



# NCWIT ACADEMIC ALLIANCE SEED FUND

FUNDING TO INCREASE ENROLLMENT, DIVERSITY, AND VISIBILITY

## 2010 Executive Report

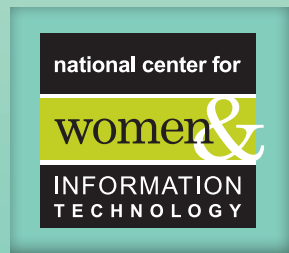


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The NCWIT Academic Alliance Seed Fund provides members of the NCWIT Academic Alliance with funds (up to \$15,000 per project) to develop and implement initiatives for recruiting and retaining women in computer science and information technology fields of study. The Seed Fund was initiated in 2007 with start-up funding from Microsoft Research and to-date has awarded more than \$315,450 in funding.

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## CONGRATULATIONS TO THE ROUND 7 WINNERS OF THE NCWIT ACADEMIC ALLIANCE SEED FUND AWARD!

The five winning projects were selected from a record number of proposals — *double the number of submissions from last year* — and represent a diverse range of schools (public and private, small and large, and minority-serving institutions).

Each winning project will receive a \$10,000 award.



Central Washington University will use a faculty mentoring research experience to recruit and retain more underrepresented students into its Information Technology and Administrative Management major.



Colorado School of Mines will study the effects of a new introductory computer science course on the recruitment and retention of women in the major.



Hunter College will adapt the successful Emerging Scholars Program from Columbia University (a past Seed Fund winner) for use in its own computer science department.



Virginia State University will sponsor a two-week summer outreach program targeted to local high school students, "There's an App for That," to increase the number of women in its undergraduate computer science program.



Wilmington University will use a curriculum in high-level analysis and design concepts — such as computer forensics, human-computer interfaces, media-rich computer applications, and gaming — to recruit more women into its computing program.

[VISIT NCWIT.ORG/SEEDFUND FOR MORE INFO](http://NCWIT.ORG/SEEDFUND)

## BUILDING THE FUTURE IT PIPELINE

Information technology (IT) underpins nearly all economic sectors, from energy, finance, and medicine to entertainment, manufacturing, and retail. It also is a critical driver of global innovation and competitiveness. The U.S. IT infrastructure is growing so rapidly that Department of Labor projections forecast it will outpace nearly every industry in job growth over the next decade.

The technology education pipeline that feeds the U.S. workforce, however, is showing stresses. Lack of support for K-12 computing curricula and declining postsecondary enrollments could yield insufficient computing talent to meet our growing demand; the failure to capitalize on the breadth and diversity of the U.S. population only compounds the potential talent shortage. If the U.S. wants to remain an economic leader in the 21st-century global economy, it must strengthen and diversify its technology workforce and the education pipeline that supports it.



## NCWIT: NATIONAL CENTER FOR WOMEN & INFORMATION TECHNOLOGY

NCWIT is a national coalition of over 200 prominent corporations, academic institutions, government agencies, and non-profits working to strengthen the technology workforce and cultivate innovation by increasing the participation of women. In a global economy, this means a larger and more competitive workforce; in a world dependent on innovation, it means designing technology that is as broad and creative as the population it serves.

NCWIT leverages the work of many distinguished organizations through a national infrastructure of alliances, workshops, research, publications, and evaluation. NCWIT's work connects efforts to increase women's participation in technology along the entire pipeline, from K-12 and higher education through industry, academic, and entrepreneurial careers.

## NCWIT ACADEMIC ALLIANCE



The Academic Alliance (AA) brings together more than 250 distinguished representatives from the computer science and IT departments of colleges across the country spanning research universities, community colleges, women's colleges, and minority-serving institutions. The Academic Alliance is dedicated to gender equity, diversity, and institutional change in higher education. It provides feedback on NCWIT programs, contributes and adapts effective practices, and serves as a national agent of change. It meets several times per year to compare approaches and provide guidance and mutual support.

Membership in the AA is free for participating academic institutions and brings many benefits. AA members have access to leading-edge promising practices for recruiting and retaining women, free assessment of their department's undergraduate programs through NCWIT Extension Services, opportunities to attend workshops and compare practices with other institutions, the ability to advertise programs, achievements, and faculty openings at the NCWIT website, and participation in NCWIT marketing and branding campaigns.



## NCWIT ACADEMIC ALLIANCE SEED FUND

The NCWIT Academic Alliance Seed Fund provides U.S. academic institutions with funds (up to \$15,000 per project) to develop and implement initiatives for recruiting and retaining women in computer science and information technology fields of study. The Seed Fund was initiated in 2007 with funding from Microsoft Research and to-date has awarded \$315,450 in funds.

There are currently 19 Seed Fund programs underway. Seed Fund programs are selected for their ability to apply promising practices (for recruiting women into and retaining women in computing higher education) in the context of discrete departmental environments, pilot new approaches to recruitment and retention, and track and evaluate their results; as well as for coverage of the five focus areas.

The five focus areas of the Seed Fund:

- 1 Recruiting via near-peer mentoring
- 2 Experimenting with K-12 outreach models
- 3 Targeting cultural barriers
- 4 Changing the Image of IT for vital audiences
- 5 Engaging girls and women through socially relevant projects

Seed Fund programs also have the ability to identify new promising practices that can be shared and disseminated with other AA members and the public. Priority is given to programs that have firm commitment for sustaining funds, a priori, assuming that the program's evaluation deems it a success. The AA uses a peer review process for awarding seed funding, convening a selection committee of alliance members to review applications. Appendix A provides a short description of each Seed Fund program and identifies the diversity and breath of approaches these programs are applying; appendix E lists the programs that were awarded in each round.

Seed Fund programs also reinforce and leverage the approach that NCWIT is taking with respect to institutional reform: the establishment of self-governed alliances, accountability to a community of peers, measurement, practices based on evidence, and sustainability. NCWIT takes evaluation very seriously and requires an evaluation plan, reviewed by NCWIT Research Scientists, for each project. Award recipients work with NCWIT to report their progress and to document their program material for dissemination by NCWIT.



The Artemis Project is a free, five-week summer day camp for rising 9th-grade girls in the Providence area that teaches computer skills, programming, and computer science concepts through engaging activities, thereby encouraging young women to join the field of computer science. The Artemis Project is coordinated by undergraduate women from Brown University in connection with Brown's Computer Science Department.

During the first week of the camp, we worked with the girls to teach them about a few Adobe design products, such as Photoshop and Illustrator. In the second week, we helped the girls design and build their own web pages. This week we've been working with the girls to learn Java. They will be using Java to code their very own Tic-Tac-Toe games. They will also be using Java to program the new Finch robots that we are introducing this year. Besides our work in the computer lab, we also have classroom activities covering a wide range of topics that are essential for all computer scientists to know. We taught the girls about binary numbers and Boolean logic, some graph theory, and some computational linguistics.

At the Artemis Project, the girls get along well and have had their own bonding experiences. The coordinators are developing friendships with the girls and the mentoring experience has proven rewarding for both the undergraduate coordinators and the high-school girls.

*Amy Greenwald, Associate Professor of Computer Science, Round 6 Winner, Brown University*



## IMPACT OF THE NCWIT SEED FUND

With 19 winning programs now in progress, the Seed Fund is beginning to provide valuable feedback to NCWIT about results and successes. Results to-date suggest Seed Fund programs have touched more than 280 schools, 8,900 high school students, 510 undergraduates, 28 graduate students, and 500 parents. Racial/Ethnic minority breakdowns ranged from 20%-97% of populations served, and gender breakdowns ranged from 15% female to 100%. Other highlights follow:

- ❖ Several Fund recipients found that while girls are very interested in computers and technology, many are surprisingly uncomfortable with computers and lack confidence in their abilities. Exposure makes the difference. The University of Pennsylvania reported that “when high school girls are exposed to what computer scientists really do and the opportunities available in computer science, they become very interested in the discipline.” Waukesha County Technical College reported similar findings and highlighted the importance of continuing to pique girls’ interest in computing in order to encourage them to pursue STEM careers.
- ❖ Guidance counselors and teachers are eager to learn more about computer science and how they can encourage their students to pursue CS. Virginia Tech’s annual summer workshop series for K-12 computing teachers was well received by its participants, who on average gave the program a 5.5 out of 6 rating. Teachers reported learning skills they can use in the classroom, rated the workshop positively compared with other workshops they had attended, and stated they would recommend the program to others. Further, they left feeling a part of a community of CS educators and positively about Virginia Tech for their students.
- ❖ Parents are an important audience for the Seed Fund, as students often look to their parents for decisions about college, potential majors, etc. The University of Texas Austin reported that in addition to regular student attendance at Breakfast Bytes, their Saturday morning CS Club, parents have become highly engaged as well, choosing to stay for the duration of the program. Recognizing the importance of parental involvement, the University of Nebraska Lincoln plans to enhance their program by strengthening ties with parents.
- ❖ Another important target of the Seed Fund program is undergraduate students at the introductory level. Seed Fund programs provide a valuable introduction to students who are undecided on their major. Columbia’s Emerging Scholars program was surprised to find that students quickly asked for more challenging problems, and report that 45% of participants declared CS as their major following completion of the program.
- ❖ Faculty members are also impacted by the Seed Fund programs. Faculty at Oregon State report becoming more aware of the importance of engaging students early, and how engineering and CS benefit society and improve lives—concepts OSU stresses in recruiting presentations. Faculty interest has been so high that they have instituted a brown bag lunch series to discuss first-year issues.

The popularity of the Seed Fund also has been a valuable recruiting tool for the NCWIT Academic Alliance. In the four years that the Seed Fund has been underway, the Academic Alliance has grown from 55 to over 250 member institutions. NCWIT publishes a press release for each round of awards which is picked up by major wire services, online news aggregators, and popular higher-education publications. A number of new AA members contacted NCWIT as a result of publicity relating to the Seed Fund. Participation in the Seed Fund review committee is an important tool for educating our members on NCWIT promising practices and innovative new ideas. Likewise, the number of AA member institutions submitting proposals has increased since inception.

An NCWIT goal is the widespread application of promising practices, and these Seed Fund programs feed directly into NCWIT’s ability to test and document such practices. Appendix B provides a view of NCWIT practices consulted and/or used by winning programs, as well as a description of new, potential practices that each program is testing.

Seed Fund award recipients must develop a plan to obtain sustainable funding for continuing successful projects and not depend upon Microsoft Research to support the program on an ongoing basis. Among the 19 recipients that completed an evaluation survey, 6 have institutionalized their successful programs. This is an outstanding result, given the experimental nature of many of these programs and the financially challenging environment most of them operate within. Award recipients also commit to advertising their awards with acknowledgement to Microsoft Research. Appendices C and D summarize the programs’ sustainability and evaluation plans.



## HOPES FOR THE FUTURE

As the Academic Alliance Seed Fund grows, NCWIT has an opportunity to guide proposals toward specific types of programs that have proved successful. For instance, one round might focus on revising curriculum or replication of evidence-based practices. Through evaluation questions asked of all Fund recipients, we are able to learn from programmatic missteps along with recipients. For instance, one recipient found that including young male mentors had a positive effect on recruitment of high-school girls. Another found that they needed to do more front-end teacher training to ensure an effective program. Additionally, innovative new ideas for programs will be tested by the Seed Fund program as possible new promising practices.

The AA is actively recruiting community colleges, minority-serving institutions and technical colleges. Likewise, the number of AA member institutions submitting proposals has increased since inception. The Seed Fund provides a valuable opportunity for these schools to implement effective programs and provide practices for recruiting women of diverse backgrounds.

The Seed Fund is a successful NCWIT initiative and an excellent way to grow the membership of the Academic Alliance. With the continued support of Microsoft Research, these important programs can strengthen our nation's technology education pipeline and computing workforce.



The Emerging Scholars Program (ESP) at Columbia University is a peer-led workshop designed to encourage talented students to stay in the CS major after introductory classes. The goal of ESP is to show students that CS is necessarily a collaborative activity and that it involves much more than just programming. ESP's target audience includes students enrolled in Introduction to Computer Science classes who have not yet declared a major, but are contemplating CS. Fifty-seven students have completed ESP in nine different sections since its founding in 2008. Of those students who have participated in ESP and declared majors, 45% of them have declared CS. One ESP participant has gone on to win the Anita Borg Memorial Scholarship, and two ESP assistants have gone on to receive CRA-W summer research positions. One ESP peer leader now works fulltime at Microsoft. ESP receives consistently positive student feedback. ESP student Diana Cimino explained: "Through the varied workshops, I was exposed to interesting people and ideas, realizing the breadth of an entirely fascinating subject in which I had no previous experience." The majority of students rated their peer leaders as "fantastic" and would "definitely" recommend ESP to other students.

*Joshua Gordon, PhD student in computer science, Round 3 Winner, Columbia University*

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## APPENDIX A: NCWIT SEED FUND PROGRAMS BY CATEGORY

### RECRUITING VIA NEAR-PEER MENTORING

Oregon State University	<i>Students Recruiting Students to CS</i> High school recruitment program
University of Nebraska Lincoln	<i>Girl Empowerment Mentoring</i> Statewide high school writing program with big-sister mentors

### EXPERIMENTING WITH A VARIETY OF K-12 OUTREACH MODELS

Brown University	<i>Extending, Expanding, and Evaluating the Artemis Project</i> Brown University will use its award to extend the Artemis Project (a summer day camp for 9th grade girls, run by undergraduate women from Brown University, that encourages confidence and interest in a computing career) to create community-use projects and reach students in the greater Boston area.
Indiana University	<i>Just Be: Making IT Real</i> Team-based activities for high schools using computing concepts in a roadshow format
SUNY at Albany	<i>Social Robotics Outreach</i> SUNY at Albany's Social Robotics Outreach will use the context of social robotics to deploy hands-on workshops that teach K-12 girls fundamental problem-solving and programming skills, while exposing them to software and hardware platforms that bridge the high school and college levels.
University of Pennsylvania	<i>Outreach and Mentoring to High-school Girls</i> Game design and summer camps engage high schools to encourage interest in computing
University of Pennsylvania	<i>Multiple Paths to Outreach</i> A day on campus for guidance counselors and teachers to hear from faculty and students about the different applications of computer science and ways they might integrate computer science problem solving into their curriculum
University of Texas Austin	<i>Breakfast Bytes</i> Saturday morning CS club for middle and high school students
Virginia Polytechnic Institute	<i>Professional Development and Networking Workshop for High School Teachers of Computer Science</i> Virginia Tech's professional development program will sponsor a series of annual summer workshops, in coordination with the Computer Science Teachers Association, that provide local K-12 computing teachers with the tools and curricula to strengthen the pipeline of women and minority computing students.



## TARGETING CULTURAL BARRIERS

Colorado Coalition for Gender and Information Technology	<i>Inspiring Ambition</i> DVD to recruit from community colleges into four-year CS and IT programs
Columbia University	<i>Emerging Scholars Program</i> Encourages active discussion of CS topics in a positive, relaxed and open environment
Towson University	<i>Multi-Level Mentoring</i> Student mentor program using peer-led team learning
University of California Irvine	<i>Encouraging Inclusion through Creativity in IT Education for Latina Youth</i> Innovative workshops for girls serving a primarily low SES Latina population
University of Texas Pan-American	<i>Dancing Robots Introduction to Computer Science</i> Course redesign for Introductory Computer Science Concepts to use the LEGO based Mindstorms robotics kit

## RECRUITING VIA NEAR-PEER MENTORING

DePauw University	<i>Leveling the CS1 Playing Field</i> Engages first-year women students through role modeling
Purdue University	<i>Are You Smarter Than Your 5th Grader?</i> Engages an influential layer — parents — with Pair Programming
Waukesha County Technical College	<i>I Can Do IT</i> Roadshow experience for younger students in partnership with Southeastern Wisconsin Girl Scouts of America.

## ENGAGING GIRLS AND WOMEN THROUGH SOCIALLY RELEVANT PROJECTS

Claremont University	<i>An Interdisciplinary Approach to Increase Interest in IT</i> Engages female and underrepresented groups through teamwork and problem-based learning in environmental projects
Rochester Institute of Technology	<i>Golisano Scholars, Kids on Campus</i> Residential summer program providing a collaborative environment



Our goal with the “Professional Development and Networking Workshop for High School Teachers of Computer Science” program is to work together with high school educators to explore innovative approaches to teaching computing, and to identify priorities, opportunities, difficulties, and resources needed to rethink computing education. We want to foster the creation of a community of creative and innovative high school educators that can partner with us to explore new ways to teach computing.

Participants rated the workshop highly in comparison with other workshops they had attended and were satisfied having learned skills that they can use in their teaching. We have plans to do another workshop next summer when we hope to have a larger group of teachers and go into more depth.

*Dr. Manuel Perez-Quinones, Associate Professor, Round 6 Winner, Virginia Tech*



## APPENDIX B: NCWIT PRACTICES AND SEED FUND PROGRAMS

PROGRAM/ INSTITUTION	NCWIT PRACTICES IDENTIFIED IN PROPOSAL	POTENTIAL NEW PRACTICE COMPONENTS OR CASE STUDIES*
Brown University	<ul style="list-style-type: none"> <li>✦ Peer mentoring</li> <li>✦ Collaborative learning</li> <li>✦ Targeted recruiting</li> <li>✦ Hands- on and active learning</li> </ul>	<ul style="list-style-type: none"> <li>✦ Effects of a girl-only 5-week summer program</li> <li>✦ Socially relevant artifact creation</li> </ul>
CCGIT	<ul style="list-style-type: none"> <li>✦ Intentional role modeling</li> <li>✦ Targeted recruiting</li> </ul>	<ul style="list-style-type: none"> <li>✦ Regionally-specific recruitment DVDs</li> <li>✦ Using video-taped role models to change attitudes toward computing</li> </ul>
Claremont Graduate University	<ul style="list-style-type: none"> <li>✦ Intentional role modeling</li> <li>✦ Mentoring</li> <li>✦ Peer-led team learning</li> <li>✦ Socially relevant projects</li> </ul>	<ul style="list-style-type: none"> <li>✦ Full-day workshops to disseminate best practices for recruiting girls into IT</li> <li>✦ Involvement of local champion(s)</li> <li>✦ Collaboration with existing organizations /institutions</li> </ul>
Columbia University	<ul style="list-style-type: none"> <li>✦ Peer-led team learning</li> </ul>	<ul style="list-style-type: none"> <li>✦ Peer-led, female-only workshops for CS1 students on collaborative problem-solving and algorithmic thinking</li> </ul>
DePauw University	<ul style="list-style-type: none"> <li>✦ Targeted recruiting</li> <li>✦ Role modeling</li> <li>✦ Dispelling myths about computing</li> <li>✦ Showcasing a broad variety of computing careers and lifestyles in computing</li> <li>✦ Providing information about CS1 (at a critical juncture) and confidence in CS1 ability</li> </ul>	<ul style="list-style-type: none"> <li>✦ Recruitment DVD</li> <li>✦ Using video-taped role models to change attitudes toward computing</li> </ul>
Indiana University	<ul style="list-style-type: none"> <li>✦ Intro to Computing using CS Unplugged</li> </ul>	<ul style="list-style-type: none"> <li>✦ Technology Day at the university for high school students</li> </ul>
Oregon State University	<ul style="list-style-type: none"> <li>✦ Intro to Computing by meeting target audience "where they are"</li> <li>✦ Socially relevant projects</li> <li>✦ Outreach-in-a-Box</li> <li>✦ Roadshow-in-a-Box</li> </ul>	<ul style="list-style-type: none"> <li>✦ CS student ambassadors from university to high schools</li> </ul>
Purdue University	<ul style="list-style-type: none"> <li>✦ Intro to Computing using CS Unplugged</li> <li>✦ Intro to Computing using Alice</li> <li>✦ Pair Programming</li> </ul>	<ul style="list-style-type: none"> <li>✦ Parent engagement</li> </ul>
Rochester Institute of Technology	<ul style="list-style-type: none"> <li>✦ Project-based interactive learning</li> </ul>	<ul style="list-style-type: none"> <li>✦ Virtual participatory theater; game design</li> <li>✦ Residential program for high school students at university</li> </ul>

\*Subject to evaluation results



PROGRAM/ INSTITUTION	NCWIT PRACTICES IDENTIFIED IN PROPOSAL	POTENTIAL NEW PRACTICE COMPONENTS OR CASE STUDIES*
SUNY at Albany	<ul style="list-style-type: none"> <li>Scalable Game Design</li> </ul>	<ul style="list-style-type: none"> <li>Use of Social Robotics to engage K-12 students</li> </ul>
Towson University	<ul style="list-style-type: none"> <li>Intentional role modeling</li> <li>Peer-led team learning</li> <li>Mentoring</li> <li>Research opportunities for undergraduates</li> </ul>	
University of California Irvine	<ul style="list-style-type: none"> <li>Intro to Computing using Scratch</li> <li>Intro to Computing using Legos®</li> <li>Creating inclusive classrooms and discussion and activity-oriented curricula</li> <li>Collaborative learning</li> <li>Peer-led team learning</li> <li>Mentoring</li> <li>Intro to Computing by meeting target audience "where they are"</li> <li>Talking Points</li> </ul>	<ul style="list-style-type: none"> <li>Summer camp computing curriculum</li> </ul>
University of Nebraska Lincoln	<ul style="list-style-type: none"> <li>Role model mentoring</li> <li>Peer-led team learning</li> <li>Intro to Computing using Storytelling</li> <li>By the Numbers</li> </ul>	<ul style="list-style-type: none"> <li>Integration of writing with computing</li> <li>Reinventing CS Curriculum</li> <li>CSE Day at the university for high schools</li> </ul>
University of Pennsylvania	<ul style="list-style-type: none"> <li>Setting up a recruitment framework for focusing an institution's efforts and planning beyond a specific event and developing a strategic recruiting plan, which can be implemented and evaluated each year</li> </ul>	<ul style="list-style-type: none"> <li>Women in CS Day at the university</li> <li>Comprehensive, multi-pronged outreach program for high school girls</li> </ul>
University of Pennsylvania	<ul style="list-style-type: none"> <li>Targeted recruiting</li> <li>Talking Points</li> </ul>	<ul style="list-style-type: none"> <li>Day-long workshop for Guidance Counselors and Teachers Collaboration with existing organizations/institutions</li> </ul>
University of Texas Austin	<ul style="list-style-type: none"> <li>Intro to Computing using CS Unplugged</li> <li>Intro to Computing using Legos®</li> </ul>	<ul style="list-style-type: none"> <li>Weekend CS club for middle and high school students</li> <li>Roadshow for middle and high school students</li> <li>Collaboration with existing organizations /institutions</li> </ul>
University of Texas Pan-American	<ul style="list-style-type: none"> <li>Intro to Computing using Legos®</li> <li>Peer mentoring</li> <li>Project-based interactive learning</li> <li>Socially relevant projects</li> </ul>	<ul style="list-style-type: none"> <li>Pre-introduction to computing course for first-generation university students</li> <li>Outreach into Hispanic population</li> </ul>

\*Subject to evaluation results



PROGRAM/ INSTITUTION	NCWIT PRACTICES IDENTIFIED IN PROPOSAL	POTENTIAL NEW PRACTICE COMPONENTS OR CASE STUDIES*
Virginia Polytechnic Institute	<ul style="list-style-type: none"> <li>✦ Unlocking the Clubhouse: Women in Computing</li> <li>✦ Better Approaches to Well Intentioned but Harmful Messages</li> <li>✦ Talking Points: Why should a Women Consider a Career in Information Technology</li> </ul>	<ul style="list-style-type: none"> <li>✦ Summer workshops for high-school teachers focused on recruitment</li> <li>✦ Summer workshops for high-school teachers focused on creativity and expression in CS</li> </ul>
Waukesha County Technical College	<ul style="list-style-type: none"> <li>✦ Intro to Computing using Alice</li> <li>✦ Intro to Computing using AgentSheets</li> <li>✦ Targeted recruiting</li> </ul>	<ul style="list-style-type: none"> <li>✦ Mobile, hands-on technology activities for rural girls</li> <li>✦ Collaboration with existing organizations /institutions</li> </ul>

\*Subject to evaluation results



Computer Science I (CS1) is the first class that incoming students take at DePauw University, creating a key opportunity to recruit female computer science (CS) majors. Our NCWIT Academic Alliance Seed Fund project, “Leveling the CS1 Playing Field,” allowed us to take the project to a new level. We created a DVD the first year of the project that includes short scenes from an actual CS1 classroom, a brief interview with a computer science major, and text overlays with information such as starting salaries for computer science majors. During the second year of the project, we mailed the DVD and a letter to one-third of the first-year women and sent email with a link to the DVD to another one-third. We also began surveying these two target groups and a control group, along with the students in the CS1 classes.

Through the generous funding from Microsoft Research, we will continue the project for several more years, until we have sufficient data collected for appropriate analysis. Thanks to our friends at Microsoft Research and NCWIT!

*Dr. Gloria Townsend, Professor of Computer Science, Round 1 Winner, DePauw University*



The Department of Computer Science at the University of Pennsylvania, with the support of NCWIT and Microsoft Research, began Women in Computer Science (WICS) High School Day to introduce girls to computer science and to get them excited about the field. In order to expand our outreach programs, we offered the first “Teacher and Guidance Counselor Day to Encourage Women in Computer Science.”

We talked to them about how guidance counselors and teachers can help encourage girls to study computer science, what skills/knowledge will best prepare students for success in computer science, and what a college curriculum in computer science entails. A high note of the day for this group was a lunchtime panel of students, who spoke about what it is like to be a (female) college student in computer science and what was helpful to them from their high school preparations. When asked to evaluate the day, one participant said, “the energy and the positive attitude of hope that the faculty, students, alums and participants expressed was invaluable for me.” All of the participants indicated that such a program should be offered again in the future.

*Michele Grab, Director, Advancing Women in Engineering Program, Round 5 Winner, University of Pennsylvania*



## APPENDIX C: SEED FUND PROGRAM SUSTAINABILITY PLANS

PROGRAM/INSTITUTIONS	SUSTAINABILITY PLANS
Brown University	Deemed crucial to long-term sustainability, the Artemis project intends to secure funding to undertake a longitudinal study to assess the impact of the project. Proven success will guarantee continued institutional commitment and facilitate future fundraising efforts.
CCGIT	Channels for its dissemination are already in place (admissions, recruiting, advising, and career counseling; regional road show). The DVD itself provides the sustainability for statewide recruiting at all levels of P-20 education and, in the case of workforce development centers, beyond.
Claremont Graduate University	Because it was successful, this program will be integrated into the Learning Communities project. Changes made during the pilot will become permanent.
Columbia University	Institutional support and other funding has kept this program going.
DePauw University	Using departmental supplied resources and work/study students, this program is completely sustainable. At the conclusion of the grant period, we will seek industry funding to obtain the \$100, \$1000 or \$2000 per academic year needed (to produce additional DVDs). Orientation sessions are conducted without monetary.
Indiana University	Builds on an existing successful program. The School of Informatics at Indiana commits to continuing financial support of the Just Be program.
Oregon State University	Builds on the existing successful COE Ambassadors program, now in its second year. Has been institutionalized with support from the college.
Purdue University	The department has committed to the necessary resources. It also promises that "once the program is established and successful, the department will continue to run it as long as it is effective."
Rochester Institute of Technology	This program will be modeled after the existing RIT College of Science Scholars program, now completing its second year and showing direct measurable enrollment benefits. As part of this effort, NCWIT funding will allow GCCIS to support four women scholars in a pilot year as ongoing funding sources are sought.
SUNY at Albany	The SRCCR consortium is already writing the follow up proposal for the existing CPATH award. This will further advance their work with undergraduate and graduate students. However, they are seeking to also expand further, with NSF backing, into K-12 education, and will write a proposal to the broadening participation area of NSF awards. This seed funding will enable them to establish traction, in conjunction with their current CPATH award, in this area. SUNY expects that this will become a separate, fully funded branch of their current social robotics effort.



PROGRAM/INSTITUTIONS	SUSTAINABILITY PLANS
Towson University	Towson is committed to working with partners to ensure the project's success and advocate as needed. Student mentors will be supported by faculty: female faculty members in the department of Computer and Information Sciences will each be assigned two mentors. Faculty will help mentors develop materials for tutoring sessions and provide role models for mentors. Faculty participants will also provide mentors with opportunities to get involved in their research. Finally, all women in both CS and CIS – including those not otherwise involved in this program- will be assigned a female advisor from the ranks of the tenure-track faculty.
University of California Irvine	The work has continued with grants support and other funding, and still has strong departmental and Girls Inc support.
University of Nebraska Lincoln	The department has supported similar efforts in the past. The department also promises strong future support through scholarships for students and long-term funding for the program.
University of Pennsylvania	Departmental funds will support the project in subsequent years. The faculty, staff and WICS students in the CS department at Penn will increase the reach of our mentoring efforts by building on the success of this outreach pilot event.
University of Pennsylvania	Seed money will allow development of materials such as brochures, resources and a website that can sustain the program beyond the life of the grant. Director of Advancing Women in Engineering program will coordinate implementation and continuation.
University of Texas Austin	Very strong institutional support. The department provides continuing funding from its own budget because of the pilot's success.
University of Texas Pan-American	Program will sustain itself by training new and existing students and supplementing expenses with student fees, equipment stipends, and departmental operating funds.
Virginia Polytechnic Institute	The Department of Computer Science will seek funding from two University sources to support the workshops after the first two years: (i) funding from the Diversity Committee of the College of Engineering for incoming student recruitment, and (ii) funding from individual members of the CSRC. Longer term, the department will work with the School of Education at Virginia Tech to obtain professional development certification for the workshop, in order to make attendance more appealing to high school personnel, and to motivate them to (partially) fund their own participation.
Waukesha County Technical College	WCTC will continue to offer the RoadShows to the SE Wisconsin Girl Scouts and has plans to expand the concept to other local groups. WCTC is committed to utilizing departmental resources to maintain the RoadShow activities along with donation of time and experience of faculty and students. A steering committee will be formed to monitor progress and success and make suggestions for future enhancements to the program.



## APPENDIX D: SEED FUND PROGRAM EVALUATION PLANS

PROGRAM/INSTITUTIONS	EVALUATION PLAN (SUMMARIZED FROM PROPOSAL)
Brown University	<ol style="list-style-type: none"> <li>1. Post surveys for participants.</li> <li>2. Longitudinal study by conducting surveys and interviews with former participants and, coordinators to assess the impact on the following: course selection, extracurricular activities, academic performance in STEM-related courses, post-secondary and post-graduate educational choice(s), and perception and interest in computing generally.</li> </ol>
CCGIT	<ol style="list-style-type: none"> <li>1. Pilot assessment before the final version of the DVD is created.</li> <li>2. Pre/post surveys for high school students and community college students.</li> <li>3. Pre/post surveys for local diverse IT employees comparing reactions to CCGIT DVD vs. Pathways DVD from the University of Washington.</li> <li>4. Track where the DVD is shown, which institutions request copies, the number of potential students that view DVD.</li> </ol>
Claremont Graduate University	<ol style="list-style-type: none"> <li>1. Track high school students' academic knowledge of IT before and after the project.</li> <li>2. Track enrollment in AP Computer Science course at CHS, specifically among females.</li> <li>3. Conduct pre and post surveys of students focusing on interest and preferences in educational and career opportunities in IT related fields.</li> <li>4. Collect quantitative and qualitative feedback from the students on their experience in relation to the project as well as the mentors.</li> <li>5. Will work with NCWIT to reuse and align measurement tools as much as possible with ongoing projects for increased comparability.</li> <li>6. Interview teachers and mentors to evaluate program effectiveness and identify best practices for implementation in future projects.</li> </ol>
Columbia University	<ol style="list-style-type: none"> <li>1. Continuation of a pre-established pilot program that had evaluation data; will continue monitoring students from pilot group.</li> <li>2. Pre/post workshop surveys to students (attitudes towards CS, future major intentions).</li> <li>3. May compare academic performance of students in ESP to those not in ESP.</li> <li>4. Continue monitoring the students from the pilot group.</li> <li>5. Track the percentage of female majors over the next few years relative to past years and performance of female majors over next few years versus performance of past female majors.</li> </ol>
DePauw University	<ol style="list-style-type: none"> <li>1. Build on database of 120 control group subjects and 116 treatments (with paper mailings only) by including a new treatment group (DVD mailings only).</li> <li>2. Online survey, interviews and focus groups (determine the value of DVD intervention).</li> </ol>
Indiana University	<ol style="list-style-type: none"> <li>1. Undergraduate students are graded on activities with several groups of high school students.</li> <li>2. IU Technology Day presentations evaluated by IU Education students through pre-, post-, and 6 month post- surveys, focus groups and interviews with children and teachers.</li> <li>3. Technology day evaluation will provide formative feedback about promising activities.</li> <li>4. Data analyzed by a graduate students in School of Education (impact on dispelling stereotypes and increasing students' interest in technology careers).</li> <li>5. Assessment to compare program with and without hands-on activities (assess student engagement).</li> </ol>



PROGRAM/INSTITUTIONS	EVALUATION PLAN (SUMMARIZED FROM PROPOSAL)
Oregon State University	<ol style="list-style-type: none"> <li>1. Formative evaluation throughout the year.</li> <li>2. School Presentations: Teachers rate presenter’s performance and style, presentation content and answer open-ended questions.</li> <li>3. Student Ambassadors complete a reflection form.</li> <li>4. Track all schools and teachers visited, students requesting more CS information, students who apply to CS department, especially number, gender, and ethnicity of applicants from targeted high schools.</li> <li>5. Track numbers of incoming students in CS and EE.</li> </ol>
Purdue University	<ol style="list-style-type: none"> <li>1. Pre/post attitudinal survey to both the parents and children at beginning and end of workshop (pre-survey - prior knowledge of and interest in robotics, programming, and CS concepts; post-survey - change of knowledge and interest).</li> </ol>
Rochester Institute of Technology	<ol style="list-style-type: none"> <li>1. Pre/post surveys of students and parents (attraction to computing).</li> <li>2. Track students (attitudes to technology, college and career choices).</li> </ol>
SUNY at Albany	<ol style="list-style-type: none"> <li>1. Evaluate workshop participants( changes in perceptions of technology and computing as a result of the exercises to determine the lasting effects of these changes).</li> <li>2. Track participation of these groups in area events (such as Robothon and Lego League) to gauge increased interest in Science and Technology.</li> </ol>
Towson University	<ol style="list-style-type: none"> <li>1. Mentees – pre/post surveys at beginning and end of semester surveys (attitudes towards computing, interest in pursuing computing as a major, responses to the mentoring, and mastery of material); comparisons with mentored females, non-mentored females, non-mentored males will be included in analysis.</li> <li>2. Enrollment data tracking number of students and grades of students in introductory sequence.</li> <li>3. Mentors – Surveys at the end of each semester; project-wide focus group (successes and opportunities for improvement), grades and progress towards degree.</li> <li>4. Whenever possible, existing assessment instruments such as NCWIT’s “Student Experience of the Major” Box will be used.</li> <li>5. Track both sets of students through subsequent semesters and through graduation.</li> <li>6. Track to see if original mentees become mentors.</li> </ol>
University of California Irvine	<ol style="list-style-type: none"> <li>1. Pre/post questionnaire for girls on the first and last days of summer camp as well as in the fall following the camp.</li> <li>2. For school-year workshops — pre/post questionnaire at the beginning of the day and at the end as well as two months following (attitudes about computing, interest in attending college, and interest in pursuing a technical major in college).</li> <li>3. Semi-structured interviews with these same girls (how and why their attitudes do or do not change over time and exposure in the camp and workshops).</li> <li>4. After each summer camp, track students who attended (graduation rates, college attendance, and enrollment in technical majors).</li> <li>5. Interview undergraduate students (how being camp counselor or workshop assistant impacted them — commitment to the program, commitment to the major, feelings about diversity in computing, and plans for their future careers).</li> </ol>
University of Nebraska Lincoln	<ol style="list-style-type: none"> <li>1. Pre/post survey of girls (CS knowledge).</li> <li>2. Qualitative survey of girls (motivation, self-efficacy, interest).</li> <li>3. Quantitative and qualitative evaluation of writing projects.</li> <li>4. Number of female students enrolling in CSE or majoring in CS related areas.</li> <li>5. Track number of girl-created learning objects adopted by schools.</li> </ol>



PROGRAM/INSTITUTIONS	EVALUATION PLAN (SUMMARIZED FROM PROPOSAL)
University of Pennsylvania	<ol style="list-style-type: none"> <li>1. End of day workshop evaluation.</li> <li>2. Two follow-up online surveys to gauge student interest in pursuing CS.</li> <li>3. Tracking student choice of major.</li> </ol>
University of Pennsylvania	<ol style="list-style-type: none"> <li>1. Pre and post surveys for counselors and teachers using pre-existing AWE tools (CS knowledge).</li> <li>2. Number of girls attending who were invited by counselors and teachers.</li> </ol>
University of Texas Austin	<ol style="list-style-type: none"> <li>1. Pre/Post survey at 1st workshop and at end of year (CS knowledge and experience).</li> <li>2. After each workshop, participants will evaluate the activities and the speaker. (Formative data will be used for continual improvements).</li> <li>3. Track all student participants (enrollment at UT and in CS department)</li> <li>4. Collect student demographics.</li> </ol>
University of Texas Pan-American	<ol style="list-style-type: none"> <li>1. Pre/Post surveys for participants (perceptions of CS, previous experience in computing, knowledge in computing).</li> <li>2. Tracking subsequent course enrollment and grades.</li> <li>3. Comparison of data between cohort in Pre-intro course and other Intro to Computing Courses.</li> </ol>
Virginia Polytechnic Institute	<ol style="list-style-type: none"> <li>1. Modify and employ assessment instruments developed by NCWIT measure the effectiveness of workshops.</li> <li>2. Develop longitudinal questionnaires for participants to measure longer term effects of putting workshop knowledge into practice.</li> <li>3. Calculate the following baseline and ongoing metrics to measure the range of outreach achieved by 2 years of workshops: number of teacher/counselor participants, number and demographics of high school students in their classes, number of visitors to the website for teacher idea exchange, etc.</li> <li>4. Consider the practicality of gathering the teachers (physically or virtually in a conference call or Skype conference) for a Saturday debriefing/exchange in the Spring after each workshop.</li> </ol>
Waukesha County Technical College	<ol style="list-style-type: none"> <li>1. Pre/post surveys for course students (interest in technology, "coolness" factor).</li> </ol>



The Girl Empowerment and Mentoring for Computing (GEM) project here at the University of Nebraska, Lincoln (UNL) is designed to inspire middle- and high-school girls to study computing at the college level. These girls enter the GEM contest by submitting a design for the use of computing in the "real world"; women students from the UNL Computer Science and Engineering (CSE) department act as big sister "mentors", and CSE faculty act as contest judges. The winning team members are eligible for scholarships to study computing at UNL.

Based on our introduction and exit surveys, we observed some interesting and encouraging results. Overall, more than half of students who completed both surveys reported improved views towards computer science. Participants also reported specifically increased confidence in their CS knowledge and abilities and interests in majoring in CS. They also reported that it does not make sense that there are more men than women in computer science.

*Leen-Kiat Soh, Principal Investigator of GEM and Associate Professor of Computer Science and Engineering, Round 2 Winner, University of Nebraska at Lincoln*



## APPENDIX E: THE SEED FUND PROJECTS BY ROUND

ROUND 1 JULY 2007	CCGIT	\$10,000	<i>Inspiring AmbITion</i>	Develop and disseminate a DVD to recruit women, non-traditional age groups, and underrepresented minorities from community colleges into four-year computing and IT programs.
	DePauw	\$10,000	<i>Leveling the CS1 Playing Field</i>	Engage first-year women students through role modeling, dispelling myths about computing, and showcasing a broad variety of computing careers and lifestyles in computing.
	Oregon State University	\$15,000	<i>Students Recruiting Students to Computer Science</i>	Leverages its highly successful "Ambassadors in Engineering" program as the model for a new student-to-student recruitment initiative focused on attracting college-bound high school students to computing studies.
	University of Pennsylvania	\$10,450	<i>CS Outreach Program to High School Girls</i>	Outreach to high school girls on a national level and culminate in a March 2008 conference. The initiative's goal is to target students from 2,500 high schools nationwide, and encourage their interest in computing.

ROUND 2 JANUARY 2008	Indiana University	\$15,000	<i>Just Be, Making IT Real</i>	Development and evaluation of three to five team-based activities for high school students, incorporating basic computing concepts using sensors, robots, pervasive computing concepts.
	Rochester Institute of Technology	\$15,000	<i>Golisano Scholars, Kids on Campus</i>	Extend MUPPETS and Virtual Participatory Theatre to HS students in grades 10-12 and also create Golisano Scholars program.
	University of Nebraska Lincoln	\$15,000	<i>Girl Empowerment Mentoring</i>	Establish a comprehensive statewide writing program and contest that includes UNL women CS students as big sister mentors to HS students.
	University of Texas	\$10,000	<i>Breakfast Bytes</i>	Breakfast Bytes, a Saturday Morning CS club to provide a continuous outlet for engaging middle/high school students, encouraging them to take HS CS classes.



ROUND 3 JULY 2008	Columbia University	\$15,000	<b>Emerging Scholars Program</b>	Seeks to increase the enrollment of female students in CS courses beyond CS1, and ultimately to increase the number of female CS majors, by creating a program that encourages active participation and discussion of CS-related topics in a more positive, relaxed and open environment.
	Purdue University	\$15,000	<b>Are You Smarter Than Your 5th Grader?</b>	Proposal to engage another influential layer, parents, with Pair Programming via 6 Workshops per semester. Open to 24 student/adult pairs and will be offered free of charge.
	Townson University	\$15,000	<b>Multi-Level Mentoring</b>	Proposal to implement a multi-level mentoring model, which will combine elements of both intentional role modeling and peer-led team learning toward the ultimate goal of showing all female undergraduates in our programs pathways to success in computing.

ROUND 4 JANUARY 2009	Claremont Graduate University	\$15,000	<b>An Interdisciplinary Approach to Increase Interest in Information Technology Through an Environmental Project</b>	This project is designed to engage students, especially female and underrepresented groups, through teamwork, problem-based learning, and a socially relevant topic to cultivate an interest in IT. Members of this project will include females acting as intentional role models and mentoring for students and teachers. The proposed two-semester project will have a direct impact on students at Claremont.
	University of California Irvine	\$15,000	<b>Harnessing Hacking: Encouraging Inclusion through Creativity in IT Education for Latina Youth</b>	Innovative workshops for adolescent girls serving a primarily low SES Latina population. We will support the Girls Inc. Eureka! summer camp. Building on experiences with the summer program will create a series of complimentary workshops for both the middle school girls served by Eureka! and high school girls as part of the College Bound effort.



We at the University of California at Irvine Bren School of Information and Computer Sciences have been developing and conducting workshops for introducing girls to digital media through crafts-style physical computing. Through [“Harnessing Hacking: Inspiring Girls to get Creative with Computing”], we are examining the role that ubiquitous and tangible computing education can play in harnessing creative practices to broaden participation in STEM.

Multi-level mentoring includes professors working with college students working with high school students working with middle school girls. We are all there together as a team, figuring things out. Everyone has someone they can learn from and everyone has someone to mentor. In this way, we are able not only to introduce girls to technology but also to reinforce the interest of all teenagers and young adults. Special thanks to Microsoft Research for their support!

*Gillian Hayes, Assistant Professor in Informatics, School of Information and Computer Sciences, University of California at Irvine, Round 4 Winner*



ROUND 5 JULY 2009	University of Pennsylvania	\$15,000	<i>Guidance Counselor and Teacher Computer Science Day</i>	Guidance Counselors and teachers would be invited to campus to spend the day hearing from faculty and students about the different applications of computer science, talking with admissions counselors about what they look for in computer science admittance, and learning ways they might integrate computer science problem solving into their curriculum.
	University of Texas Pan-American	\$15,000	<i>Dancing Robots Introduction to Computer Science</i>	The project will redesign the existing course, CSCI 1360 Introductory Computer Science Concepts to use the LEGO based Mindstorms robotics kit.
	Waukesha County Technical College	\$15,000	<i>I Can Do IT</i>	The I Can Do IT project will allow WCTC to offer a unique Roadshow experience to younger students through continued partnerships with the Southeastern Wisconsin Girl Scouts of America council.

ROUND 6 MARCH 2010	Brown University	\$15,000	<i>Extending, Expanding, and Evaluating the Artemis Project</i>	This project will use the award to extend the Artemis Project (a summer day camp for 9th-grade girls, run by undergraduate women from Brown University, that encourages confidence and interest in a computing career) to create community-use projects and reach students in the greater Boston area.
	SUNY at Albany	\$15,000	<i>Social Robotics Outreach</i>	This project will use the context of social robotics to deploy hands-on workshops that teach K-12 girls fundamental problem-solving and programming skills, while exposing them to software and hardware platforms that bridge the high school and college levels.
	Virginia Polytechnic Institute	\$15,000	<i>Professional Development and Networking Workshop for High School Teachers of Computer Science</i>	Virginia Tech's professional development program will sponsor a series of annual summer workshops, in coordination with the Computer Science Teachers Association, that provide local K-12 computing teachers with the tools and curricula to strengthen the pipeline of women and minority computing students.



