

# **6.S196 / PPAT: Principles and Practice of Assistive Technology**

Today: Course Overview and Structure;  
Assistive Technology Terminology

Wednesday, 7 Sept. 2011  
Prof. Seth Teller

## Today

- Staff introductions
- Definition of AT
- Class goals
- Textbook
- Partner organizations
- Term structure and key dates
- Grading
- Resources
- Terminology and language
- Lab (*today* at 3pm in 32-044)

## Staff

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## What is Assistive Technology?

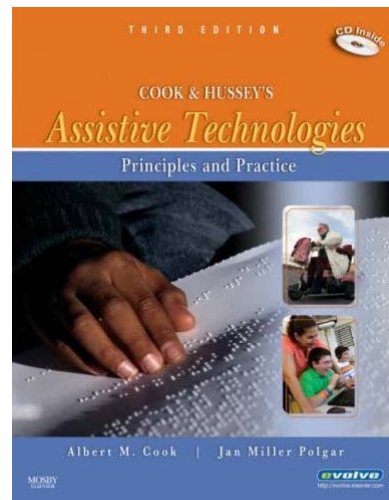
- A device, service or process that eases or facilitates performance of some daily living task and/or participation in some activity in some environmental/social context
  
- Assistive technology is a broad and necessarily interdisciplinary field, involving mechanical design, materials, electronics, software, cognitive science ...

## Goals

- Broad introduction to assistive technology
  - Terminology, models, approaches, characteristics
- Term-long small-team project with a “client”
  - Team will work with a person living with a disability
  - Practitioners (clinicians, therapists, technicians)
  - Practice contextual inquiry, systems thinking, spiral design and implementation, evaluation
  - Feedback from staff/practitioner panels
- Explore opportunities beyond end of term
  - MIT AT group; MIT IDEAS Challenge; MIT100K

## Textbook

- Albert M. Cook and Jan Miller Polgar, Cook & Hussey's Assistive Technologies: Principles and Practice (Third Ed.)
- ~\$80 at the Coop
- Reserve copies available at Barker



## In Scope: Functional Deficits

- Human performance!
- Mobility impairment
- Motor impairment (manipulation)
- Communication impairment
- Sensory impairment
- Cognitive impairment

## Client Example 1

- B. has a neuromuscular disorder, producing reduced sensation and muscle atrophy in her hands and feet. She desires "help gripping small objects," help "holding my hand steady when I take photos (I have a tremor when I concentrate hard)." Also, as her "little fingers don't extend," she desires "a sleeping brace to help stretch those fingers." Requests modification of ankle foot orthoses to render them cooler and better-ventilated. B. also requests a brace that "enables me to swim and/or wade without injury to my ankles (which are affected by severe muscle atrophy in my ankles and feet)." B. desires "something to hold on to (or that holds on to me) to keep me from falling off of the Wii balance board when playing Wii Fit."

## Client Example 2

- M. has low vision, manifesting as an inability to discern text, signage and objects from their surroundings. He desires a means of providing visual amplification and contrast enhancement to support tasks such as menu-reading in dim restaurants and sign-finding in stores. He also desires a hands-free mode in which he can see a contrast-enhanced image of the workspace in front of him, to support tasks such as woodworking (he currently organizes materials by row and column in bins, and finds them by feel). M. desires verbal warning of imminent body collisions (chair, table, door, doorjamb). Desires means of finding small objects (keys, wallet, etc.) at home.

## Client Example 3

- S. has a brain injury, which produces deficits in short-term and working memory. She finds existing reminder devices "too simplistic," and past experience with multiple devices "overwhelming." She desires easy creation of "multiple, recurring alarms" that "do not interfere with one another." She wishes to have alarms announce themselves in her own voice rather than as "meaningless alarm tones." She desires easy creation of recurring alarms such as "drink water" (several times per day) or "take vitamins" (daily), as well as *in situ* creation of one-time reminders such as "car is parked on Level 3" or "attend class today at 1pm." Integration with a calendar program would be desirable.

## Partner Organizations

- MIT IS&T AT Information Center (ATIC)
- MIT Public Service Center
- MIT Hobby Shop
- Braintree Rehabilitation Hospital
- The Boston Home (Dorchester)
- The Carroll Center for the Blind (Newton)
- Leonard Florence Center for Living (Chelsea)

## Term Structure and Key Dates

- Week 1: Introduction and overview
- Week 2: Team formation & client matching
- Week 3: Contextual inquiry
- Week 4: Brainstorming, V1 prototyping
- Week 5: Evaluation metrics
- Week 6: First Panel
- Week 7: Write up initial findings

## Term Structure, Key Dates (cont.)

- Week 8: V1 development (cont.)
- Week 9: User testing
- Week 10: V2 development
- Week 11: User testing
- Week 12: V3 development
- Week 13: User testing
- Week 14: Write up final report
- Week 15: End-of-term Panel

## What to Expect

- Intensive work with your teammates
- Regular contact with your client
  - Probably involving travel off campus
  - Certainly outside of scheduled lab times
- Weekly evaluation and feedback from staff
- Consultations with clinicians, practitioners
- Formal presentation opportunities (panels)
- Also: ethics, human subject experiments

## Grading

- Individual weekly assignments (20%)
- Writeup of initial findings (10%)
- Weekly project deliverables (35%)
- Week 6 & 15 panel presentations (20%)
- Writeup of final report (15%)
- Class participation (qualitative)
- No exams, midterm or final

## Resources

- Web site (with resource links), textbook
- Course staff
  - Help facilitate client contact
  - Help scoping your team project
  - Provide regular feedback on progress, direction
- Partner organizations
  - Source of clients, clinicians and practitioners
- Rapid prototyping facilities (e.g. hobby shop)
  - Wood shop, metal shop, waterjet, laserjet
  - Safety training, additional design guidance
  - Your own initiative (Edgerton, MITERS, etc.)
  - We'll cover associated fees, material costs



## AT Terminology

- Material drawn from [C&H] Chapters 1, 2

## Terminology and Language

- Definition of AT: "The broad range of devices, services, strategies, and practices that are conceived and applied to ameliorate the problems faced by individuals who have disabilities."
- Note: AT is about more than devices; key endeavor is application of knowledge
- Note: as a discipline, AT practitioners or providers [ATPs] focus on *addressing functional deficits* in some *task context*

## Rehabilitative vs. Assistive

- Rehabilitative technology
  - Focus on regaining function or capability after injury or illness; used for remediation of loss of function, rather than being part of person's daily activities. Could include educational technology (e.g. cognitive retraining software). Intended for transient use.
- Assistive technology
  - Client comes as s/he is, with existing capabilities and limitations. ATPs define a device or system that addresses the client's needs and wishes. Intended for life-long use. Main focus of this class.

## People-First Language

- Deprecated terms (no longer in common use): retarded, epileptic, crippled, quadriplegic etc.
- Disability no longer the sole adjective that defines the person; it is something that a person is living with, just as he or she has other characteristics
- Focus on the person (and the function to be augmented or provided), not on the disability
- Thus: person with developmental disability, person with epilepsy, person who uses a wheelchair
- But: choice of language is complex and can often be contentious. Subject of today's Lab.

## Activity and Participation

- Activity: "execution of tasks" [ICF]
- Participation: "involvement in life situations"
- Concepts are not entirely distinct
- Example components of activity and participation: "learning, applying knowledge, communication, mobility, self-care, community, social and civic life;" access to public, private, built and natural spaces; access to people and animals that provide support.

ICF = *WHO International Classification of Functioning, Disability and Health*

## Hard and Soft Technologies

- Hard technologies
  - Tangible
  - Assembled from readily available components
  - Mouth sticks, computers, software, ...
- Soft technologies
  - Decision making, strategies, training, service delivery
  - People, written or on-line documentation & processes
  - Dependent on human knowledge; harder to obtain
- Both are integral to AT systems

## Appliances and Tools

- Appliance: “provides benefits to the individual independent of the individual’s skill level”
  - E.g. glasses, splints, seating system
- Tool: “requires development of skill for use”
  - E.g. mouth stick, speech interface, power chair
  - Require training, strategies, skills (soft techs!)
  - PWD may be only one in env’t using the tool
- Design may render tools (e.g. complex, multi-part environmental control systems\*) as appliances

\*Also called EADLs (electronic aids for daily living)

## Orthotics and Prosthetics

- Orthotic devices (or orthoses): devices that assist or augment function
- Prosthetic devices (or prosthetics): devices that provide a functional replacement

## Other AT Terminology

- Minimal vs. maximal technology
- General vs. specific technology
- Commercial vs. custom technology
- See C&H Chapter 1 for discussion

## Coming Up

- *Come to lab this afternoon!* 3pm in 32-044.
- No meeting this Friday
- Monday lecture:
  - Assistive technology system models
  - Read Chapter 1 of Cook & Hussey
- Monday lab: wheelchair mobility exercise
  - Meet in 32-044 at 3pm
  - Wear comfortable clothes
- Wednesday lecture
  - MIT Assistive Technology Information Center (ATIC)

## Before You Leave

- Please fill out the (hardcopy) skills and teaming questionnaire and give it to the course staff