Assistive Technology and Accessible Technology Design

Richard Ladner
Sheryl Burgstahler

University of Washington
Seattle
Access to IT is Important Because IT Advances:

- change the way we live, work, learn, & communicate, & play
- drive advances in other fields
- power the economy

A collaboration between:

UW Computer Science & Engineering

DO-IT Center (Disabilities, Opportunities, Internetworking & Technology)
Technology can increase:

- independence
- productivity
- participation

in

- education
- careers
- family life
- community
- recreation
Assistive Technology
Very Short History of AT: Rodney & the Apple II

- 6 years old
- No use of hands & legs
- Used mouth wand
- Issue: Could not press 2 keys at once
- Solution: Engineering student built switch box to lock shift, control, repeat keys
Now: Thousands of Products

Closing the Gap Resource Directory 2012 provides just a sample of available products:

- 342 hardware products
- 982 software products
- 112 other AT
- 251 producers of AT
Conferences—Technology for People with Disabilities

- *Closing the Gap Conference, October, Minneapolis, MN*
- *California State University Conference on Technology for People with Disabilities, March, San Diego, CA*
- *Accessing Higher Ground, CO*
Examples of AT

- Mobility
- Communication
- Low vision
- No vision
- Hearing impairment
- Learning issues
  (e.g., reading, writing)
AT for Mobility: Mouse/Pointer Alternative

- keyboard
- head pointer
touchpad  trackball  joystick
foot-operated mouse
AT for Mobility: Keyboard

- on-screen keyboard
- alternate keyboards (mini, expanded, one-handed, “ergonomic”)
- sw tools (sticky keys, …)
Consider too...

- speech recognition
- Morse code input

- building, room, furniture accessibility
- location of controls
- wrist/arm supports
- Seating, positioning, mounting
AT for Low Vision

- large monitor
- enlarged keyboard labels
- screen/text enlargement
- video magnifiers
AT for No Vision

- scanner, OCR, speech output
- Braille refreshable & embossed displays
AT for Learning Issues

- scanning, OCR, speech output
- word prediction, abbreviation expansion
- large print, highlighting, color options
- speech input
- idea organizers
- spell/grammar checkers
Flexible, Multi-feature Software
Example: Read & Write GOLD

Toolbar with collection of literacy support tools for reading, writing, studying, research

- OCR, scanning, speech output
- Voice recognition
- Use with Word & other software
Other Technology for Learning Issues

- “Smart pens”
  - With OCR, speech output
  - To record lectures linked to specific notes (LiveScribe)
- Talking calculators
- Post-it notes, highlighter pens, ...
- Large-print documents on colored paper, ...
Sang-Mook Lee, Ph.D.
Geoscience Professor, Seoul National University

- sip & puff, head controls
- onscreen keyboard
- English speech input
- phone-computer interface
Anthony Arnold  
AT Specialist  
Prentke Romich

- synthesized voice on communication device
- touch screen
- computer-based environmental control, phone access
Kayla Brown
UW student

- laptop computer
- miniature mouse
- speech recognition
- smart phone
Imke Durre, Ph.D.
Climatologist
National Weather Service

- speech output
- Braille translation software
- Braille display & printer
- speech input
- Morse code foot switch
Accessible Technology Design
U.S. Federal Laws That Affect IT Accessibility

- Americans with Disabilities Act—Civil rights legislation for everyone
- Section 508 of the Rehabilitation Act—Procurement legislation for Federal government)
UW Accessible IT Task Force

- Enhancement of online resources
- Promotion of accessible IT
- Exploration of policies & processes
Universally-designed Video

- Address multiple audiences in design
- Film with captions in mind
- Large, clear captions
- Searchable captions
- Design so that key content is spoken as well as visually presented
- Content clearly organized
- Audio-described version available
Beneficiaries of UD include people who:

- are unable to hear the audio
- are unable to see the video
- are unable to use a mouse
- are limited in English skills
- do not speak English
- are in a noisy/noiseless location
- have slow Internet connections
- need to find content quickly

uw.edu/doit/video
Universally-Designed Website

- Perceivable
- Operable
- Understandable
- Robust

- World Wide Web Consortium (W3C)
  WCAG 2.0
Accessible Website Design

- Standard HTML
- Alternative text for images
- Simple backgrounds
- Appropriate color schemes & contrast
- Descriptive link text
- Avoid reliance on mouse-only input
- ...
Test a Web Page for Accessibility

- Turn off graphics
- Turn off sound
- Use only keyboard
- Use accessibility checker tools (e.g., SiteImprove)
Web Design & Development I
Course Curriculum

UNIT 1
Module 3: Web Standards and Accessible Design

Overview
The purpose of this module is to assure that your web projects are accessible to all possible users. Computer users are incredibly diverse. They access the Web using a wide variety of browsers on different operating systems. They have different screen resolutions, font sizes, and color schemes. Many users access the Web on tablet computers with touch screens, or on mobile phones. Many users have disabilities and access the web with custom configurations or using assistive technologies. Web standards are the rules that govern how web pages are built so they work for all these different users. In this module you will learn about standard web coding languages, HTML and CSS, and will learn about the different versions of HTML that are available. You will also learn how web pages can erect barriers for users with disabilities if they aren’t designed and coded properly, and will learn about accessibility standards that help you to create web pages that are fully accessible to everyone.

Lessons
- Lesson 1: Web Standards
- Lesson 2: How People with Disabilities Access the Web

http://uw.edu/accesscomputing/webd2
Course Features

- *Teaches standards-based & accessible web design*
- *Accessible design is taught early as a core design principle, & reinforced throughout the course*
- *For assignments students must use valid code & conform to accessibility standards*
Accessible Design of Online Learning, Issues:

- Guidelines/standards to adopt
- Policies & procedures that promote accessible design
- Use of content management systems that facilitate the creation of accessible courses
- Professional development of faculty & online course designers
Some Macintosh OS X &/or Windows 7 Accessibility Features

- sticky keys, mouse keys
- keyboard/mouse customizations/shortcuts
- visual notifications for audio alerts
- variable colors, contrast
- screen/text enlargement
- speech output
- speech recognition
iPhone Accessibility

- speech output
- speech input
- screen/text enlargement
- variable colors/contrast
- audible, visible, vibrating alerts
- assignable ringtones
- Bluetooth connectivity for keyboard, refreshable Braille display, ...
Goals for All IT

- Build in accessibility features
- Ensure compatibility with AT
Reported IT Benefits: I can...

- type/speak homework assignments
- translate documents into Braille myself
- use word processing/presentation/spreadsheet software & read books with speech output
- scan printed documents & let my computer read to me
- read a document quietly/privately with a Braille display
Reported IT Benefits: I can...

- (with captions) understand video content
- organize my papers, schedule, bills, ...
- research, bank, shop, take courses online
- record lectures
- operate a telephone
- control my environment
- engage in conversations even though I cannot speak
Reported Needs:

- easy-to-push exterior buttons on my phone
- voice recognition in more languages
- more interactive tutors to help with mathematics
- more accurate automatic captioning for videos
- better hardware/software support
- lower cost AT
- take the “A” out of “AT”
Anthony:

- “…assistive & mainstream technology companies need to work together in order for people with disabilities to get better results with their products.”

- “…we need to continue to prepare future developers on accessibility issues.”
Issues

- 1/3 of AT purchased is abandoned
- Ubiquitous computer-based devices
- Greater awareness, but increasing numbers of IT developers to be reached
- No longer reasonable alternatives to IT access
- Segregation vs integration for people using AT
- Unique access & use challenges of elderly