AccessComputing Leadership Institute

November 5 - 7, 2008

Richard Ladner, Sheryl Burgstahler
University of Washington

Institute Objectives

- share best practices & develop new ones that will increase the number and success of persons with disabilities in computing fields.
- share & learn about funding opportunities to bring these practices to the people who need them.
- help develop new leadership in broadening participation in computing for persons with disabilities.

Desired Impact

BPC disability-related projects will benefit society by

- Making computing opportunities available to more citizens &
- Enhancing computing fields with the expertise & perspectives of people with disabilities.

Thursday Agenda

8:00 am	Buffet Breakfast & Networking
9:00	Welcome
9:45	Panel: Reports on Existing Projects
11:15	Break
11:30	Panel: Personal Experiences
12:30 pm	Working Lunch
1:45	Putting Pieces Together: Designing a Project
2:45	Break
3:00	Work Group Meetings: Sharing Projects, Ideas
4:15	Debriefing & Discussion on New Ideas
4:45	Preview Tomorrow, Daily Feedback
5:00	Adjourn

Welcome

- Introductions & project ideas
- Housekeeping: restrooms, breaks, meals, q&a
- Accessibility of meeting considerations
- Materials in folders

University of Washington

AccessComputing

UW Collaboration

Department of Computer Science & Engineering

DO-IT (Disabilities, Opportunities, Internetworking & Technology)

Goal

- To increase the participation & success of individuals with disabilities in computing careers

  Richard Ladner, PI

  Sheryl Burgstahler, Co-PI & Director

  Michael Richardson, Manager

  Rob Roth, DHH Specialist

  Terry Thompson, Technical Specialist

  Scott Bellman, Work-based Learning

  Lisa Stewart, Program Coordinator

Partners

Gallaudet University est. 1864

Microsoft

- Regional Alliances for Persons with Disabilities in STEM:
  - University of Southern Maine
  - New Mexico State University
  - University of Washington
- SIGACCESS

Objective 1

- to increase the number of **students with disabilities** successfully pursuing undergraduate & graduate degrees & careers in computing fields

- *Activities:* College transition & bridge programs; tutoring; high school, college, graduate internships; e-mentoring

Examples

- Summer Academy for Advancing Deaf & Hard of Hearing in Computing, UW
- Gallaudet Summer Transition Academy in Computing
- ImagineIT Workshop, RIT
- Summer Computing Institute, U. Southern Maine
- Introduction to computing & engineering fields event University of Minnesota, Duluth
- Accessible Technology Seminar, Florida State
- Internships in Alaska, Arizona, Florida, New York, Washington, Wisconsin

Objective 2

- to increase the capacity of **postsecondary computing departments** to fully include students with disabilities in computing courses & programs

- *Activities: Communities of Practice (CoPs); Capacity-Building Institutes* of stakeholders/gatekeepers; *Computing Department Accessibility Checklist*

Computing Department Accessibility Checklist

- Universal Design
- Accommodations

Planning, Policies, & Evaluation

- Are people with disabilities, racial/ethnic minorities, & both men & women young & old students, & other groups included in departmental planning & review processes & advisory committees?
- Do you have a procedure to assure a timely response to requests for disability-related accommodations?

Facility & Environment

- Are all levels of departmental facilities connected via a wheelchair-accessible route of travel?
- Can at least one public telephone in the department be reached from a seated position?

Support Services

- Do staff members know how to respond to requests for disability-related accommodations such as sign language interpreters?

Information Resources

- Do pictures in departmental publications & on websites include people with diverse characteristics with respect to race, gender, age, & disability?
- In key publications, does the department include a statement about its commitment to universal access & procedures for requesting disability-related accommodations?
- Do departmental web pages adhere to accessibility guidelines or standards?

Computing Courses & Faculty

- Do video presentations used in courses have captions? Audio descriptions?
- Do faculty members know how to respond to requests for disability-related accommodations?
- Are faculty members familiar with & do they employ instructional strategies that maximize the learning of all students?
- Is universal/accessible design incorporated into the curriculum of appropriate courses?

Objective 3

- to create a **nationwide resource** to help students with disabilities pursue computer fields & computing educators & employers, professional organizations, & other stakeholders develop more inclusive programs & share effective practices
- *Activity: AccessComputing* Knowledge Base (KB) of 250 FAQs, case studies, promising practices

KB Q&As

- How can I get started in making my distance learning course accessible to all students?
- How can I make my computing department more accessible to students with disabilities?
- How can people who are blind use computers?

KB Case Studies

- Distance Learning: A Case Study on the Accessibility of an Online Course
- Universally Designed Web Pages: A Case Study on Access Issues for a Student with a Learning Disability
- Web Access: A Case Study on Making Content Accessible to a Student who is Blind

KB Promising Practices

- Digital Frog International: A Promising Practice in Designing Accessible Educational Software
- The ImagineIT Workshop: A Promising Practice in Engaging Students with Visual Impairments
- Maplewood Middle School: A Promising Practice in Integrating Technology for Students with Visual Impairments

Panel: Reports on Existing Projects

Activities for Specific Disabilities

Promoting Access and Interest in Computing for Students with Hidden Disabilities

Steve Fadden, PhD

Landmark College Institute for Research and Training

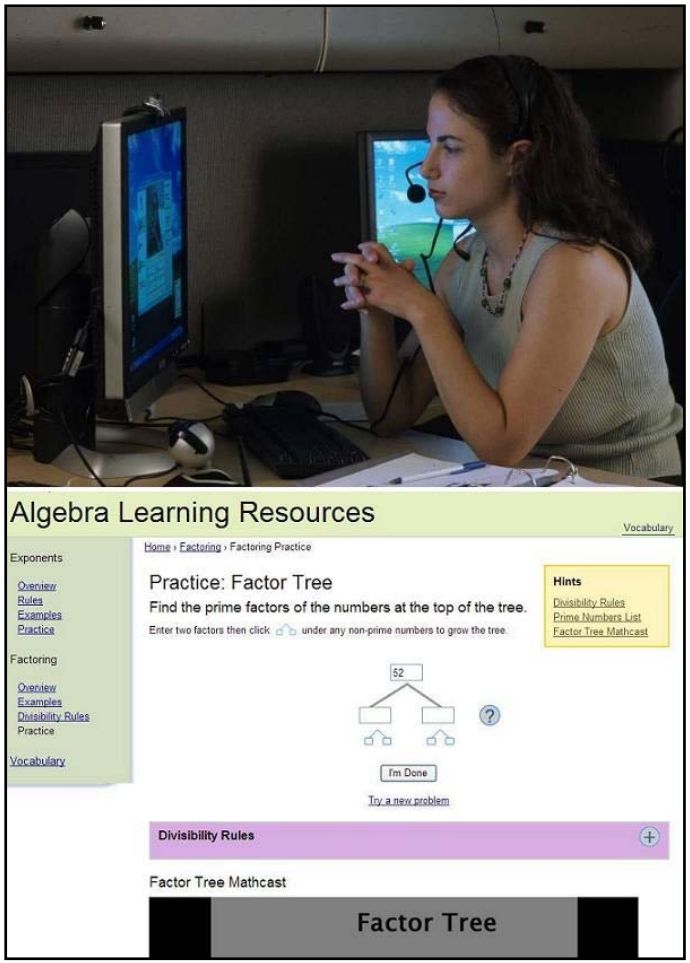
stevefadden@landmark.edu

Students Mentoring Students

- Projects vary each semester, but include
  - Eye tracking
  - Usability studies
  - Developing Flash applications
  - Robotics and programming (Pico Crickets)
- Students master technologies and techniques
- Mentor college and younger students

Usability Evaluation and Design

- Work with students to identify problems with online learning resources
- Students develop and test new designs (current work includes developmental algebra)
- Redesigned resources are being implemented in developmental 2-year college courses to address barriers faced by students with disabilities

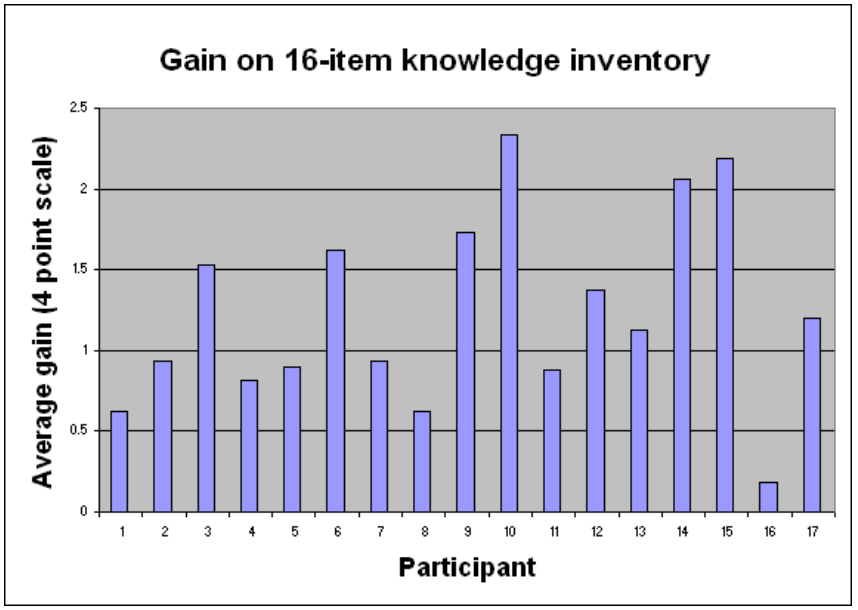


Student Panels and Workshops

- Students participate in capacity-building workshops for educators
- Inform participants about disabilities and student experiences
- Participants learn and practice techniques to promote access to computing and academic success in barrier courses

Data Collection Approach

- Formative feedback: Data include student ability assessments, knowledge gains, self-efficacy data, student interests, and faculty/staff beliefs about student abilities and outcomes
- Summative feedback: Graduation and degree information through DegreeVerify as well as in-person contact (when possible). Currently focused on academic performance and course retention rates for barrier courses



Access Computing

Anna Cavender

Summer Academy for Advancing Deaf and Hard of Hearing in Computing

University of Washington
2007,2008 … 2009, 2010

Summer Academy for Advancing Deaf and Hard of Hearing in Computing

Goals:

- bridge the gap between a K-12 and a college environment
- realistic, college-level computer science courses within a supportive and fun environment
- encourage students to pursue computer science in college and prepare them with keys to success
- provide proper help and approachable tutors, but encourage independent learning and creative problem solving

Curriculum

- 9-week program
  - Introduction to Computer Programming
    - CS 1 and CS 0.5
  - Animation
- 18 students from all over USA
  - High school, college freshmen, college sophomore
  - Diversity of backgrounds
  - Recruited D/HH tutors

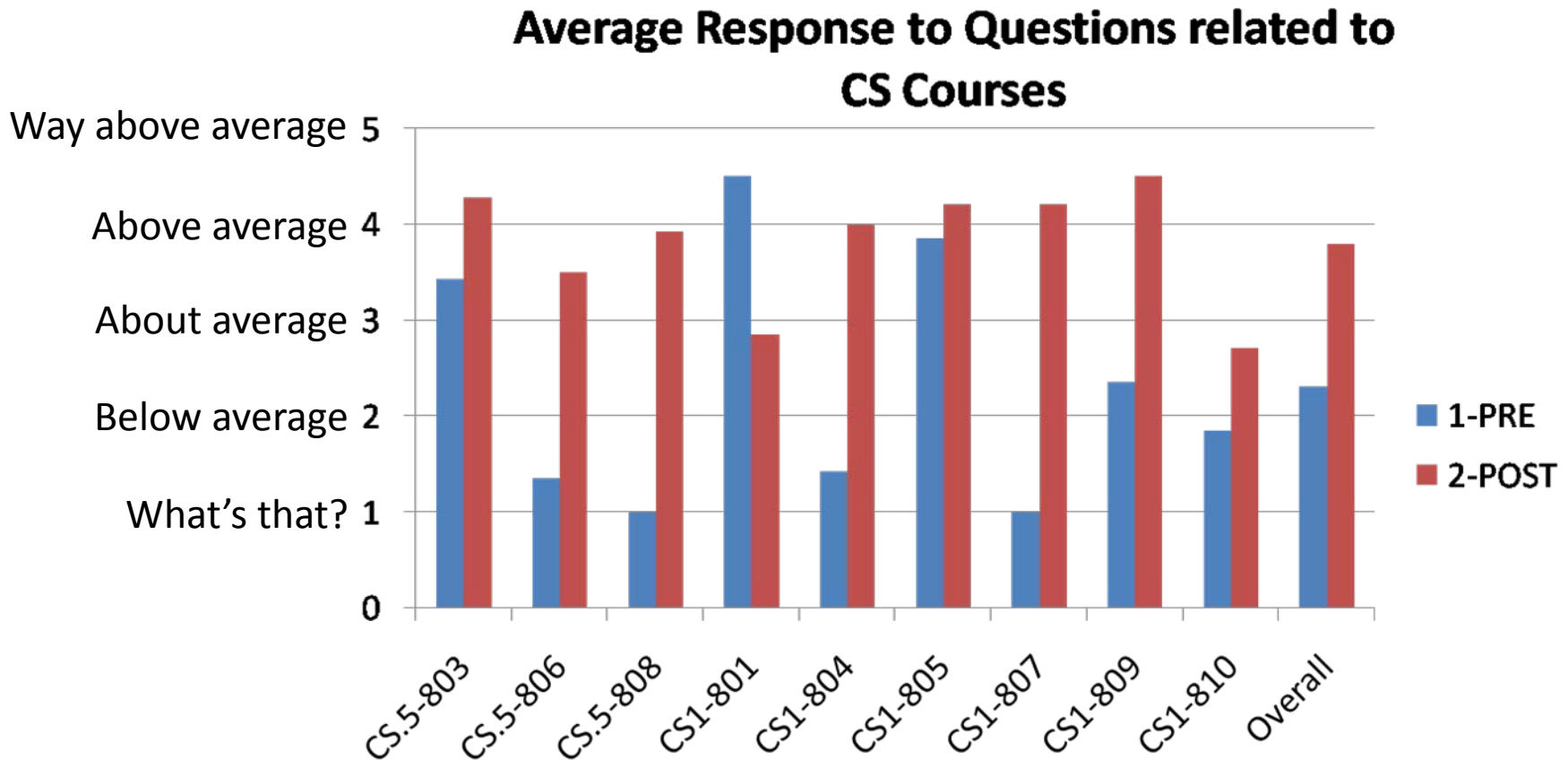
It's not all about course work

- Guest speakers/mentors
  - Deaf and hard of hearing computer scientists
- Visits to computing companies
  - Adobe, Boeing, Gas Powered Games, Google, Intel, Microsoft, and Valve
- Fun activities
  - Baseball game, Ducks tour
- Community Premiere

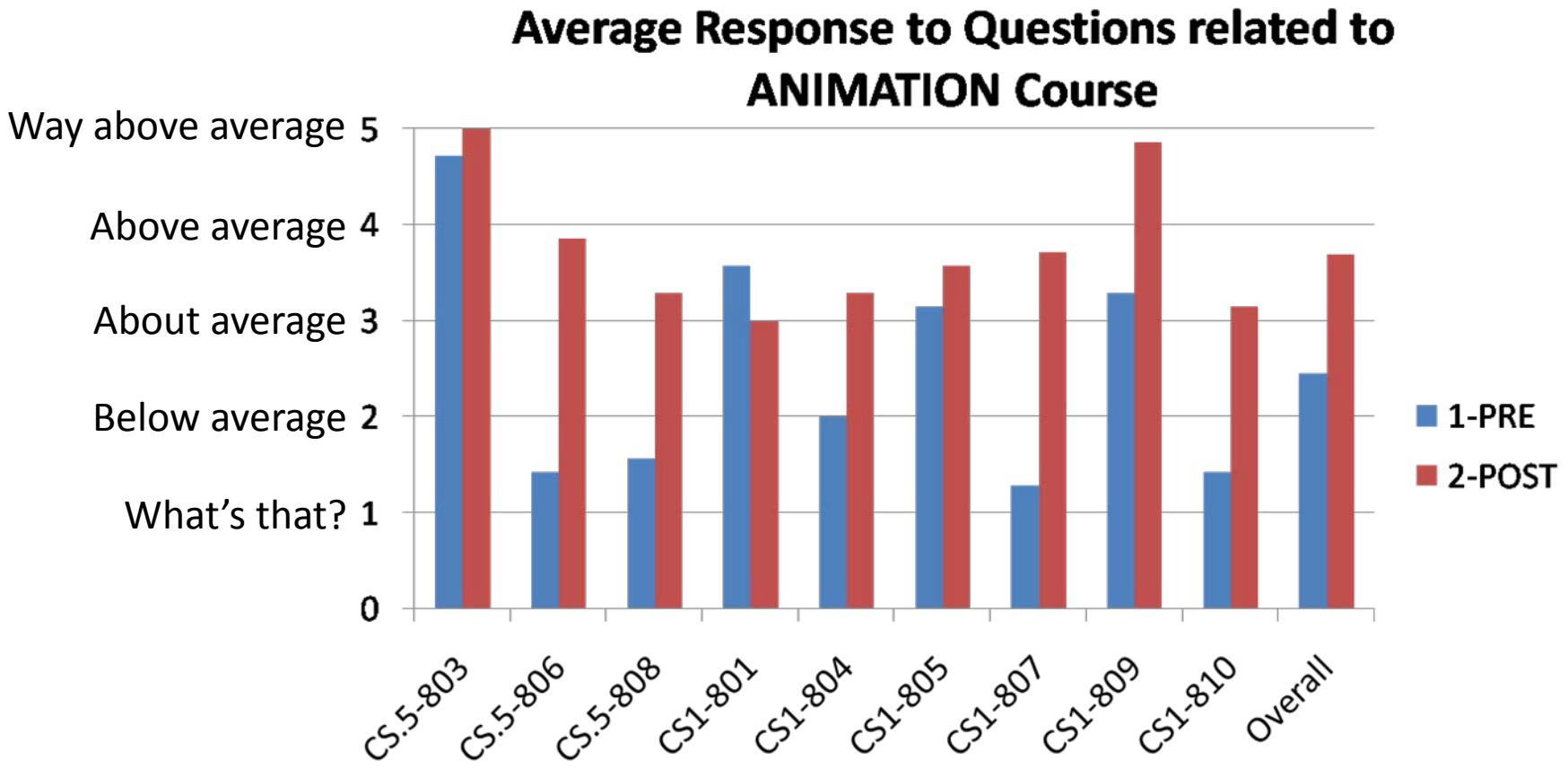
Outcomes from CS 1 and CS 0.5

- 50% succeeded and could go on in computing
- 33% above average grades
- All 18 who completed our program also completed the CS courses
  - (typical dropout rates: CS 0.5 = 30%, CS 1 = 10%)
- All 3 students in CS 0.5 passed, 2/3 above average

Study Survey - CS



Study Survey - Animation



Summer Academy for Advancing Deaf and Hard of Hearing in Computing

www.washington.edu/accesscomputing/dhh/academy/

2006 Summer Computing Program at Gallaudet

A Report Presented to
AccessComputing
University of Washington

Fat Lam
Gallaudet University

November 2008

Goal and what we did

- Goal: Recruit 15 students.
- Sent out 2500 flyers to schools and programs serving deaf students.
- Email sent to 51 schools for the deaf.

Recruitment Result

- 12 students applied.
- We accepted 11 students.
- 7 students came (4 males and 3 females). They were from Arizona, California, Maryland, Massachusetts, New Jersey, and Washington.
- Chinese: 1, Black: 1, Hispanics: 2, White: 3.

The Program

- Mornings: Math related to computing

  -Cryptography, Python Programming, Floating Point Arithmetic, 3D graphics, Linear Functions and Vectors.
- Afternoons: Computing

  -Robot Construction, Calibration of IR range sensors.

Program (continued)

- Late Afternoons
  - Personal Discovery
- Evenings
  - Study Table or Games.
- Field Trip every Wednesday afternoon

  NSA

  NASA

  CIA

  NGA (National Geospatial-Intelligence Agency)

Interest in CS

- Students were surveyed on their attitudes towards the program.

Decreased	0
Somewhat decreased	0
Same	29%
Somewhat increased	29%
Increased	43%

ImagineIT Workshop for Students with Visual Impairments

Stephanie Ludi
Dept. of Software Engineering
Rochester Institute of Technology
salvse@rit.edu

Funded as part of the Accessible Computing Education Project, by the National Science Foundation (Grant #0634319).

Motivation and Scope

- The need to increase participation in computing
- Students with visual impairments are underrepresented
- 14 students in Grades 7-12, in 4 teams
- Interest in computing, varied experience
- Visual acuity varied, including blind

Robotics Activity Overview

- 2 days with Lego Mindstorms NXT
- BricxCC environment, NXC language
  - Screen reader and magnifier accessible
  - Low learning curve
- Development of accessible materials and labels
- Navigate through the maze and locate a sound source. After exit, locate the sound source, play a sound and stop movement.

Feedback: Student Survey

	Scale	Feedback
Likelihood enroll in computer class in school	High, but self-selected participants Several said no courses available	
Experience in working in teams	1 - 4	1.92 avg
Interest in robotics and programming	1 - 5	4.15 avg
Challenge of the activities,	1 (Difficult) - 3 (Easy)	8 about right, 3 difficult, 2 easy
Extent of fun of the Mindstorms activity	Not Fun, Neutral, and Very fun	11 very fun
Increase in understanding opportunities	1 - 5	4 avg

Feedback: Parents

- ..This workshop allowed these teens many opportunities to let them see that a career in computers is very possible.
- The workshop gave the kids a lot of hands-on experience with computers that they might not have gotten otherwise .. plus they were able to share ideas and learn from other students.
- ..This will definitely make a significant impact on my son's (I'm sure many others participants as well) development and choices in life.
- Other feedback: smaller teams, noise control, more programming instruction
- Parents had opportunity to share experiences (school district support, additional programs)

Access Computing

Mary Jo Thorpe

Inspiring Blind High School Students to Pursue Computer Science with

Instant Messaging Chatbots

Jeffrey P. Bigham

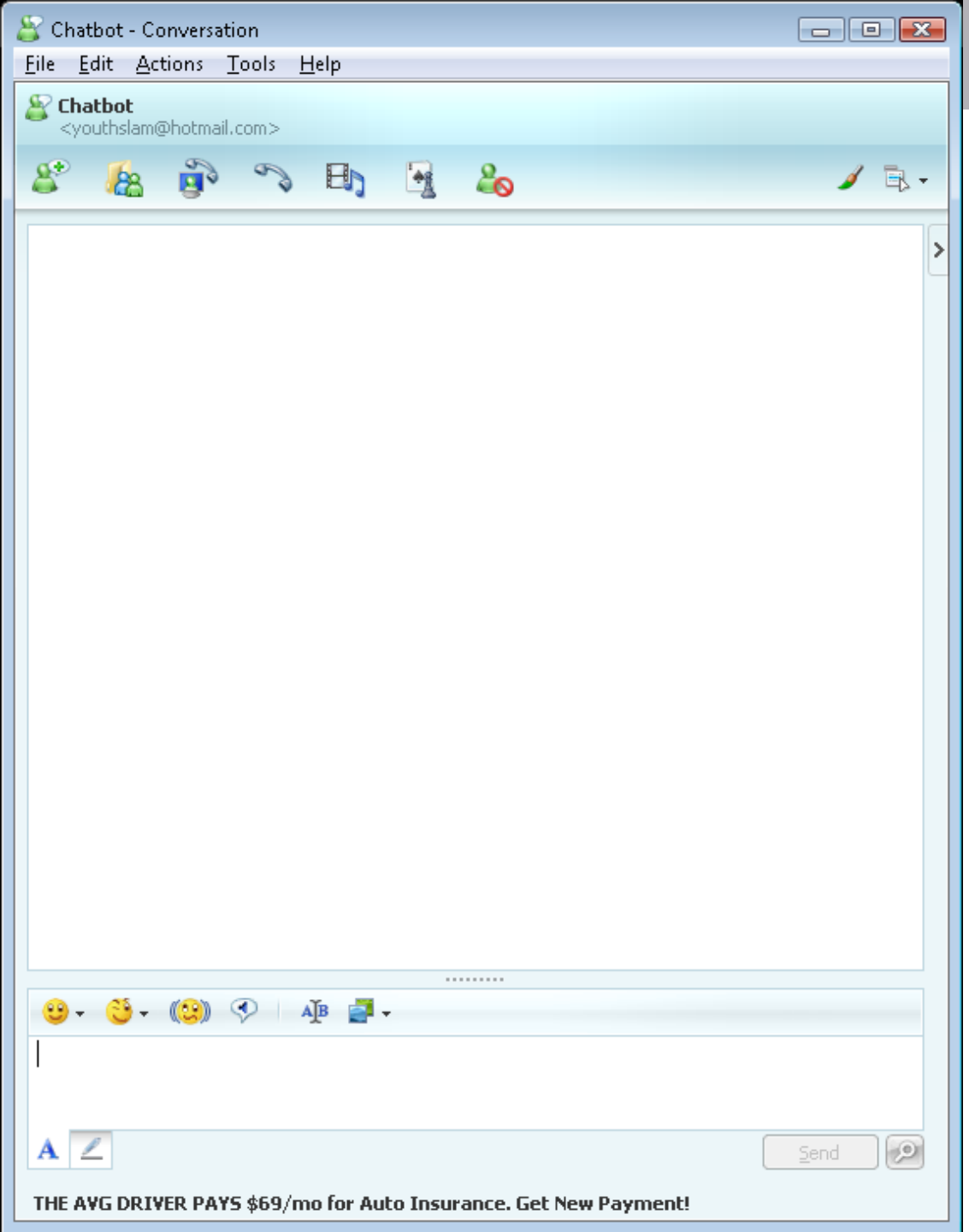
Maxwell B. Aller, Jeremy T. Brudvik, Jessica O. Leung,
Lindsay Yazzolino, and Richard Ladner

University of Washington
Computer Science & Engineering

NFB Youth Slam

- 200 blind high school students
- 60 blind mentors
- 4 days at Johns Hopkins University
- Exploring fields falsely believed too difficult
  - Especially STEM fields

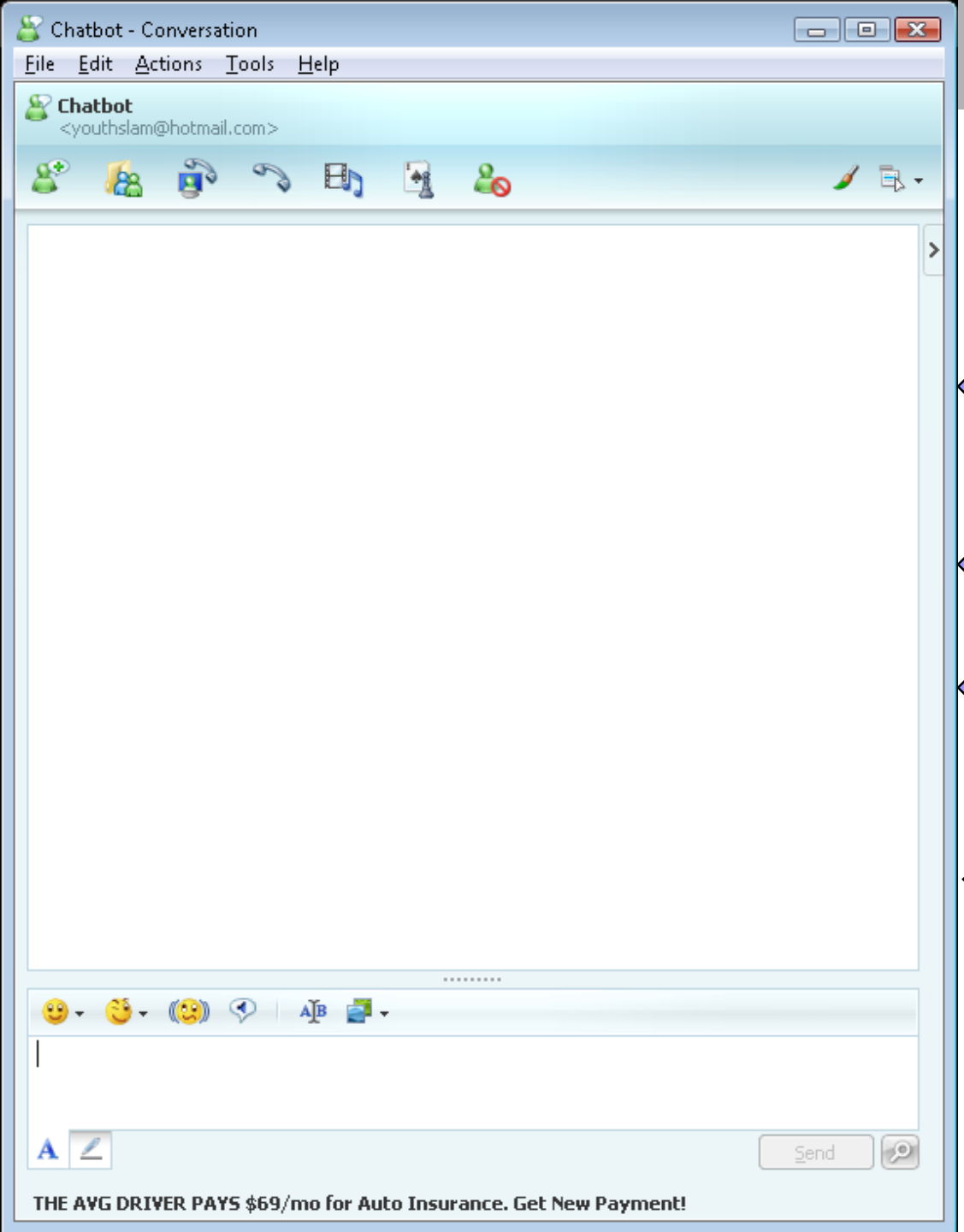


IM Chatbots

- Created by a student
- Read by a screen reader

Chatbot Demo



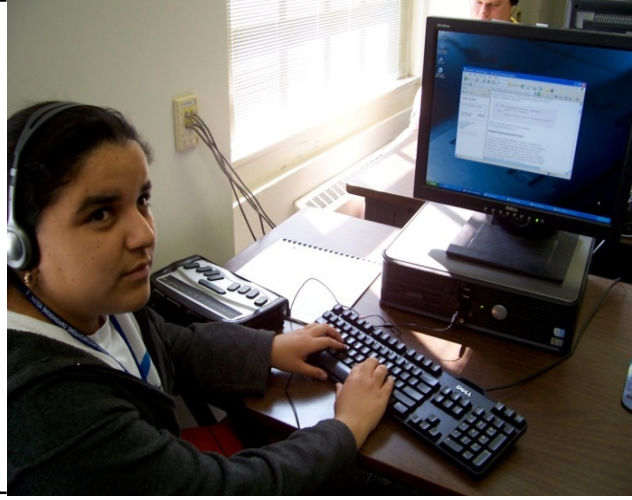
Responses triggered by simple regular expressions.

Chatbots work with remote web services – today's weather, news and dictionary.

Programming from the Start

```
class HowAreYouBot : BasicBot {
  public override string HandleMessage (
      string message, string user, BotMemory bm) {
    if(bm ["asked"] == "yes") {
      bm ["asked"] = "no";
      return "That 's great!";
    } else {
      bm ["asked"] = "yes";
      return "How are you today?";
    }
  }
}
```

User: Hello
Bot: How are you today?
User: Great.
Bot: That's great!



WebInSight

Code and curriculum at:
webinsight.cs.washington.edu/chatbots

Thanks to: National Federation of the Blind, National Science Foundation, Boeing, John Hopkins University, Sangyun Hahn, Marc Riccobono, Mary Jo Thorpe.

Activities for Multiple Disabilities

Access Computing

Samantha Langley

Access Computing

Daniela Marghitu

Incorporating Disability-Related Topics in Computing Curricula

Access Computing

Terry Thompson

ACCESSIT Web Design & Development Curriculum for High Schools

- Developed with funding from the U.S. Department of Education, National Institute on Disability and Rehabilitation Research (NIDRR)
- Maintained with funding from NSF on AccessComputing grant
- Developed in collaboration with high school web design instructors from Bellingham, WA Public Schools
- http://www.washington.edu/accessit/webdesign

Guiding Principles of Curriculum

- Emphasizes standards-based and accessible design
- Begins by building a foundation of design theory principles, and all web design techniques are taught with these principles in mind
- Is project-based
- Is cross-platform, and not linked to any specific software manufacturer
- Includes soft skill elements (i.e., organizational skills and the ability to communicate effectively with team members and clients)
- Provides students with an opportunity for "real world" experience designing and developing websites for local community organizations.

Curriculum Interest and Usage Data

- Data collected from instructor registrations (instructors must register with valid email addresses)
- 551 registered instructors
- 45 states (all but AL, HI, ND, SD, and WY)
- 26 countries
- To date, usage data is anecdotal: High schools, middle schools, community colleges

Sheryl Burgstahler

Universal Design of Webpages in Class Projects

www.washington.edu/doit/Brochures/Technology/universal_class.html

Access Computing

Richard Ladner

COMPUTER SCIENCE Unplugged

Home
About Unplugged
Activities
Half-Bakery
Get Unplugged
People
Research
Languages
Events
Videos
Curriculum Links
Links
Forum

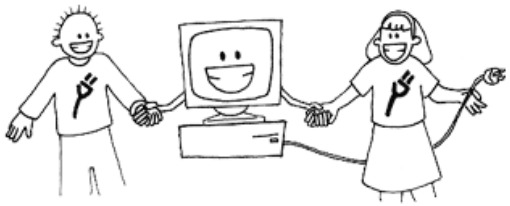
Teach computer science without a computer!

Computer Science Unplugged is a collection of activities designed to teach the fundamentals of computer science without requiring a computer. Because they're independent of any particular hardware or software, Unplugged activities can be used anywhere, and the ideas they contain will never go out of date. Unplugged activities have been trialled and refined over 15 years in classrooms and out-of-school programmes around the world.

Get Unplugged Now!

And it's free!

You can download Unplugged activities as individual PDF files from their pages on this site, or download a teachers' version of the collection as a single file. But it's worth browsing this site. You'll find supplementary material for each activity: videos, links, photos, feedback, curiosities and more. We're also working on online games, competitions, links to curricula, and new material. Printed versions of the Unplugged material are available for purchase, and proceeds from sales are put back into the project.



Unplugged is based at the University of Canterbury in

Computer Scientists

Nicole Torcolini, Computer Science Student, Stanford

TV Raman

Christian Vogler

Computer Scientists

Chieko Asakawa
IBM Japan

Hideji Nagaoka
Tsukuba U. of Tech

Sangyun Hahn
Ph.D. Student
CSE, University of Washington

Zach Lattin
Math Major

Panel: Personal Experiences in Pursuing Computer Science/IT

Ted Hart

Jeanine Cook

Annie Anton

Shiri Azenkot

Working Lunch

With panelists & participants discuss what practices show promise for broadening participation in computing careers.

Putting the Pieces Together: Designing a Project

Relevant Data

Richard Ladner

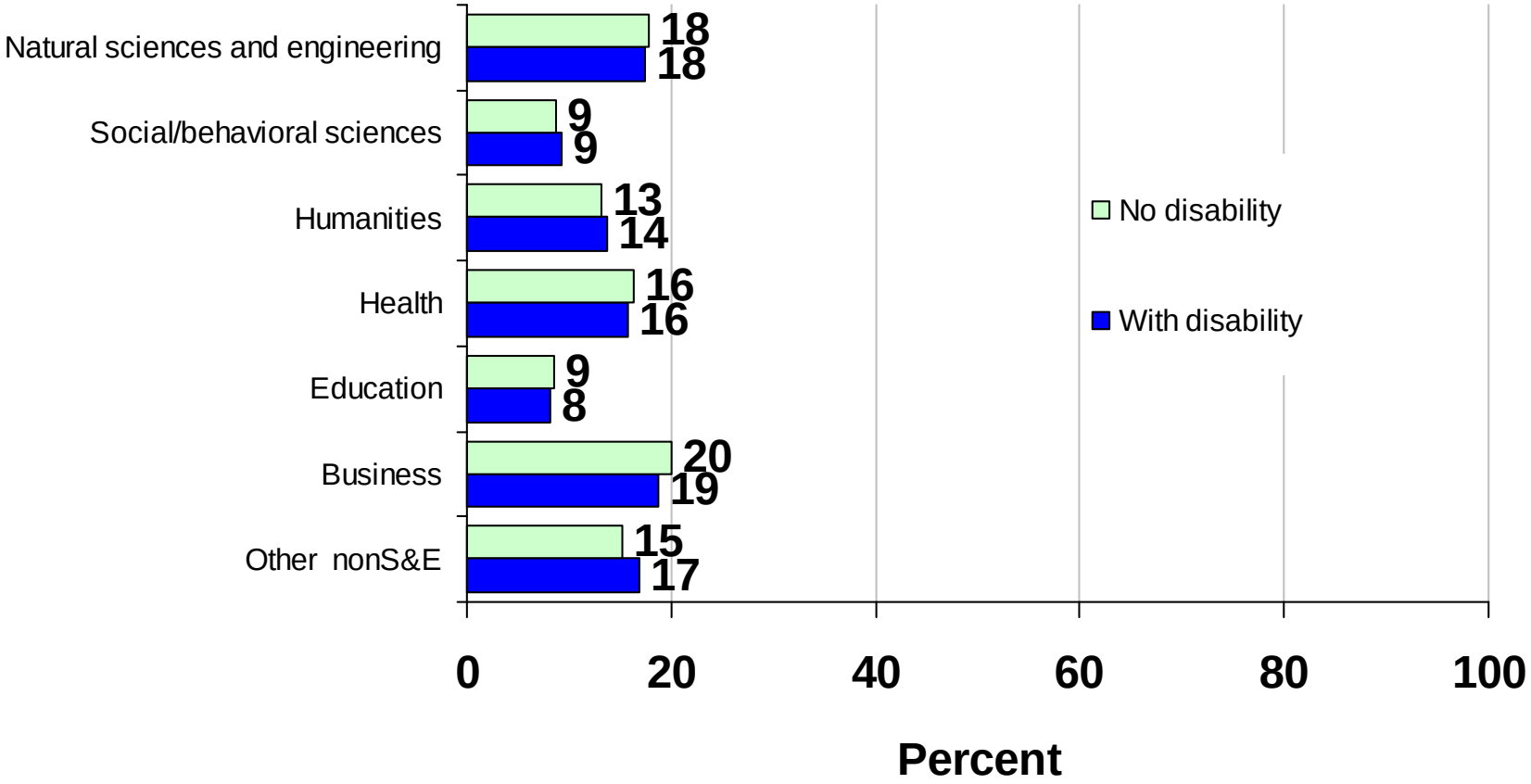
Estimates of Disability

	Percent with disabilities	Number with disabilities
Population 15-24	11%	4,128,000
Students 6-17	12%	5,708,900
STEM undergraduates	11%	580,000
STEM graduate students	7%	30,000
STEM doctorate recipients	1%	307
Population 25-64	16%	24,350,000
US workforce 21-64	10%	14,313,000
STEM workforce	5%	242,700
STEM doctoral faculty	8%	13,500

SOURCES: Population & U.S. workforce—U.S. Census Bureau, Survey of Income & Program Participation, 2002; Students 6-17—U.S. Department of Education, Office of Special Education Programs, 2005; Undergraduate & graduate students—U.S. Department of Education, National Center for Education Statistics, National Postsecondary Student Aid Study, 2004; STEM doctorate recipients, NSF/SRS, Survey of Earned Doctorates 2005, Workforce & doctoral faculty—National Science Foundation, SESTAT data system, & Survey of Doctorate Recipients.

Undergraduate students with disabilities choose S&E majors at about the same rate as students without disabilities

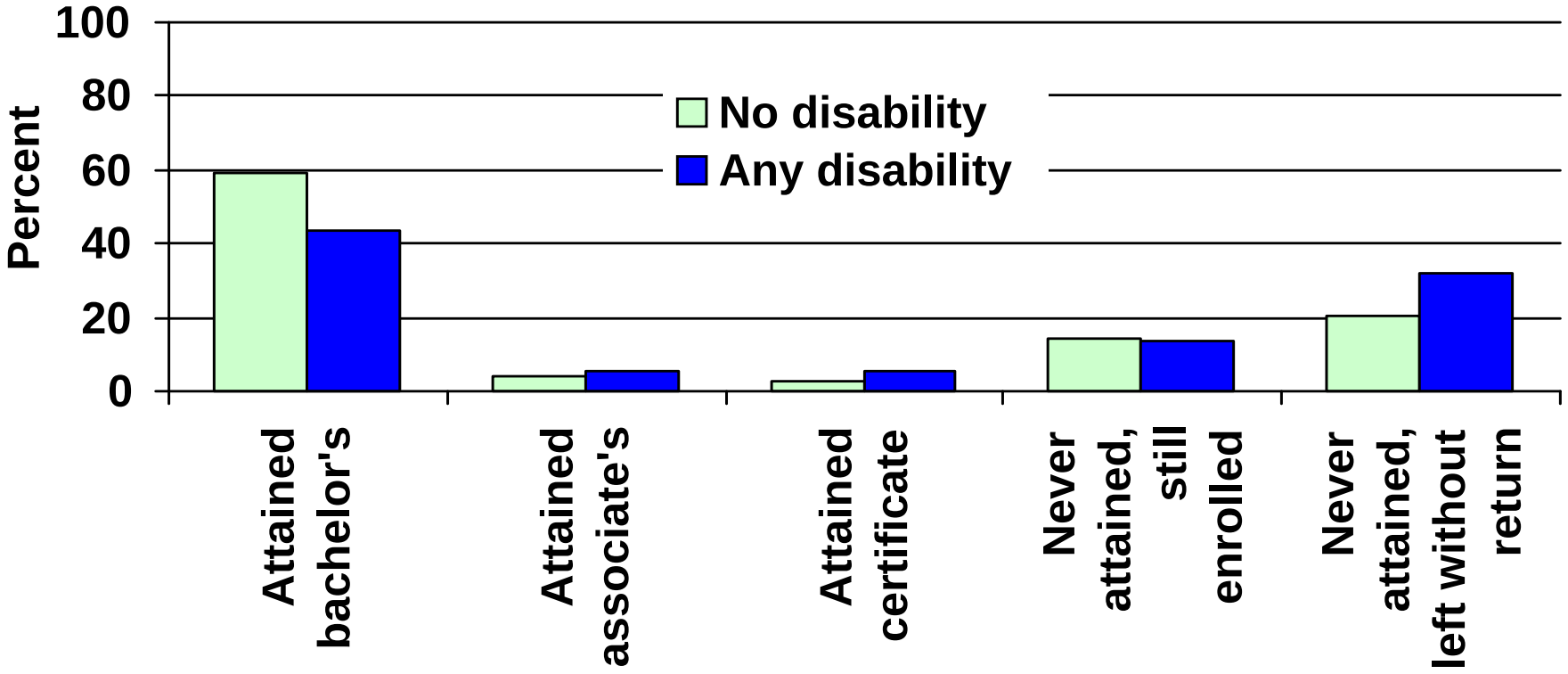
Undergraduate students, by major & disability status: 2004



SOURCE: U.S. Dept. of Education, National Center for Education Statistics, National Postsecondary Student Aid Study: 2004

Students with disabilities are less likely than those without to complete a bachelor's degree

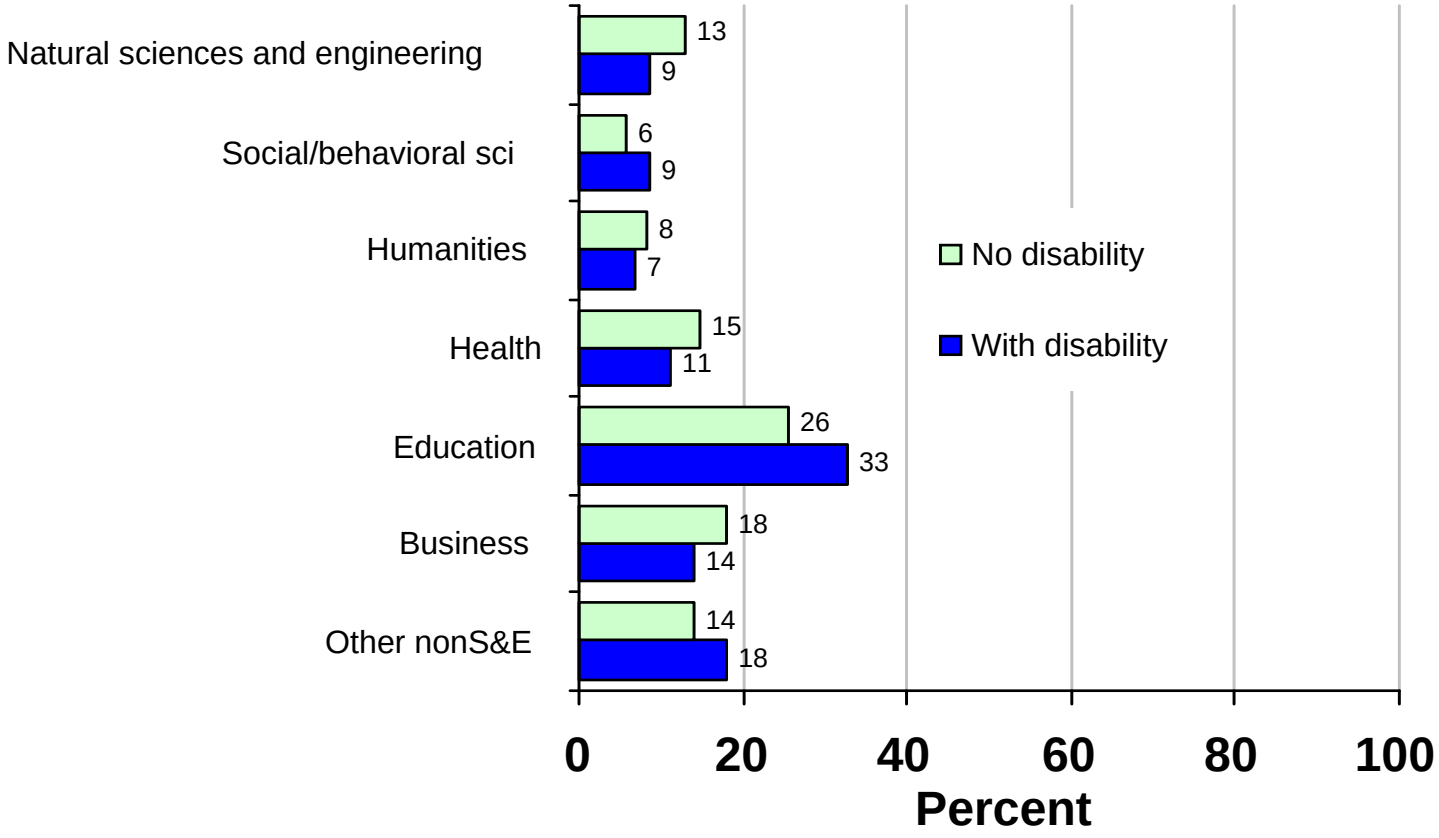
Students who began at 4-year colleges or universities in 1995, by disability status & persistence in 2001



SOURCE: U.S. Dept. of Education, Natl Center for Education Statistics, Beginning Postsecondary Students Longitudinal Study

Graduate students with disabilities are less likely than those without to major in science & engineering

Graduate students, by majors & by disability status: 2004



SOURCE: U.S. Dept. of Educ., National Center for Education Statistics, National Postsecondary Student Aid Study

Some Basic Facts

- 11% of students age 14-21 have disabilities; learning disabilities are most prevalent.
- 11%/7% of undergraduate/graduate students have disabilities; learning disabilities are most prevalent.
- 13% of undergraduate IT majors have disabilities.
- 5% of graduate IT majors have disabilities.
- 0.8% of IT doctorates have disabilities (e.g., 1999-2004 there were 53 in the US.).
- 5% of employed IT scientists & engineers have disabilities.
- As people age, the percentage of those with disabilities in that age group grows.

Problem Areas

- Students with disabilities tend to drop out of computing majors more than other students.
- Very few students with disabilities go on for advanced degrees in computing.
- Transitions between educational levels & to careers are especially challenging for students with disabilities.

NSF Grant Opportunities

Jan Cuny

BPC Solicitation

Other NSF Opportunities

Mini Grants & Other Opportunities

Sheryl Burgstahler

- grants.gov website & “email subscription”: includes NSF + Dept of Ed, NIH, Dept. of Labor
- Foundations
- Corporations
- Individuals

Mini Grant Proposals

- **Project Title**, Date(s), Location, Director
- **Project Objective(s) & Outcome(s):** How will your project promote the interest, participation, &/or success of individuals with disabilities in computing careers?
- **Project Description:** How will your project accomplish its objectives?

Mini Grant Proposals

- **Project Budget:** For what expenses do you request funding from *AccessComputing*? (We are able to support the direct costs of the project such as travel expenses for a speaker, refreshments for participants, facility rental, & duplication & mailing of materials.)

Mini Grant Proposals

- **Project Management, Support Staff, Timeline:** Who will do what & when?
- **Project Evaluation:** How will you know you have accomplished project objectives (e.g.,evaluation forms, observations, follow-up interviews after program participation)?

Work Group Meetings: Sharing Projects & New Ideas

Roles of proposal writers & “consultants”

Work Group Debriefing: Sharing Projects & New Ideas

Dinner, Today's Feedback

- Dinner Tonight
- Daily Feedback
- Agenda Tomorrow

Friday Agenda

8:00 am	Working Buffet Breakfast, Networking, Discussion
9:00	Overview of Agenda
9:30	Grant Writing Tips
10:00	Planning & Implementation: Tips from the Field
11:00	Break
11:15	Working Group Meetings: Project Planning
12:30 pm	Working Lunch
1:30	Final Topics for Discussion
2:30	Debriefing & Discussion on New Ideas
2:50	*AccessComputing* Leadership Institute Evaluation
3:00	Adjourn

Logistics

Lisa Stewart

Travel

Institute Evaluation

Institute PowerPoints

Q&A

Ways to Engage With Us:

Join Communities of Practice:

- dscop@u.washignton.edu for disability services
- compcop@u.washington.edu for computing faculty, administrators, employers
- bpcop@u.washington.edu for broadening participation alliances & projects
- vetscop@u.washington.edu for promoting computing fields to veterans with disabilities
- dhhcop@u.washington.edu for deaf & hard of hearing individuals, service providers & advocates

Ways to Engage With Us:

- Apply/test *Computing Dept Accessibility Checklist*
- Let us help you make your project accessible to people with disabilities (recruitment, support, websites, etc.)
- Invite YOUR project participants to our e-mentoring, internships (including the AccessComputing Team)
- Contribute questions, practices to KB

NSF Grant Writing Tips

Jan Cuny

Lessons Learned

- Pay close attention to solicitation
- Engage stakeholders
- Link each activity with goal & objective
- Employ universal design, even if target audience has a specific type of disability
- Measure outputs, outcomes & impacts
- Address data collection challenges

Evaluation: Tips from the Field

Sheryl Burgstahler

Good resource: The 2002 User-Friendly Handbook for Project Evaluation

Evaluation Methods

- Surveys, interviews, focus groups regarding specific activities
- Institutional data (degrees, majors, institutional changes)
- Participant longitudinal transitions through critical junctures

Conclusions

–For students,

- Increase the overall pool of college graduates with disabilities to increase computing degrees
- Provide motivational activities to recruit students without initial interests in computing
- For students with computing interests, comprehensive interventions have more impact than isolated efforts

–Institutional change is needed, too

Project Planning, Implementation, & Evaluation: Tips from the Field

Panel: Richard Ladner

Samantha Langley

Stephanie Ludi

Working Group Meetings

Continue project planning, with a focus on evaluation

Working Lunch

Continue to discuss potential proposals

Debriefing of Working Group Meetings

Share project implementation & evaluation ideas.

Working Group Meetings

Final topics

Debriefing Working Group Meetings

Share new ideas.

Reminder: Desired Impact

BPC disability-related projects will benefit society by

- Making computing opportunities available to more citizens &
- Enhancing computing fields with the expertise & perspectives of people with disabilities.

Evaluation

Complete the Institute final evaluation.

www.washington.edu/accesscomputing