

**University of California, Irvine**

Debra Richardson

**2005 Annual Hub Report for NCWIT****Goals**

- Identify and collect interventions and practices that enhance undergraduate education in information technology, provide additional evaluation where needed, and actively disseminate practices that appear most effective at achieving and sustaining participation of female students.
- Suggest adjustments and improvements to undergraduate IT curricular and educational approaches to encourage female students to pursue a CS/IT education, based upon comparison of isolated approaches.

**Summary**

Our overarching goal is systemic change of undergraduate education in information technology (including but not limited to computer science) so that more women are inclined to participate. This involves changing the curriculum and the way it is delivered at multiple institutions, not just at UCIrvine. One step is to identify practices in undergraduate education that have been shown effective at achieving higher recruitment and retention of women at one or more institutions. Such an intervention may not work at all institutions. A key step in replicating effective practices is an understanding of an institution's current environment/context, and determining what must change, what intervention will have a positive impact. Our initial focus is locally, at the Bren School of Information and Computer Sciences (Bren School) at the University of California Irvine (UCIrvine), where we can explore and evaluate practices as well as means of determining what change is needed. We developed a survey for current Bren School undergraduate students, in consultation with NCWIT social scientists. The survey sought student perceptions about past motivators and the current environment with a focus on recruitment and retention. We collected an initial set of survey responses during summer session 2005 and have completed data entry. We continue data analysis in collaboration with the NCWIT social scientists; at least one publication based on this initial data set is anticipated. We are collaborating with NCWIT social scientists to modify and field test a second version of the survey with the aim of creating a web-based survey for more general use. We intend to then make this tool available for national use.

We completed a prototype collaborative workspace ('wiki'). This workspace is designed to support the NCWIT community's dialog around promising and effective practices in undergraduate education, not only regarding experience with implementing such practices – i.e., what worked for some and what didn't - but also how one might replicate an effective practice. The prototype includes means to easily enter text, track comments and suggestions about practices as well as link to materials in the NEEDS.org digital library. We continue development of the prototype with the additional aim of informing design requirements for a more generalized NCWIT collaborative workspace for a broader set of collaborative dialogs in other arenas.

**2005 Milestones**

<b>Milestone</b>	<b>Target Date</b>	<b>Status</b>
Survey tool used to understand current institutional context	September 2005	Initial development of survey instrument (paper-based) completed in May; initial data collected in June; data analysis began in December. Second iteration (web-based) is anticipated in June 2006.
Collaborative workspace to support discussion on	December 2005	Prototype completed November 2005; development continues into 2006.

effective practices		
Initial population of effective practices	December 2005	Current focus on pair programming, contextualized computing education, and mentoring; these practices populate next iteration of collaborative workspace to support dialog about effectiveness and replication.
Set of interviews with leading interventionists	December 2005	Initial interview conducted February 2006. Others scheduled.

## Results and Metrics

### Activities and Findings

Informatics is a new Bren School undergraduate major that implements several promising practices for women's participation – including teaching computer science in context, collaborative team development (pair programming in the freshman year followed by team projects in later years), and community building. The Informatics degree emphasizes interdisciplinary study of the design, application, use and impact of information technology and goes beyond technical design to focus on the relationship of computing and people, organizations, cultures and societies. There are currently 26% women enrolled in the Informatics major. This is nearly twice the percentage of women in the other computing majors at UCIrvine, and a result of both higher recruitment of women and higher retention generally. This trend seems to be holding, but further time and study is needed to verify the effectiveness of implemented practices.

We designed a prototype survey aimed at giving us a better understanding of our current context/environment and administered it to undergraduate students enrolled in the 2005 summer session at UCIrvine. (239 surveys were collected.) Initial data analysis continues with the help of the NCWIT social scientists. Many survey questions showed no significant differences between men and women, although were still informative about what students perceive as working and needing change. Some differences were identified in the following areas: who women ask for help, work styles and type of homework assignments appreciated. The project scientist and the NCWIT social scientists will produce a second web-based version of the survey, which will be field-tested at UCIrvine on a larger and more diverse sample of students. This will provide more significant results. This web-based survey tool will be geared for more general use and made available for a national survey.

We completed a prototype collaborative workspace (a type of 'wiki') and provided a demonstration of this prototype at the November 2005 NCWIT meeting in Pittsburgh. Development work continues and the next iteration is due April 2006. The workspace is designed to support the NCWIT community's dialog around practices associated with undergraduate education and other conversations. The prototype includes means to easily enter/edit text, track comments and suggestions about practices as well as link to materials in the NEEDS.org digital library. An unexpected outcome of our work with NEEDS is the discovery of a previously unknown interface issue with their search service. Our development team continues to work with NEEDS to resolve this. Development and implementation of this workspace is expected to provide input of general use in the NCWIT intranet.

We began scheduling initial interviews with leading interventionists and conducted one telephone interview in early 2006. Other interviews are scheduled in 2006. "Lessons learned" shared during these interviews will be made available in the collaborative workspace.

## Outreach Activities

The PI is faculty advisor and the project scientist is a mentor for the UCIrvine Women in Computer Science (WICS) student club, now a “project” of ABRC<sup>i</sup>. WICS collaborated with Association of Women in Technology<sup>ii</sup> (Southern California) to provide workshops or panels for Girl Scouts, Brownies, and Girls Inc.<sup>iii</sup> ABRC co-sponsored the Sally Ride Science Festival and the Girls Inc. annual UCIrvine campus visit (WICS members volunteered for both these events.) In addition, ABRC collaborated with Google to host a workshop and recruiting event: “Reality Check: A Female Perspective on Life as a Software Engineer.”

The PI and/or project scientist also participated in the following events: Majors/Minors Fair at UCIrvine, Career Day presentations for middle schools, high school recruiting with UCIrvine Office of Admissions, hosted high school visits to UCIrvine campus and Bren School, and serve on an advisory committee for the Global Information Technology Academy program at Brea-Olinda High School.

## Publications and Specific Products

### *Publications*

David Kay, Andre van der Hoek, and Debra J. Richardson (2005). *Informatics: A Focus on Computer Science in Context*, SIGCSE’05: Technical Symposium on Computer Science Education, February 23-27, 2005, St. Louis, MO.

Andre van der Hoek, David Kay, and Debra J. Richardson (2005). *A B. S. Degree in Informatics: Contextualizing Software Engineering Education*, ICSE’05: 27<sup>th</sup> International Conference on Software Engineering, May 15-21, 2005, St. Louis, MO.

### *Documents produced and shared with NCWIT*

Suzanne Schaefer, Debra Richardson. Proposal for NCWIT wiki and Related Issues in Documenting Effective Practices, February 4, 2005.

### *Community College Articulation of ICS/Informatics degree*

Coastline Community College, Informatics curriculum (14 courses) approved by unanimous vote of Coastline Community College (CCC) Curriculum Committee. CCC will offer their first Informatics courses in Fall 2006 as part of a fully articulated program with the Bren School Informatics baccalaureate degree.

### *Documentary*

Nhu Vuong (undergraduate Bren School honors student). *Project Athena: A study of women in Computer Science*. A documentary about life as a female computer scientist, why women leave, why women stay; subjects are four women in varying stages of their lives as computer scientists and in different IT professions.

### *Prototype/Demonstration*

Suzanne Schaefer, Prototype collaborative workspace (‘wiki’), demoed at NCWIT meeting in Pittsburgh, PA., November 2005.

### *Presentations*

UCIrvine Bren School and Coastline Community College (Sally Kurz). *Informatics: The Next Wave in CIS*, TechEd International Conference & Exposition 2005 (<http://www.techedevents.org/2005/>), April 4, 2005. TechEd is a project of The Community College Foundation (<http://www.communitycollege.org/>).

Debra Richardson. *Contextualizing Computer Science & Software Engineering Education*, 18th Conference on Software Engineering Education and Training (CSEE&T) 2005 (<http://www.site.uottawa.ca/cseet2005>), April 18-20, 2005, Ottawa, Canada.

## Matching Funding

NSF-ATE: C-SPIRIT: Coastline – Seamless Articulation Program for Informatics Recruitment and Intersegmental Transfer, submitted to NSF October 2004. Awarded September 2005.

We are working closely with Coastline Community College to develop a fully articulated two-year transfer program for Informatics, the new undergraduate major in the Donald Bren School of Information and Computer Sciences. We have provided course materials and assisted in obtaining various community college committee approvals for the new curriculum. The first Informatics classes will be offered at Coastline Community College beginning in academic year 2006-2007. This project is expected to serve as a model for wider dissemination of the Informatics curriculum.

We are actively looking for private funding as well as planning to revise and resubmit three NSF proposals that were submitted in 2005 but declined.

## Looking Ahead to 2006

Looking ahead we will complete and expand upon activities begun in 2005. In addition, we will: continue evaluation of the Informatics major; leverage student surveys to evaluate and explore changes that need to be made in the computer science majors; publish results from the initial and subsequent surveys; and document ongoing activities and experimental plans for replication and evaluation of effective practices at UCIrvine. This documentation will include information on evaluation – e.g., creating targeted survey questions, incentives for students to complete evaluation forms, pointers to NCWIT social science contact information and institutional research resources.

## 2006 Milestones

<b>Milestone</b>	<b>Target Date</b>
Collaborative workspace second iteration	April 2006
Collaborative workspace populated with initial set of effective practices	May 2006
Ongoing report on experimental plans at UCI	June & December 2006
Field-test web-based survey	Spring 2006
Publication of results from initial UCI surveys	June 2006
Web-based survey tool available to Academic Alliance (AA)	July 2006
Set of interviews with leading interventionists available to AA	July 2006
Another survey tool specifically aimed at first year undergraduates	August 2006
Collaborative workspace to include promising-looking activities in context	September 2006
Overview/workbook of key steps for replicating effective practices	December 2006
Seek additional funding	ongoing

**Other related results not related to NSF project***American Indian Summer Institute in Computer Science*

Twenty high school students completed a two-week residential program at UCIrvine. They received instruction in computing, writing, and cultural studies. In addition, they attended college admissions and financial aid workshops. Corporate and campus funding supported this program.

*Local American Indian community project*

The project scientist is collaborating with members of the local American Indian community on a project sponsored by a local corporation. This project will evaluate and provide recommendations to address the enrollment and retention of American Indian college students in general as well as more specifically, enrollment into the computer sciences. The ABRC hosted a Gathering Table sponsored by a local corporation. Attendees included representatives from UCIrvine, Los Angeles and Orange County K-12 educators, local American Indian community members, corporate leaders, and UCIrvine American Indian Student Association officers. This working group will continue to meet in 2006.

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<sup>i</sup> Ada Byron Research Center for Diversity in Computing and Information Technology (ABRC) is the UCIrvine hub for NCWIT.

<sup>ii</sup> PI is on the Executive Advisory Board for the Southern California Chapter of the Association of Women in Technology.

<sup>iii</sup> PI serves on the Board of Trustees for Girls Inc. Orange County.