

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

Abstract

In 2002, isisHawaii launched the first Hawaii-based online mentoring program to help local women network with other women in various professional fields. Since 2003, with a seed grant from The Women in Technology (WIT) Project (a statewide workforce development initiative funded in part by the U.S. Departments of Labor, Agriculture and Education), isisHawaii's One+One eMentoring Program has provided support early in the education process, targeting pre-college female students seeking non-traditional careers in science and technology.

This paper will discuss how isisHawaii and WIT effectively built upon available eMentoring 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 women. As it follows the One+One program from inception through its first three years, the paper discusses survey highlights, anecdotal findings and program revisions/enhancements that produced successful results.

Background

In Hawaii, as across the nation, critical shortages in the 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 employment¹.

“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 Inouye (D-HI)² in his 2004 floor statement to the Senate.

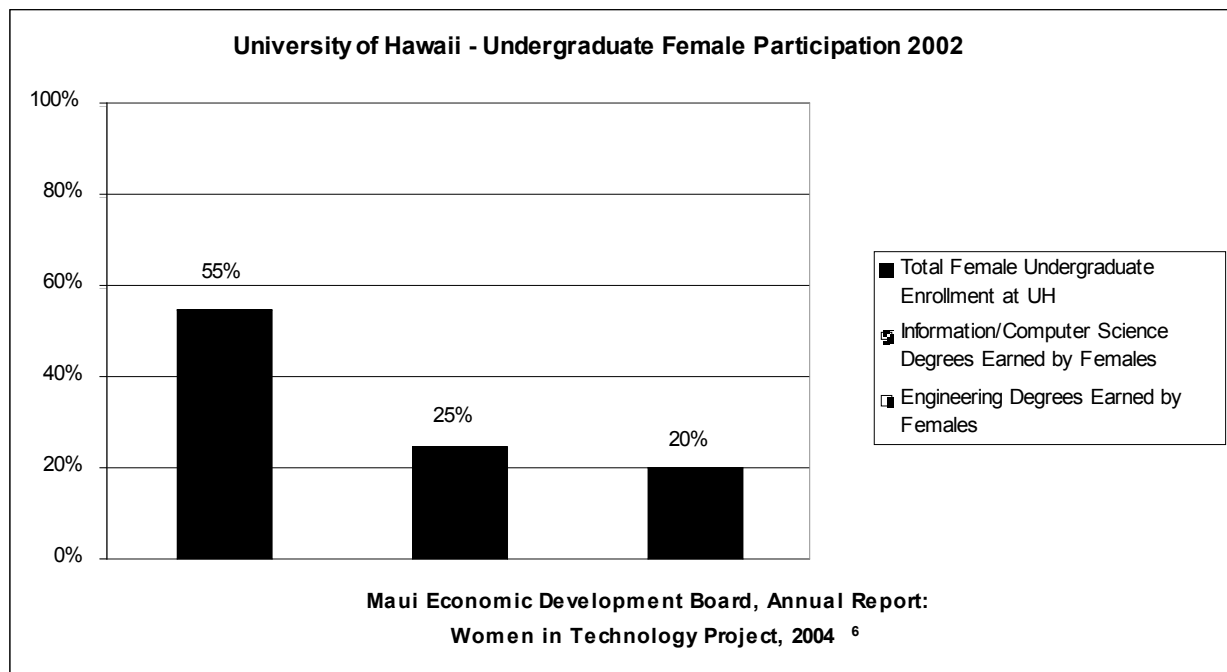
According to the U.S. Department of Labor's Bureau of Labor Statistics published in 2000, the ten fastest growing jobs through 2010 are in the technology and medical fields, with eight of the ten in the STEM fields, i.e., Systems Analyst, Database Administrator, Desktop Publisher, Network Systems and 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%³
- Women now earn about 57% of all undergraduate degrees but are awarded only 22% of the diplomas in computer science and engineering⁴.
- 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. Scientists⁵.

Hawaii's STEM pipeline mirrors the national dearth of female participation:



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 technology⁷.

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 entirely⁸.

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 engineers⁹.

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 Hawaii’s emerging hi-tech industry encompassing the fields of Science, Technology, Engineering and Math. Federally funded by the U.S. Departments of Labor, Agriculture and Education, 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 its sponsorship of 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 expanded 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 (“i” for “Internet”, “sis” for “sister”) began as an independent non-profit organization dedicated to provide women in Hawaii with online mentoring and networking resources. Within 6 months, more than 50 members were registered.

Using its foundation of working professionals and networked women, isisHawaii then created its One+One eMentoring 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.

Although eMentoring is not a new concept, what makes the One+One Program special is its focused recruitment of active local professionals. This provides students with the value-add opportunity to meet with their mentors and be exposed to local resources. This combination of computer-aided mentoring with actual face-to-face interaction is, by far, more powerful than either of the two mentoring methods individually. This hybrid platform is specially adapted to meet Hawaii's cultural needs, allowing our young women exposure and access to women they can relate to, who are succeeding in their home communities.

- A high school senior, torn between her love of math and science, was counseled by her eMentor that she might consider a double major...something that the student did not know was possible. During her first vacation break, she visited her eMentor, who happened to be a college department chair and, together, they mapped out a course schedule and toured the campus.
- A high school senior was invited by her eMentor to visit her research lab and assist in teaching an undergraduate course. The student was so excited to actually experience procedures she had only read about in textbooks (her high school did not have a lab). Even after the student left Hawaii for college, they have maintained a very close relationship. Currently, this student is also a contributing journalist to isisHawaii's website, sharing her new experiences at an East Coast university.

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 were 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: 2005-06

One Maui and seven Oahu high schools completed the June 2005-06 One+One session. Forty mentors were matched with students while an additional 22 industry volunteers were on a call list for matches. Certificates of Completion and custom-designed isisHawaii lapel pins were given to those who completed and returned their evaluations.

Students

- Overall, students gained confidence, learned more about their STEM interests and made valuable personal connections with industry professionals: 86% said they gained a better understanding of a STEM profession with 14% expressing a desire to explore more STEM fields; 29% were able to take advantage of other opportunities through the isisHawaii One+One Program such as job shadowing, meeting their mentors and/or attending events.
- The program positively influenced or confirmed educational and career decisions in 57% of the students despite the low frequency of email exchanges (i.e., 63% emailed each other less than 1x/week, 25% at about once/week). Monthly topics were suggested to encourage greater exchange between mentor/mentee.
- Most students found their e-mentors to be friendly and helpful (88%). Some mentoring partnerships will continue their online relationships (29%) beyond the One+One Program.

Some comments from students:

“I learned from my mentor that anyone, including women, can succeed to a high level position in any profession that is dominated by males. She use herself as an example and she inspired me.”

"I once went to my mentor's laboratory where she set aside most of her day to show me how to run one of her college labs. It was so amazing to actually perform experiments I read about in my biology class. My mentor also answered a ton of questions that aren't related to biology; I can tell her about anything.”

“...It really helps to have someone older than me to assist with future planning. This program (gave) me opportunities that many students will not be able to receive. I (felt that) my mentor (could) guide me with my future because she has been through it before..”

Mentors

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.

- Most mentors appreciated the concept of virtual mentoring but only if both parties are willing and active participants. Others liked the focus on STEM, the focus on mentoring girls, the structure and goal-oriented aspect and the opportunity to meet new people with like-minded interests.
- 100% were willing to volunteer again as One+One e-mentors for the upcoming school year; 33% would volunteer as guest speakers and provide some sort of on-site opportunity (eg., site visit, unpaid student internships, job shadowing); 44% would volunteer at events.
- 100% rated the program either “excellent” or “good”; 89% would recommend this program to another colleague.

Some comments from mentors:

“I am participating in this program to invest in others. I have been fortunate to have phenomenal mentors in my life and feel that it is important to give back when the opportunity arises.”

“I (felt) that I helped my mentee answer questions about life, not just her career. Of course, we discussed what she should major in in college, but we also discussed all the extracurriculars available in college, the importance of liking the living environment, as well as the college program, life past college, etc. I encouraged her constantly, helped with whatever she asked, and (felt) that, overall, I took some of the fear out of the idea of going away to the ‘big bad university.’”

“I have informed other STEM colleagues about isisHawaii. They were very excited about this opportunity. One colleague became a mentor and another that runs a STEM program at (the university) has contacted isisHawaii about e-mentoring.”

School Coordinators

All of the School Coordinators (SCs) who responded to the survey felt that the One+One Program supported their school’s educational goals. It provided gender equity support in technical areas, as well as allowing mentors to fulfill academy pathway requirements. SCs also appreciated the value of exposing students what is “real and relevant” in industry.

- SCs spent very little time coordinating and implementing the program on a weekly basis (less than one hour/week, 2-3 hrs./week). They liked the spectrum of STEM fields that students could choose to explore.
- 100% rated the program “excellent” or “good” and will re-enroll during the next school year. 100% also would encourage the school to provide more programs like One+One

and recommend the eMentoring concept to other schools.

“...With programs like isisHawaii, women are given a plethora of opportunities to go beyond the curriculum of high school to actually communicate with others in the field, visit (the university), visit job sites, experience a hands-on activity, etc. Opportunities that may not exist in the scope of their family and friends are not available to them at the asking.”

Parents

Although there were many positive parent comments in past evaluations, no formal parent feedback was returned this year. It is unclear whether this was due to evaluations being conducted online and/or the fact that their response depended on their child's informing them of the evaluation itself. An option to print out and mail in their written evaluations was offered.

With enrollment doubling each year, expectations for 2006-7 remain high. In order to maintain the high quality of the program and keep it a positive experience for all involved, isisHawaii will increase program support in the technical area and in partnership-building.

In early 2007, isisHawaii will be launching an inquire-n-search module called “Ask a Mentor.” This will be an interactive area where educators as well as students can ask mentors single questions relating to STEM. By picking categories that will result in a list of qualified professionals, participants can choose who they want to answer questions either publicly or privately. Hopefully, this will spark more frequent online exchange, a problem noted as the One+One program continues to expand.

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:

- New eMentoring partnerships in 2007 including the University of Hawaii-Manoa Institute for Astronomy; Center for Microbial Oceanography: Research & Education; JABSOM Area Health Education Center.
- Strong relationships with existing 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 reflecting Hawaii's diversity 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, the One+One eMentoring program can serve as an outstanding model for future collaborations between education and industry especially since the Hawaii Department of Education will be mandating that all high school seniors connect with industry professionals for senior projects by 2012.

Looking towards 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
- Establishing longitudinal tracking protocols that will formally measure college attendance, STEM enrollments, degrees conferred and career placements.

Ultimately, the One+One program demonstrates how technology can assist young women, separated by time and distance, in developing strategic relationships with industry professionals. By augmenting the electronic mentor/protégée dialogue with face-to-face interactions, this hybrid model is maximizing the benefits for both the student and the professional. Through this community-based, culturally appropriate program, these all-important mentors can provide the encouragement and support needed to jumpstart more young women into the STEM fields, thus addressing one of Hawaii's and the nation's most critical workforce problems.

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