2006-2426: BUILDING INDUSTRY/EDUCATION PARTNERSHIPS FOR TOMORROW'S WORKFORCE - TECH CAREERS: "I AM THE FUTURE"

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Building Industry/Education Partnership's for Tomorrow's Workforce

Tech Careers: "I Am The Future"

Abstract—The island of Maui is known the world over as a beautiful vacation destination. It is also home to an emerging High Technology sector. The technology industry in Hawaii has been faced with chronic recruitment and retention challenges due to a local labor force insufficient to meet the growing demand for engineering and technical talent and the expense of recruiting offshore. The Maui Economic Development Board and Women in Technology[1] (WIT) have helped industry to understand that women and other underrepresented minorities are key resources in meeting these challenges.

This paper presents survey results and anecdotal evidence from the seven year history of WIT's signature event: Tech Careers "I Am The Future." It explains how this event was revised and improved to become an anchor for STEM career influence and outreach efforts to Maui County high school students and beyond. Hundreds of students and teachers have participated in the program that is now an annual event for the companies in the Maui Research and Technology Park (Park) and the U.S. Air Force.

The program model offers students a chance to hear presentations from host companies at the Park. The companies are prepped in advance with hands-on engineering activities to engage the students. Students then hear from a panel of diverse young technology professionals who graduated from local high schools on the subject of "How I Got My Start." The final activity is a visit to the normally inaccessible observatories at the Maui Space Surveillance Complex, ten thousand feet above sea level atop Mount Haleakala.

In its first year, Tech Careers employed a passive recruitment process to enroll interested students. Sixty-six percent of participants were male, and most came from private schools or those in wealthier districts. Anecdotally, they were also primarily Caucasian. In subsequent years, gender equity recruitment protocols were implemented and refined so that now the participant population appropriately reflects the gender, socio-economic and ethnic diversity of the community from which they are drawn. In addition, efforts are undertaken to involve younger students in the hopes of having an earlier impact on career choice. This paper discusses the collaboration between industry and educators, provides suggestions for starting industry-based career outreach programs, and offers strategies for attracting girls and underrepresented students to such a program.

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[1] The Women in Technology Project, funded in part by the U.S. Department of Labor, is a project of the Maui Economic Development Board, Inc. in partnership with Hawaii Island Economic Development Board, Inc.

Introduction

The Women in Technology Project (WIT), launched in fall 1999, encourages women and girls in the in the state of Hawaii to pursue science, technology, education and math (STEM) careers. Primary research conducted by WIT's parent organization, the Maui Economic Development Board[2] (MEDB), revealed that employers in Hawaii's technology sector pay dearly when they are forced to import employees. Recruitment and relocation expenses are significant because of Hawaii's remote location and turnover of transplants is high: they stay an average of only 2 years. This research inspired an industry-led workforce development initiative to build a trained resident workforce to address these challenges. Technology industry employers were willing to commit to long-term investment in cultivating Hawaii's own engineering talent, including the relatively untapped resources of women and minorities that are underrepresented in this field.

In 2000, MEDB formally placed workforce development as its top program priority and launched a partnership with businesses and educators to encourage a healthy pipeline from education to employment in science, technology, engineering and math (STEM). MEDB's newly launched Women in Technology Project, funded in part by the U.S. Department of Labor led the efforts. Before this initiative, no other workforce program in Hawaii had been created with the scope, industry clout and resources to reach young women and underrepresented populations during their high school years when career goals begin to take shape. The signature event of this initiative is an annual career day designed to expose local high school students to, and spark interest in, STEM courses and career opportunities.

WIT analyzes enrollment statistics in the UH system and looks at levels of women majoring in chemistry, computer science, mathematics, physics, astronomy and engineering. Since WIT 's inception in 1999, women have steadily been about 57% of the total students enrolled, but only about 28% of the students are women in these majors. As of Fall 2004 this was still case. In its planning for the event, WIT emphasized recruitment of historically under-represented students, including females, Pacific Islanders, socio-economically challenged and academically at-risk students. Due to Department of Education policies it is not possible to survey students with regards of their ethnicity or socio-economic status, which research is further limited by the inability to track students after participation.

Year One

The first "Tech Careers: I Am The Future" day was held in 1999, before WIT became involved. Members of MEDB met with teachers from a private school and Department of Education administrators to design the day's activities. MEDB met with key industry personnel to gather information on the types of technology careers available locally. On the first day of spring break, 50 students, teachers and counselors attended the first annual event at the Maui Research and Technology Park (Park).

The program was designed to complement existing School to Work, Career Day and tech awareness efforts already conducted by local schools. Eight local technology companies

[2] The Maui Economic Development Board is a private nonprofit organization, well-respected for its leadership in helping to diversity Maui County's economy through the development of the high technology industry.

participated and presented students with information on locally available STEM jobs and the preparation required via community college, university or other post-high school programs.

In this first year, 53% of the participants came from private schools or from districts where the median household income is $50,000 or higher and 47% from those $45,000 - $50,000[3]. Only 34% of the student participants were female. However, the first event was notably successful in reaching younger students: 71% of attendees were freshman or sophmores.

Year Two

The second annual event was held in March, 2000. It was dubbed "I Am The Future, A High Tech Maui Boot Camp." This time nine local tech companies helped plan, coordinate, and present the program to 50 students and 10 educators. Staff from the companies again presented information on the range of job responsibilities and preparation required. In addition, a special session was held for teachers and counselors on the education requirements and desired skill sets for new hires. Information on internships available at the Park was also shared. Another new feature was a panel of Park employees talking about their personal career paths and the opportunities for a STEM career on Maui.

This year, 22% of the students came from private schools or districts with median family income over $50,000 and 78% from those $45,000 to $50,000. Representation of females remained at 34%, and 53% of the participating students were freshmen or sophomores.

Year Three

The third annual event was held in March, 2001. In cooperation with the U.S. Air Force and the University of Hawaii Institute for Astronomy, Tech Careers 2001 was expanded to two days. The second day was a site-visit to the Institute for Astronomy's observatory at the summit of Mount Haleakala. The event was officially sponsored by the County of Maui, the Maui High Performance Computing Center, and the U. S. Department of Labor.

Participation in the first day's program included 12 local technology employers (eight of which also were actively involved in planning the day's activities), 32 students and 11 teachers. Students heard from technology employees about their career paths while teachers learned how to prepare their students for tech careers. Everyone then heard a presentation on entrepreneurship in technology. Finally, students chose a breakout session with one of eight participating technology companies. On the second day, participants toured the University of Hawaii Institute for Astronomy and the Maui Space Surveillance Complex

During the six weeks preceding the event, WIT staff visited guidance classes at four of the five public high schools on Maui, and math, science, or technology classes at two of these schools. Over 500 students and 11 teachers/counselors participated in these classroom presentations. In addition to the classroom visits, teachers, administrators and guidance counselors received emails and phone calls in the month preceding the event.

[3] No district on the island of Maui has a median family income below $45,000.

The recruitment efforts paid off. An unprecedented 61% of the event participants were female. In addition, 82% of the participants came from public school districts with a median family income of $45,000-$50,000, and only 18% came from private schools or districts with median family income over $50,000. No data was collected this year on the grade level of participating students. Although no data was formally collected on the ethnic background of participating students, anecdotal evidence is that the students were a more diverse group than in prior years.

This third year was the first in which a formal evaluation instrument was employed to measure the programs efficacy in improving student awareness of STEM education and careers and garner suggestions for improving the program. This first survey was completed by 97% of the participating students. The majority (58%) reported that they had learned of the event from a teacher and 29% learned of it through the classroom presentations.

The event was an unqualified success in that 97% of participating students reported that the event had raised their awareness of technology-related job opportunities in Maui County and 94% that it had raised their awareness of job demand in STEM fields. The students' surveys reported that 90% of them were considering getting STEM degree (up from 68% prior to the event) and 94% were considering technology-related careers (up from 71% prior to the event).

Feedback included requests from students for hands-on activities and more time. Consistent with this feedback was the fact that the companies that provided hands-on activities during the breakout session received the highest reviews from the students. This feedback is consistent with research findings that hands-on activities and cooperative learning have been found to stimulate interest in STEM for all students, especially girls (Land of Plenty, 2000).

Year Four

The fourth annual Tech Careers event was held in March, 2002. A full-day conference was held at the Park followed by a site visit to the facilities of the Maui Space Surveillance Complex on the second day. The event was sponsored by the County of Maui, Maui High Performance Computing Center, the U. S. Air Force Research Laboratory (Detachment 15), and the U. S. Department of Labor. WIT again visited local high schools to promote the program. During many of the presentations given this year, past participants spoke up to recommend the event to their classmates.

Twelve local tech employers and 42 students participated[4]. The tech employers responded to the prior year's feedback by incorporating more hands-on activities in their breakout sessions. This year, 46% of the participating students were female, 77% from districts with median family income of $45,000-$50,000 and 23% from private schools or districts with median family income above $50,000. No data were collected on the grade levels of participating students.

The majority (61%) of participating students learned of the event from a teacher, 12% heard about it from a guidance counselor, and 14% from a friend. Student evaluations reported that the

[4] Student participation was lower this year which was attributable to a state-wide teachers' strike which began two weeks prior to and during Tech Careers Day. School was cancelled through the duration of the strike, significantly affecting our ability to coordinate with the students and confirm attendance.

event raised awareness of technology-related jobs in Maui County for 99% of the students and raised awareness of the job demand in technology for 95% of them. The impact on education and career choice was again significant in that 98% of participating students said they were considering technology-related degrees (up from 76% at the start of the event) and 100% said they were considering technology-related careers (up from 88% before the event).

In a pattern that has remained throughout all subsequent years of the program, the students again responded positively to the panel of people currently employed in STEM fields speaking on how they got their start and to breakout sessions with individual companies, especially those that demonstrated "cool" equipment or provided any hands-on activity. There are always some requests for more time for the breakout sessions and more hands-on activities.

Year Five

The fifth annual Tech Careers event was held in April, 2003. The two-day format was repeated, with day one at the Park and day two at the Maui Space Surveillance Complex atop Mount Haleakala. The event was sponsored by the County of Maui and the U. S. Department of Labor.

Ten local tech employers participated in planning and executing the event. An increased effort was made to recruit students from the islands of Lanai and Molokai. These islands are part of Maui County and both have a median family income of less than $45,000. In addition, WIT conducted outreach to a fifth public high school on Maui: the remote, rural Hana High School. In past years, there was no significant representation from any of these districts. The recruitment effort was a success, with 34 attendees coming to the event from Lanai and 10 from Molokai.

In response to past participants' requests for more hands-on activities, the first day included two competitions (one in the morning and one in the afternoon). Students competed in contests requiring manipulation of a robotic arm and construction of a marble-carrying boat.

The fifth annual event had 71 participants. This year, 50% of the participants were female, 62% from districts with median family income of below $45,000, 27 % from districts with a median family income of $45,000-$50,000 and 11% from private schools or districts with median family income above $50,000. No data were collected on the grade levels of participating students.

Student evaluations reported that the event raised awareness of technology-related jobs in Maui County for 95% of the students and raised awareness of the job demand in technology for 97% of them. The impact on education and career choice was again significant in that 82% of participating students said they were considering technology-related degrees (up from 63% at the start of the event) and 82% said they were considering technology-related careers (up from 60% before the event).

Year Six

The sixth annual Tech Careers event was held in April, 2004. The program again consisted of a day at the Park and a day at the Mount Haleakala observatories and was sponsored by Maui

County and the U. S. Department of Labor. The same ten companies participated in planning and presenting the event.

As in the previous year, additional efforts were made to register students from Lanai and Molokai and Hana, Maui. These efforts paid off with participation from Hana for the first time (7 students) and continued participation by Lanai (7 students) and Molokai (6 students). Also for the first time, Oahu students from two schools were invited to participate and sent four students each.

The first day presentations again included the "How I Got My Start" panel and breakout visits to Park tenants. Also reprised was the inclusion of two hands-on competitions for the students. The visit to the Maui Space Surveillance Complex included presentations on the telescope, laser light and holograms, and the use of infrared heat sensors and liquid nitrogen.

In all, 53 students participated. In this sixth year, 60% of the participating students were female, 19% from districts with median family income below $45,000, 30% from districts with median family income of $45,000-$50,000 and 42% from private schools or districts with median family income above $50,000[5]. WIT resumed collecting data on the grade level of students and found that 30% of participants were freshmen or sophomores.

Student evaluations reported that the event raised awareness of technology-related jobs in Maui County for 98% of the students and raised awareness of the job demand in technology for 96% of them. At the sixth annual event, 90% of the students arrived already considering a STEM degree. Surprisingly, this percentage dropped to 83% after the event. It is not clear whether some students were turned off of STEM careers or determined that they wanted technology jobs that did not require a full degree. In any event, the net impact of the conference on career choice was positive given that 85% reported that they were considering a technology-related career after the event, up from 81% who arrived at the event already considering such a career.

Year Seven

The seventh annual Tech Careers event continued the two-day format and was held in April, 2005. The event was sponsored by Maui County, the U. S. Department of Labor, and the U. S. Department of Agriculture. The event drew participation from 8 local tech employers and 49 students.

Recruitment efforts continued to all Maui high schools, Lanai and Molokai. WIT learned that sophomore turnout was low the previous year because day one of the Tech Careers event had coincided with mandatory standardized testing of 10th graders. In light of the goal of reaching younger students so that they may choose math and science electives while still in high school, WIT scheduled the seventh annual event to avoid this conflict. Attention to this detail paid off in that sophomores represented 30% of total participants this year (up from 12% the previous year). In all, freshmen and sophomores were 57% of the participating students.

[5] Hana High School falls into this category.

In this seventh year of the event, 59% of the students were female, 41% from districts with median family income below $45,000, 51% from districts with median family income of $45,000-$50,000, and 8% from private schools or districts with median family income above $50,000.

Student evaluations reported that the event raised awareness of technology-related jobs in Maui County for 97% of the students and raised awareness of the job demand in technology for 84% of them. The seventh annual event continued the trend of an exceptionally high percentage (94%) of the students arriving at the event already considering a STEM degree and the puzzling drop in this percentage (to 90%) after the event. However, the net impact of the conference on career choice was again positive, with 90% reporting that they were considering a technology-related career after the event, up from 77% who arrived at the event already considering such a career.

After the confusing drop in percentage of students considering a STEM degree at the sixth Tech Careers day, several questions were added to the evaluation to help clarify the impact of the event on students. In response to these, WIT learned that 90% of the students claim the event increased their interest in STEM, 94% of the students consider the event to have led them to think more about continuing their education after high school, 97% believe the event led them to a better understanding of their own goals, and 100% would recommend the event to their friends.

Summary

WIT's "Tech Careers: I Am The Future" program is a proven success on many levels. Year after year it demonstrates productive collaboration between Maui County's technology industry and high school educators, and garners fiscal sponsorship from industry, Maui County and the federal government. Survey results indicate that the experience impacts positively on participating students' awareness of technology employment opportunity and demand locally and their consideration of technology career paths. The program's progress is graphically represented in the following table:

	1999	2000	2001	2002	2003	2004	2005
Females	34%	34%	61%	46%	50%	60%	59%
Median family income below $50k	47%	78%	82%	77%	89%	49%	92%
Increased awareness of tech jobs	n/d	n/d	97%	99%	95%	98%	97%
Increased awareness of demand	n/d	n/d	94%	95%	97%	96%	84%
Arrived considering tech career	n/d	n/d	71%	88%	60%	81%	77%
Left considering tech career	n/d	n/d	94%	100%	82%	85%	90%

n/d = no data

Although the trip to the observatories atop Mount Haleakala cannot be replicated elsewhere, most of what makes this program a success can. WIT was able to increase the numbers of female participants and participants from lower socio-economic districts by conducting in-person outreach to classrooms with follow-up phone calls and emails to teachers and counselors.

The Tech Careers event is essentially public relations for STEM fields. Rather than focusing on teaching, the event is geared toward inspiring students to choose STEM education paths and careers. The successful formula for the event includes a panel of local tech employees (preferably local high school graduates) talking about how they got started in a tech career; morning and afternoon tech-based, hands-on student competitions; and breakout sessions with individual employers where "cool" technologies are demonstrated (preferably with a hands-on element).

References Cited

Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology (2000, Sept.). *Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development (CAWMSET)*, p. 22.