Accessibility
CSEP 590
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Instructors
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Course Goals
• Introduction to accessibility technology and research
• Introduction to issues, policy, and laws related to accessibility
• Introduction to persons with disabilities (the users)

Student Engagement
• Reading
  Each unit will have a reading assignment
• In-class and on-line discussion on lecture topics
• Project
  • One page project proposal with references due October 20th
  • 10 page project report on November 24th
  • 10 minute presentation on November 24th
  • Reading and commenting on others projects until December 5th.

CSE 590 W
• Students in CSE 590 W, Computers and Disabilities, will be attending our class and will participate in the discussion and reading project reports.
• Added expertise will help with discussion.

Grading
• Quality of participation in discussion, both in-class and on-line.
• Quality of the project
  • Depth of analysis
  • Organization
  • Writing
Guest Speakers

- Annuska Perkins, Microsoft
- Cynthia Shelly, Microsoft
- Krzysztof Gajos, Microsoft Research
- Kate Deibel, CSE
- Kurt Johnson, Dept. of Rehabilitation Medicine
- Mathai Philipose, Intel Research
- Susumu Harada, CSE
- Anna Cavender, CSE
- Jeff Bigham, CSE
- Julie Kientz, Technical Communication and Information School
- Jake Wobbrock, Information School
- Shaun Kane, Information School

Topics

- Disabilities
- Current solutions
- Research
- Policy and law
- Technology acceptance

Research Examples

- ClassInFocus
- VoiceDraw
- WebAnywhere
- Supple
- Abaris
- Barrier Pointing

Introductions

- Name
- PMP student or not
- If PMP, workplace
- If not, research area

Introduction to Accessibility

Richard Ladner

Reading

- Assistive and Mainstream Technologies for People with Disabilities. Chapter 7 from The Future of Disability. Institute of Medicine of the National Academies. 2007.
National Federation of the Blind
Speech Themes
• My background
• Importance of diversity
• Access technology
• Empowerment

Outline
• Persons with disabilities
• Access technology
• Access technology research

World Health Organization
• International Classification of Functioning, Disability and Health (ICF), 2001
  › Health: umbrella term for disease, disorder, injury, or trauma.
  › Functioning: umbrella term for body functions and structures, activities, and participation.
  › Disability: umbrella term for impairments, activity limitations, and participation restrictions.

Basic Data
• 16% of US population to ages 15 to 64 is disabled.
• 10% of the workforce is disabled
• 5% of the STEM workforce is disabled
• 1% of PhDs in STEM are disabled

Demographics General Population

Demographics Ages 14-21

Categories of Disability
- Vision
- Hearing/Speech
- Mobility/Motor/Dexterity
- Cognitive

Conditions that Cause Mobility/Motor/Dexterity Disabilities
- Cerebral Palsy
- Muscular Dystrophy
- Spinal Cord Injury
- Missing limbs

Conditions that Cause Cognitive Disabilities
- Dyslexia
- Attention Deficit/Hyperactivity Disorder (ADHD)
- Autism
- Asberger’s Syndrome
- Downs Syndrome

Onset of Disability
- Born with a disability
- Caused by illness of accident
- Coincident with aging

Example: Onset of Deafness
- Born deaf
  - There are genetic causes of deafness
- Deaf before speech (prelingual)
  - Spinal meningitis still causes deafness in babies
- Deaf after learning to speak and hear (postlingual)
- Deaf late in life
  - Most common

Degree of Disability
- Mild
  - Possibly correctable
- Moderate
  - Inconvenient
  - Possibly partially correctable
- Profound
  - A serious impediment in everyday life
  - Possibly partially correctable
Example: Degree of Vision Disability

- Correctable with glasses or contacts.
- Cataracts
- Color blindness
- Retinitis Pigmentosa (tunnel vision)
- Macular Degeneration
- Fully blind

Stability of Condition

- Stable
  - Cerebral Palsy
  - Genetic forms of deafness
- Degenerative
  - Retinitis Pigmentosa
  - Macular Degeneration
  - Muscular Dystrophy
  - Usher’s Syndrome
  - Many age related disabilities

Multiple Disabilities

- Deaf-blindness
  - Usher’s Syndrome
- Attention Deficit/Hyperactivity Disorder (ADHD) and Dyslexia
- Deaf with Cerebral Palsy (CP)
- Deaf with Asbergers Syndrome

Models of Disability

- Medical Model
  - Disabled people are patients who need treatment and/or cure.
- Rehabilitation Model
  - Disabled people need assistive technology or human assistance for employment and everyday life.
- Legal Model
  - Disabled people are citizens who have rights and responsibilities like other citizens. Accessibility to voting, television, and telephone are some of those rights.
- Social Model
  - Disabled people are part of the diversity of life, not necessarily in need of treatment and cure. They do need access when possible and have legal rights.

Examples

- A deaf couple rejoices at learning their newborn is also deaf.
- Citing the Americans with Disabilities Act (ADA) blind man sues Target because its web page is not accessible using a screen reader, and wins.

Terminology

- Impairment
  - Characterizes physical, mental, physiological loss or injury.
- Disability
  - Refers to a functional limitation.
- Handicap
  - Barrier or problem caused by society or environment.

American Psychological Association
Terms to Avoid

- Terms that identify people with their disability
  - “the deaf”, “the blind”, “the disabled”
- Trendy Euphemisms
  - “physically challenged”, “special”, “differently-abled”
- Derogatory terms
  - “deaf and dumb”, “retarded”, “handicapped”, “deviant”

The Trouble with “Impaired”

- Hearing Impaired, Vision Impaired, Mobility Impaired are in common use.
- Many feel that the word “impaired” accentuates the negative.
- “Impaired” has its roots in the medical, education, and rehabilitation fields and not from the disabled people themselves.

“Disability”

- “Person with disability”
  - Put the person first, rather than the disability
  - Politically correct in US
- “Disabled person”
  - Putting the adjective before the noun does not normally emphasize the adjective in English. It describes the noun.
  - Politically correct in UK

Examples of Terminology

- National Association of the Deaf
  - “The mission of the NAD is to preserve, protect and promote the civil, human and linguistic rights of deaf and hard of hearing individuals in the United States of America.”
- National Federation of the Blind
  - “The NFB is a consumer organization of blind people working together to improve opportunities for the blind and the understanding of blindness by the general public.”

Outline

- Persons with disabilities
- Access technology
- Access technology research

Technology

- Prosthesis
  - Augmentation to restore lost function. Call it a “cure.”
- Assistive technology
  - Popular in rehabilitation literature. Emphasis on the need for assistance.
- Access technology
  - Allows an activity that would be difficult to impossible to achieve without it. Emphasis not on restoring function, but on achieving an end goal by whatever means possible.
  - Examples: Screen readers, video phones, wheelchairs
### Access Technology Approaches

- Technology to augment an individuals’ abilities.
  - Hearing aid
  - Voice input device
  - Screen reader
  - Cane
- Change the environment to compensate for individuals’ abilities
  - Curb cuts
  - Closed captions
  - Braille lettering in public places
  - Adherence to web accessibility guidelines

### Mainstream Technology

- The purpose of much of technology is to make all our lives a bit easier
- A mainstream technology may provide accessibility by its very nature.
  - Instant messaging
  - Video phone
  - Golf carts

### Universal Design

- Design of environments, products and services to be used with people with a wide range of abilities.

### Influence of Access Technology

- Technology invented for accessibility may become mainstream
  - Telephone
  - Optical Character Recognition
  - Speech Synthesis
  - Speech Recognition
  - Synchronous texting
  - Mobile GPS

### Alternative Computer Input Devices

Thanks to Dan Comden, Director of the UW Access Technology Lab
Glidepoint Touchpad Trackball

Joystick – mouse alternate

Head Pointing system

Headmouse transceiver

ProPoint & Thumbelina

Rollermouse + large keys
Alternative Computer Output Devices

Thanks to Dan Comden, Director of the UW Access Technology Lab

Technology for Deaf People
Hearing Technology

• Hearing Aids
• FM Systems
• Cochlear Implants

Latest Hearing Aid

• Lyric

FM Systems

• Personal
• Public (Opera House, ...)

Cochlear Implant

“Normal” ear
Implanted ear

Texting

• TTY
• TTY Relay Service
• E-mail
• Instant Messaging
• Captions

TTY

TTY circa 1970
Modern TTY with built-in acoustic modem
TTY Relay

E-Mail / Instant Messaging

Closed Captions

Closed vs. Open Captions

- Closed Captions
  - Optional
- Open Captions
  - Always on the screen
  - Like subtitles for foreign language films
- Leader - WGBH Media Access Group

Video

- Video Phone
- Video Relay Service (VRS)
- Video Remote Interpreting (VRI)
- MobileASL (UW Project)

Picturephone

“Picturephone” demonstrated by AT&T at the 1964 World’s Fair

- Required too much bandwidth for phone system
- Deaf world excited then disappointed
Video Phone

Ubiquitous Video Phones

Video Relay Service (VRS)

Video Remote Interpreting (VRI)

Outline

• Persons with disabilities
• Access technology
• Access technology research

Access Technology Research

• Industry
  ◦ Hundred of small companies
  ◦ Google, Microsoft, IBM have some major efforts
• Universities
  ◦ UW is a leading school
  ◦ SUNY Stony Brook, University of Maryland, Baltimore County, Colorado, Wisconsin
  ◦ Japan, UK, and many other countries have major universities and government programs.
• Centers
  ◦ Trace Center, Smith-Kettlewell
Accessibility Conferences

- International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS)
- Conference on Technology & Persons with Disabilities Conference (CSUN)
- Assistive Technology Industry Association (ATIA) Conference
- Closing the Gap Conference
- Accessing Higher Ground: Accessible Media, Web and Technology Conference.
- International Conference on Computers Helping People with Special Needs (ICCHP)
- International Cross-Disciplinary Conference on Web Accessibility (W4A)

Mainstream Conferences

- More and more accessibility research appears at mainstream conferences
  - ACM CHI
  - IUI – Intelligent User Interfaces
  - DIS – Designing Interactive Systems

CHI “Disability” Search

- Year      | Number
- 1982 – 85 | 0
- 1986 – 90 | 10
- 1990 – 95 | 15
- 1996 – 00 | 20
- 2001 – 05 | 90
- 2006 – 07 | 50 (2 years)

Overview of Accessibility