided some details about colleges, particularly mainland schools, based on college searches for my own children and my experience as college faculty.”

- Parents found the One+One Program added value to their child’s education, especially in post-secondary guidance. Exposure to “real world” careers and role models, plus the ability to have their child discuss a variety of STEM issues with active professionals contributed to increased focus and direction in the child’s college pathway. In some cases,

confusion about college majors and course of study were resolved with mentors' guidance. Sharing of mentor's personal experiences played large role in helping students overcome fears and confidence issues.

Some comments from parents:

"I liked that my daughter was receiving advice from such a successful professional. I also thought it was very generous that the program paired my daughter with someone that was so similar to her in many ways."

"The mentor my child had was exceptionally helpful and made it fun and interesting. This had a positive impact on her future."

"My daughter now understands how hard it is to be in science-related fields and takes her work more seriously now."

A first annual Kick Off event was held in November 2005 in response to participant survey responses last year requesting more face-to-face activities. The event provided an opportunity for mentoring pairs to meet, to showcase successful partnerships, to provide a forum for the exchange of ideas, as well as to introduce the eMentoring concept to new students and administrators.

- Students enjoyed learning about STEM professions and being able to engage in conversations with a variety of STEM professionals.
- New students gained a better understanding of the value of having a mentor as someone who could help them achieve their educational and career goals.
- Attendees also benefited from the testimonials of two very successful mentoring partnerships, tips on how to engage unresponsive partners, topics to discuss and possible face-to-face opportunities for hands-on experiences in the field.

For the Fall 2005-06 mentorships, technical upgrades in registration and eMentoring processes are underway. Registration will be streamlined into a single online submission. A more structured mentoring model will be introduced to help move the mentoring partners forward in setting specific goals and targeting milestones.

Currently, the One+One program has grown to nine participating high schools on Oahu and Maui. Thirty-nine students have registered with interests ranging from technology fields such as computer sciences and database programming, to all areas of engineering, biological sciences, communications and nursing.

Overall, interest fields over the past three years remained proportionately the same with a slight increase in engineering (6%). Significantly, however, the One+One active mentoring partnerships have increased 400% from 2003-2006.

Summary

Since its inception in 2003 as a WIT/isisHawaii collaboration, the One+One program has moved steadily toward self-sustainability. This is due to a number of positive factors that have developed as result of the dedicated efforts from staff and community:

- Strong relationships with local mentoring resources such as the University of Hawaii system, IEEE Hawaii Chapter, Hawaiian Electric Company, NOAA, Hawaii Science and Technology Council and more.
- Nurtured contacts with high school staff and faculty to help coordinate and recruit potential student candidates.
- Availability of a subscription and fee-based recruitment, as well as an eMentoring component, to other non-profit organizations with like-minded missions.
- Leveraged programs, i.e., offline events to attract grant monies. For example, for the “What is an Engineer?” project funded by the Engineering Information Foundation, WIT partnered with the UH Society of Women Engineers to present an event to middle and high school girls. The taped interviews of panel members will be edited and DVDs distributed free to participating schools and counselors for future reference.
- Leveraged resources or the “clearinghouse” approach. While in search for new eMentoring resources, additional opportunities have been created such as guest speakers for school and isisHawaii offline events; site visits for students; job shadowing; industry requests for outreach.

Through the isisHawaii website, the One+One program has also established a venue for creating awareness of employment opportunities for female students in Hawaii’s emerging STEM industries. Previously, many students and schools were unaware that Hawaii had any local resources in the hi-tech sector. As it evolves, this eMentoring program can serve as an outstanding model for future collaborations with schools and industry to support a statewide online, youth mentoring program.

Looking at the near future, isisHawaii has already begun implementing the following strategies to improve the program:

- Involving parents through technology and face-to-face opportunities
- Strengthening recruitment and retention for Neighbor Island participants
- Developing a stronger relationship with the DOE’s Hawaii Career and Tech Education
- Seeking new mentoring resources in Hawaii, especially in computer, electrical, civil (environmental) and biomedical engineering

Ultimately, the One+One program demonstrates how technology can assist young women, separated by time and distance, in developing strategic relationships with industry professionals. In this manner, these all-important mentors can provide the encouragement and support needed to jumpstart more women into the STEM fields, thus addressing one of the nation’s most critical workforce problems.

Acknowledgements

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