



An Alliance to Increase the Participation of Individuals with Disabilities in Computing Careers

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Introduction

The goal of the newly established *National Alliance for Access to Computing Careers* (*AccessComputing*) is to increase the representation of people with disabilities in a wide range of computing careers, including those in computer science, information systems, software development, computer engineering, systems management and maintenance, and teaching. The Department of Computer Science and Engineering and DO-IT (Disabilities, Opportunities, Internetworking and Technology) at the University of Washington (UW) lead *AccessComputing*. partners—Gallaudet University, Microsoft, the NSF Regional Alliances for Persons with Disabilities in STEM (hosted by the University of Southern Maine, New Mexico State University, the University of Wisconsin–Madison, and the UW), and SIGACCESS—and collaborators represent education, industry, government, and professional organizations nationwide. This article shares background information on challenges facing individuals with disabilities with respect to computing careers, objectives of *AccessComputing*, and activities in which you can participate.

The need for *AccessComputing*

There is wide recognition that innovation in computing requires a diverse workforce of qualified systems designers, computer scientists, information professionals, software developers, information systems analysts, technology teachers, computing faculty, and other computing professionals. The inclusion of individuals from under-represented groups, including women, racial/ethnic minorities, and people with disabilities, is vital to the success of the computing industry in the United States in a competitive “flat world”.

Data from the Computing Research Association shows the number of newly declared computer science majors declined 32% from 2000 to 2004. As reported by a Microsoft executive in the *Chronicle of Higher Education* (May 27, 2005, p. A32), “*It’s a major concern for us because we’re a company that runs on people. Our hiring has continued to go up, but unfortunately what we’re seeing right now is a decline in the potential supply.*” The shortage of qualified professionals in computing fields is due in part to the under-representation of these same under-represented groups.

Individuals with disabilities experience far less career success than their peers without disabilities. They are less likely to complete postsecondary education and to pursue academic studies in science, technology, and engineering; the attrition rate of those who

do is high. People with disabilities who are also racial/ethnic minorities and/or females face additional challenges to pursuing high tech careers. However, the success stories of a few individuals with disabilities in computing fields demonstrate that opportunities do exist for people with disabilities who develop academic, technical, and self-determination skills and successfully overcome the barriers imposed by inaccessible facilities, curriculum materials, computers, scientific equipment, and electronic resources; inadequate academic supports; lack of encouragement; few role models; low expectations; and lack of knowledge about accommodations on the part of educators.



Computing careers are potentially open to individuals with disabilities because of advancements in assistive technology that provide access to computers. However, inaccessible design of facilities and software, web pages, and distance learning courses continues to erect barriers. For example, content embedded in graphical images must be provided in an accessible text format to be usable by individuals who are blind and using text-to-speech systems; although accessibility guidelines are readily available, few web developers, including those in computing departments, are aware of the barriers they erect.

In his keynote address at the 2005 Joint Annual Meeting of broadening participation projects funded by the NSF, Dr. Larry Scadden, retired program officer for the NSF Program for Persons with Disabilities (now called Research in Disabilities Education, RDE) identified four issues to address in order for students with disabilities to fully participate in high tech fields—access to technology, access to classrooms and labs, full participation in existing activities, and attitudes of gatekeepers. Successful student- and institution-based interventions to broaden participation in high tech fields have been identified by NSF-funded projects for racial/ethnic minorities, women, and people with disabilities include:

- (a) hands-on STEM experiences;
- (b) industry and research internships;

- (c) bridge programs between academic levels;
- (d) mentor and peer support; and,
- (e) professional development of educators and staff.

AccessComputing goals, objectives, and activities

Alliance objectives are:

1. to increase the number of students with disabilities successfully pursuing undergraduate and graduate degrees and lifelong careers in computing fields.
2. to increase the capacity of postsecondary computing departments to fully include students with disabilities in computing courses and programs.
3. to create a nationwide resource to help students with disabilities pursue computer fields and computing educators and employers, professional organizations, and other stakeholders develop more inclusive programs and share effective practices.

AccessComputing will reach project objectives through (A) activities for students with disabilities, (B) activities for faculty, administrators, and employers, and (C) development of a national resource.

A. Activities for students with disabilities

A1. College transition and bridge academies and workshops

– are currently being designed and implemented by *Alliance* at Gallaudet, the University of Southern Maine, New Mexico State University, the University of Wisconsin-Madison, Seattle Central Community College, the University of Minnesota, the University of Southern Florida, the University of Washington, and the University of Southern Connecticut. In these activities, students with disabilities learn about careers in computing and college opportunities; role-play on working with faculty and employers; practice self-advocacy skills; explore options for internships and jobs after college; take computing-related field trips; meet computing professionals, including those with disabilities; learn about resources; interact with peers and mentors; are invited to participate in *Alliance* e-mentoring communities, internships, and other work-based learning activities described below.

A2. Research and industry internships

– within computing fields are offered to postsecondary students with disabilities. The *Alliance* covers a limited number of participant salaries for cases where a computing professor or other employer has a good research or industry work experience, but does not have funding to pay the student. Project staff work with each supervisor and student to identify appropriate accommodations; this interaction improves the participant's opportunity for success and strengthens the institution's capacity to work successfully with individuals with disabilities.

A3. E-mentoring community

– of high school and college students with disabilities includes computing professors, postsecondary students, and other adult mentors in computing fields; many have disabilities themselves. In the e-mentoring community, staff and volunteer mentors:

- facilitate conversations about opportunities in computing fields and encourage, advise, and assist students with transition between academic levels and from school to work.
- provide psychological support and help protégés develop social, self-determination and self-advocacy skills; positive identity; and a sense of belonging.
- provide students with opportunities for leadership development (e.g., by assisting with a conference exhibit or participating on a panel in a summer program).
- help students identify fields of interest, college funding, and steps toward computing careers.
- invite participation in Alliance academies, workshops and internships.
- encourage participation in existing programs that promote computing careers.
- suggest that students use campus study skills, writing, and other academic support services.

B. Activities for faculty, administrators, employers

B1. Communities of Practice (CoPs)

– share perspectives and expertise and identify practices that promote the participation of people with disabilities in computing fields. Collaborators may request *Alliance* funding for registration fees and publications for conferences for which their *Alliance* presentations/exhibit proposals are accepted, on-campus events, and computing internships for students with disabilities. *Alliance* CoPs are described below.

The *Computing Faculty, Administrator, and Employer CoP* engages computing professionals—faculty and administrators as well as representatives from industry and professional organizations—to increase their knowledge about disabilities and to make changes in computing departments that lead to more inclusive practices. Specifically, they:

- introduce *Alliance* staff to administrators of professional computing organizations so that staff can help these organizations make their websites accessible, their conferences accessible to attendees with disabilities, and their conference programs inclusive of disability-related topics.
- help identify, field test, and validate Computing Department Accessibility Indicators (discussed below) to make computing departments more accessible to students with disabilities.

- help plan, attend and/or recruit others to Alliance events and identify campus/community computing events to which students with disabilities might be invited.
- help staff target articles to computing publications.
- provide connections with computing faculty and industry for internships.

In addition to the Computing Faculty, Administrator, and Employer CoP, there are several other CoP's that have been established:

- (i) the *Broadening Participation CoP* is populated with *Alliance* collaborators who administer alliances and projects that serve to broaden participation in computing fields, typically focusing on increasing the representation of women and racial/ethnic minorities;
- (ii) the *Disability Services CoP* includes disability service professionals from community/technical colleges, 4-year institutions, and universities nationwide, together with their networks of postsecondary and K-12 schools and parent groups; and,
- (iii) the *Deaf and Hard of Hearing CoP* is populated with existing practitioners/networks that support individuals who are deaf or hard of hearing and are interested in increasing the representation of these individuals in computing fields.

B2. Capacity-building institutes

– draw in other members of relevant stakeholder groups. Participants will meet 1-2 days as a pre-conference session of a relevant conference. The agenda will include presentations by experts followed by discussions in small groups and group reports. Content from Capacity-Building Institutes will be developed for publication to inform Communities of Practice and policy makers. Participants will identify strategies for recruiting and retaining students with disabilities in computing fields, making courses and departments more accessible, including accessibility topics in computing curriculum, implementing faculty training, and identifying directions for research.

B.3. Systemic change indicators

– for postsecondary computing departments are being developed. *Alliance* staff, partners, and collaborators will create, test, and validate *Computing Department Accessibility Indicators* (checklists) to be used for a postsecondary computing department. Draft lists of *Computing Department Accessibility Indicators* (see current draft at www.washington.edu/accesscomputing/equal_access_csd.html) will be reviewed and updated multiple times by *Alliance* collaborators and other stakeholders. *Alliance* staff will create an online pre-post assessment tool within the *AccessComputing* Knowledge Base that administrators can use to track systemic changes toward more accessible computing departments.

C. A nationwide resource

Alliance staff have created and continue to expand a searchable *AccessComputing* Knowledge Base of FAQs, promising practices, and case studies (See Knowledge base link from www.washington.edu/accesscomputing/). The Knowledge Base provides educators with strategies for creating more inclusive computing courses programs, where students with disabilities are encouraged to pursue computing fields. It provides a similar resource for employers. It also helps students with disabilities interested in computing fields find e-mentoring communities, internships, scholarships, job listings, undergraduate and graduate school information, and other useful resources. All printed and electronic materials are provided in accessible formats; multi-media will be captioned and audio described for viewers who have sensory impairments.

How you can participate in *AccessComputing*

The *Alliance* assures nationwide, long-term impact because it:

- supports local and regional workshops, academies, capacity-building institutes, and internships to recruit and retain students with disabilities into computing fields;
- helps computing departments, professional organizations, and alliances that serve women and racial/ethnic minorities make their activities and resources accessible to students with disabilities;
- collaborations among individuals with disabilities, computing professionals, faculty, employers, professional organizations, and disability service providers; and,
- collects and publishes research and practice data to support the inclusion of people with disabilities in computing fields.

Consider participating in *AccessComputing*:

- Join a CoP.
- Test Computing Dept Accessibility Checklist and suggest improvements to project staff.
- Work to make your project accessible to people with disabilities (see <http://www.washington.edu/doi/Brochures/Programs/design.html> for suggestions)
- Refer students with disabilities to us for mentoring and internships.
- Contribute questions or promising practices to the *AccessComputing* Knowledge Base.

If you are interested in participating in these or other ways consult:

<http://www.washington.edu/accesscomputing>

or send an inquiry to: accesscomputing@u.washington.edu.

Conclusion

AccessComputing outcomes will benefit society by making computing opportunities available to more citizens and enhancing computing fields with the perspectives of people with disabilities.