Technology and the Deaf and Hard of Hearing Community

Anna Cavender

11/17/2008

Outline

- Technology and DHH Audiences
- Research projects here at UW
  - MobileASL
  - ClassInFocus
  - ASL-STEM Forum
- Other research on technology for DHH

TTY

- Developed 1964 by Robert Weitbrecht , deaf physicist
- Specific Etiquette:

Code	Meaning
BRB	Be Right Back
CU	See You (be seeing you)
GA	Go Ahead
SK	Stop Keying
SKSK	Now hanging up
Q, QQ, QM	Question Mark (?)
PLS	Please
OIC	Oh, I See
TMW	Tomorrow
THX	Thanks
WRU	Who are You? (or Where are You)

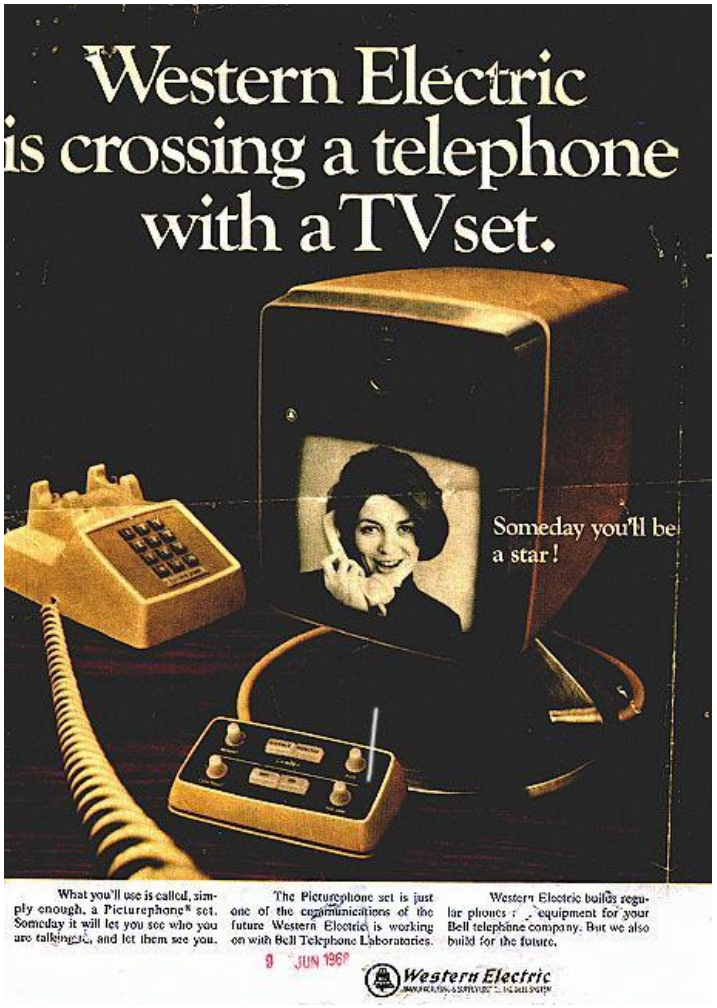
Pros:

- Access to phone network

Cons:

- Communication in English, not ASL

Picturephone



"Picturephone" demonstrated by AT&T at the 1964 World's Fair

Pros:

- Communication in ASL

Cons:

- Required too much bandwidth for phone system
- Deaf Community excited, then disappointed

Text Messaging

Blackberry, Treo, iPhone, etc.

Pros:

- Access to cell phone network
- Cheap and low-tech

Cons:

- Communication in English, not ASL

Today's Video Phone

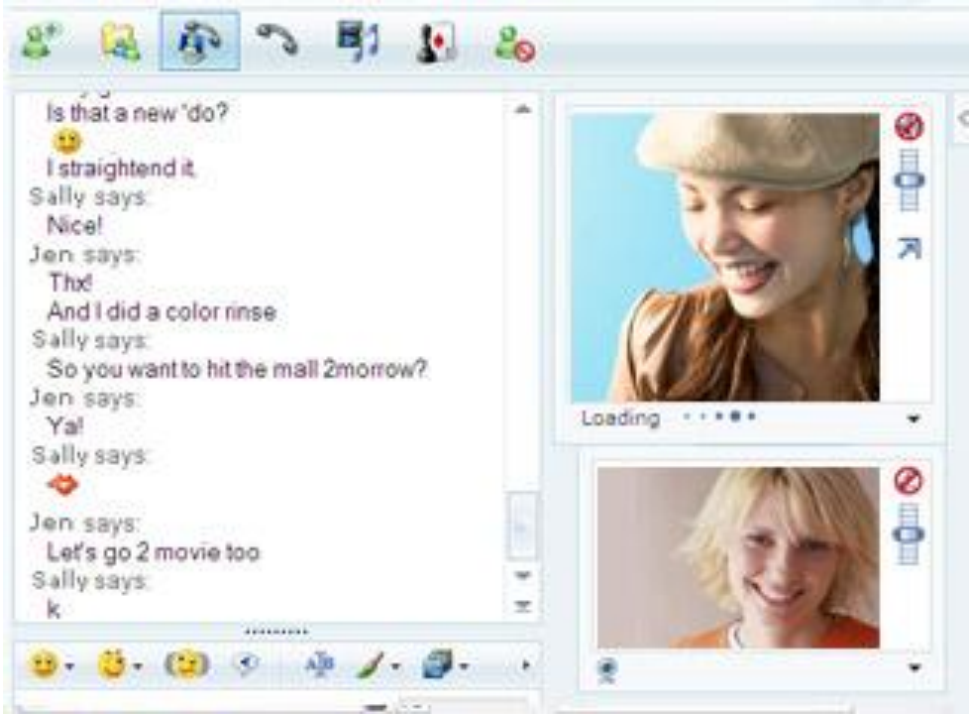
Many video chat and video conferencing services.

Pros:

- Communicate in ASL or English.
- No dedicated device

Cons:

- Requires high bandwidth for intelligible sign language



Windows Messenger

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MobileASL

- Deaf people in the U.S. could use video cell phones to communicate in American Sign Language (ASL)
- Problems: low network bandwidths, small cell phone processors
- Solution: video compression specific to sign language

DHH Cyber Community

GOAL: Better include deaf and hard of hearing students in mainstream universities

ClassInFocus:

Better access in the classroom through technology

ASL-STEM Forum:

Growing ASL for Science, Technology, Engineering, Math

DHH Cyber-Community

- **ClassInFocus: Enabling access to STEM* education**
  - High bandwidth connections between universities
  - Networked classrooms allow students to control learning environment

- **ASL-STEM Forum: Enabling ASL to grow in STEM***
  - Online video forum (vlog) to facilitate discussion about signing for STEM

* STEM = Science, Technology, Engineering, Math

Public Law 94-142 (for K-12)

- Individuals with Disabilities Education ACT (IDEA)

  "All children with disabilities are assured a free appropriate public education"

- Shift from centralized residential schools to programs within mainstream schools
  - 85% of d/hh students at mainstream schools
- Trickle through to post-secondary enrollment

M. E. Ross and M. A. Karchmer. Demographics of deaf education: More students in more places. (151:2):95–104, 2006.

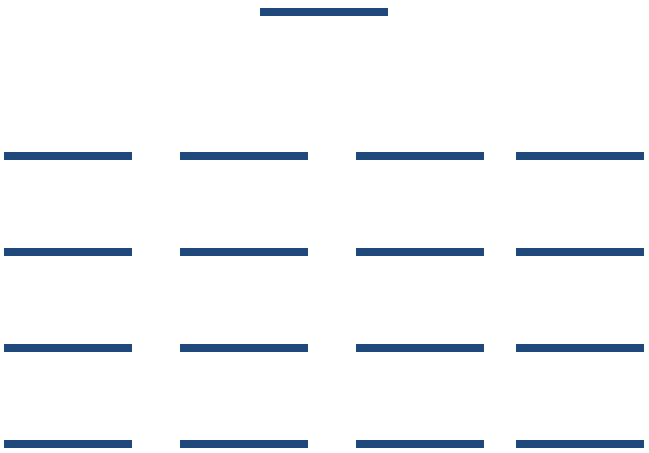
Post-secondary Demographics

- 25,000 deaf and hard of hearing students enrolled in ~4,000 post-secondary institutes in U.S.
- 95% of colleges/universities serve 1 or more deaf or hard of hearing student
  - Students are dispersed thinly
- Increased enrollment at mainstream universities

National Center for Education Statistics (NCES) 1999.

Classroom layout

Typical Classroom



Deaf Classroom

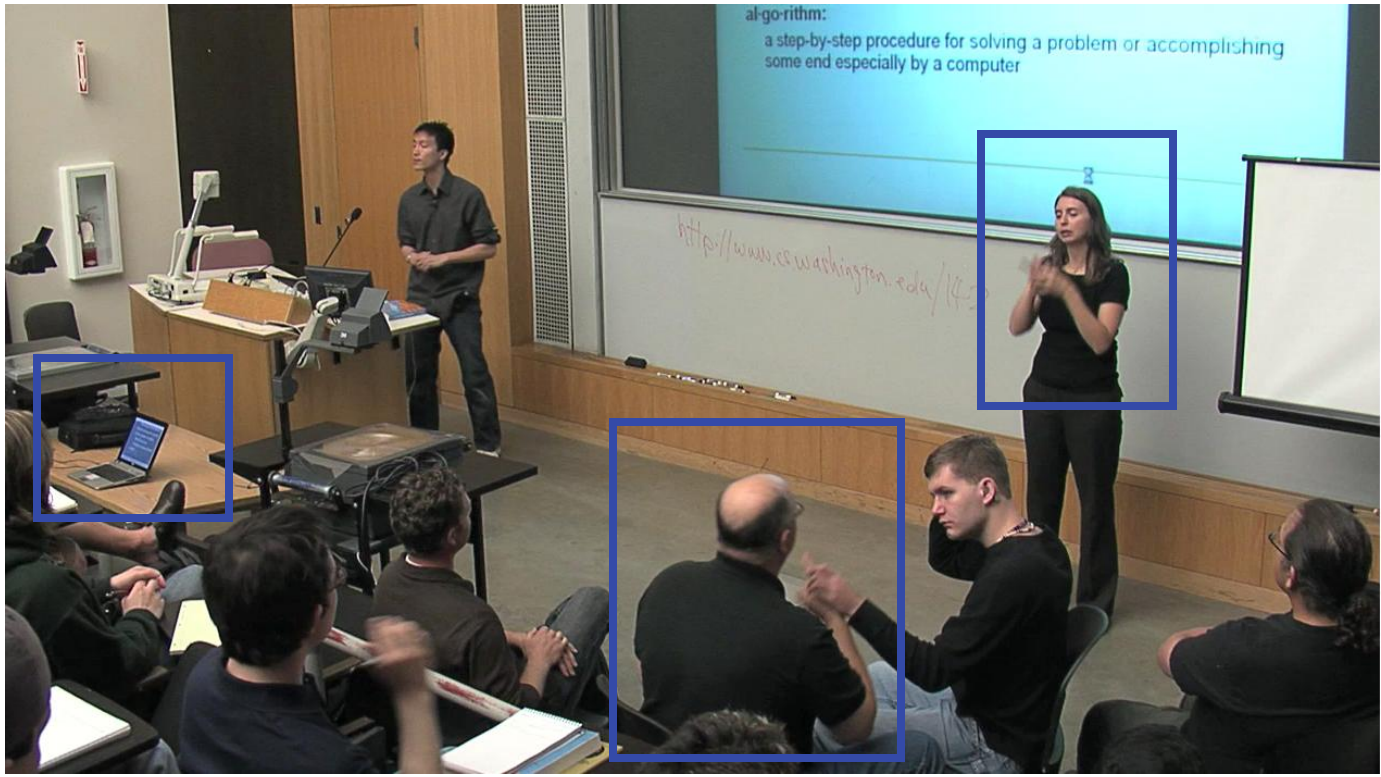
Classroom layout

Typical Classroom

Deaf Classroom

Current Accommodations

- Interpreters
- Real-time captionists
- Hearing aids
  - FM systems
- Note takers



Summer Academy for DHH 2007 – Intro to Programming

Problems:

Deaf and hard of hearing students in mainstream classrooms are often:

- Overloaded with visual information*
- Excluded from content*
- Isolated from peers*

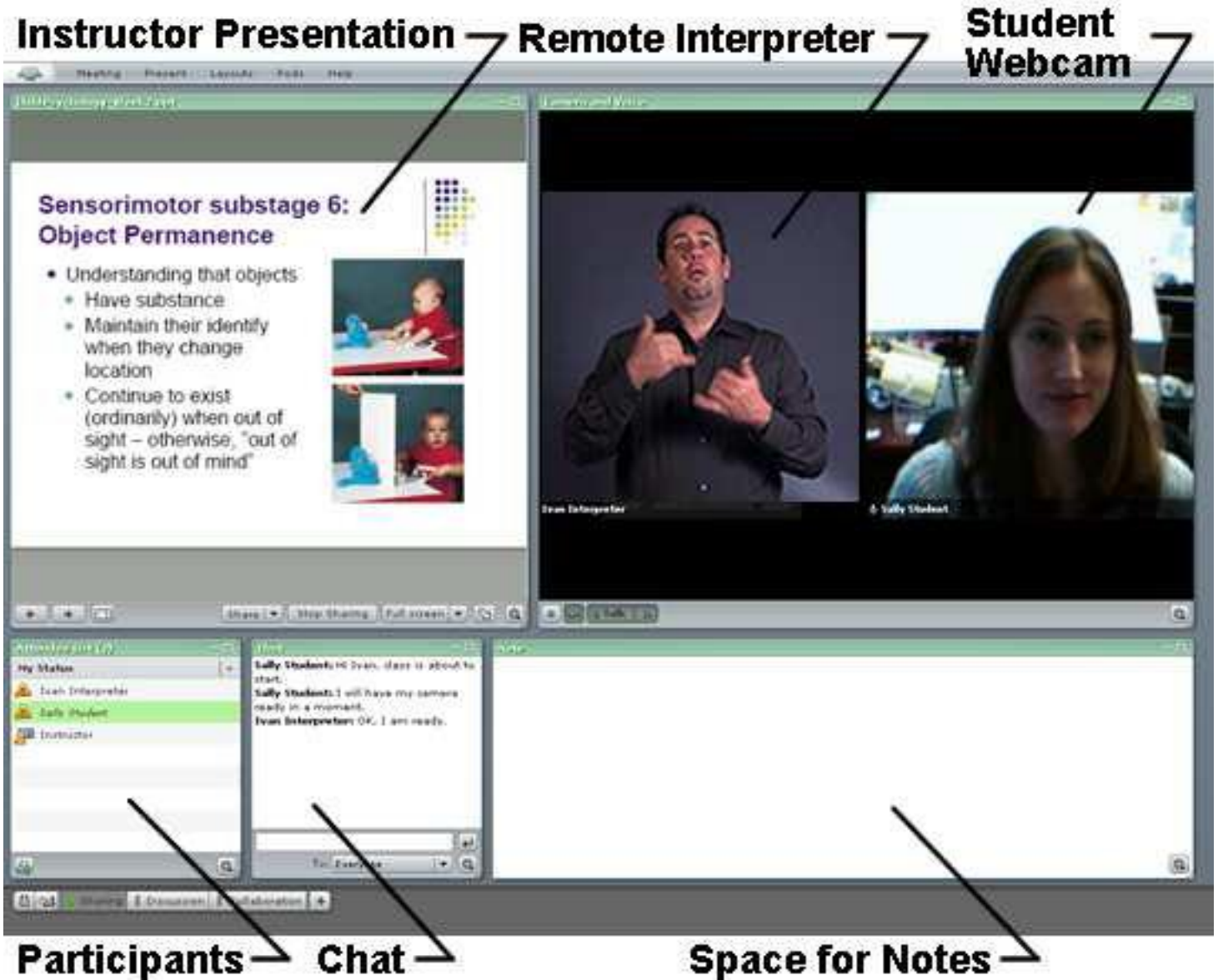
Proposed Solutions:

Modify existing technology to best suit the student by:

- Reducing visual dispersion
- Enhancing classroom collaboration
- Preserving missed content for later retrieval

* Harry G. Lang. Higher education for deaf students: Research priorities in the new millennium. *Journal of Deaf Studies and Deaf Education*, 2002.

ClassInFocus



Reduce Visual Dispersion

On-the-fly video modifications

- Cut, size, zoom, transparency, arrangement
- Student control of interface and layout

Enable Student Flexibility

- Personalized view of learning environment
- Independent choice of feeds:
  - slides, video, accommodation, etc.

Enhance Class Interaction

- Increase channels of communication
- Better support group work
  - Small group chat, whiteboard, project

Preserve Missed Content

- Help students find missed information
- Student-driven video segmentation

ASL-STEM Forum

Problem:

- Lack of scientific terminology in ASL
- Deaf STEM students widely dispersed
- Invented signs are lost

Solutions:

- Sign language dictionaries
- Use video-enabled social networking

Online Dictionaries

- Shodor Deaf-STEM
- RIT Comets
- Vcom3D Signing Dictionary

- Problems:
  - Not scalable
  - Limited coverage
  - Static
  - Avatars not as good as video

Navigate: Index Search

Programming Languages

- Abstract classes
- Abstract data types
- Abstraction
- Accessors
- Action events
- Actual parameters
- Algorithms
- API
- Applets
- Arguments
- ArrayList
- Arrays
- Assertions
- Asterisk
- Back trace
- Behavior (of an object)
- Binary numbers
- Binary Search
- Bits
- Boolean
- Bottom-up programming
- Break
- Buffer overruns
- Bugs
- Call stack

... >> Computer Science >> Programming Languages >> Computers

sub-topics

Parent topic: Programming Languages

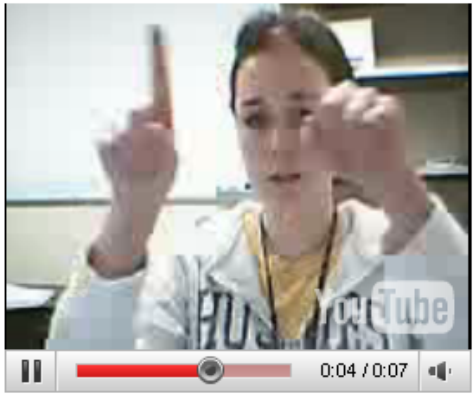
Definition: a machine that manipulates data and executes lists of instructions known as programs.

Source: Reges & Stepp, 2007

Example: Example sentence for context: "It will be useful to review some basic concepts about computers."

Other suggested signs for "Computers" (more...)

Highest Rated Sign



Video id: #27 (enlarge)
Post date: 3/13/2008
Posted by: jndewitt
Rating:

1 rating

See all signs (5) | Add a new sign

Sort by: Post time | Videos first | Displaying 2 comments of 2

Posted by plglaser, 21 days ago

I use the signing "Computer" similar to #22 but the movement is not right (Jessica uses the signing- get worse), I use "Computer" as "C" handshape- get better (C going up, not down on arm)

DHH Cyber Community

- Richard Ladner
- Anna Cavender
- Jeff Bigham
- Jessica DeWitt
- Daniel Otero
- Bill Clymer (RIT/NTID)
- James DeCaro (RIT/NTID)

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Signing Avatars

- "Translate" English to ASL
  - (limited vocabulary, human designer still needed).
- Used to augment webpages and/or educational materials
- One-way communication
- Example
- Not an interpreter

Matt Huenerfauth, Liming Zhao, Erdan Gu, Jan Allbeck. Evaluating American Sign Language generation through the participation of native ASL signers. ASSETS '07. 211-218.

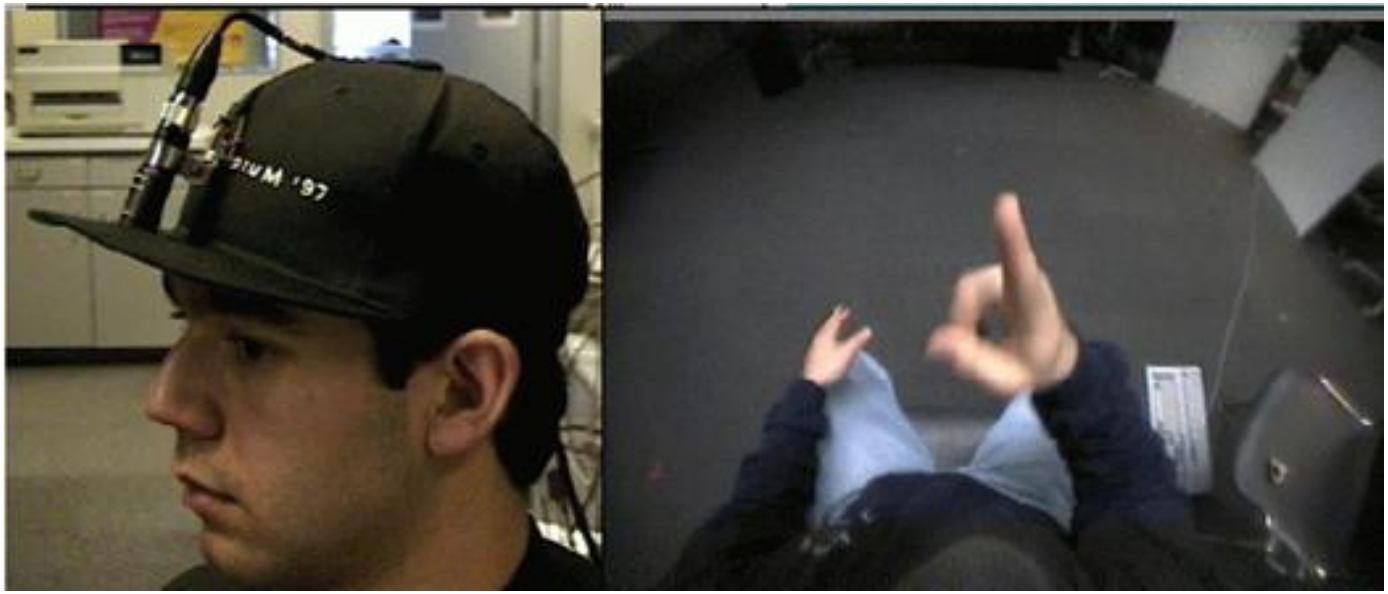
Tessa, VisiCast

- TESSA = Text and Sign Support Assistant
- Converts Post Office clerk's voice to BSL avatar
  - pre-trained voice recognition software
  - constrained set of words in post office context

Cox et. al. **Tessa, a system to aid communication with deaf people.** ASSETS 2002

Thad Starner

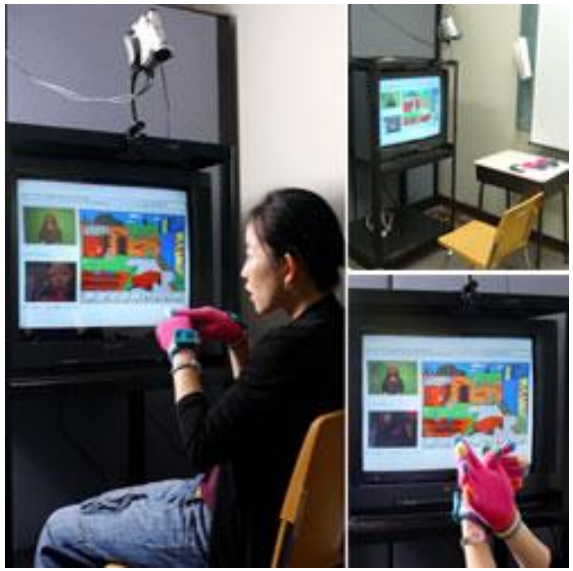
- ~20 word lexicon
- 96% correct when unconstrained
- 98% with added 5-word sentence constraint



Starner et. al. **Real-Time American Sign Language Recognition Using Desk and Wearable Computer Based Video.** IEEE Pattern Analysis and Machine Intelligence 1998

Copy Cat, ASL Game

- *CopyCat*
  - helps deaf children acquire language skills while playing the game
  - collects gesture data for ASL recognition system



Brashear et. al. **American sign language recognition in game development for deaf children.** ASSETS 2006

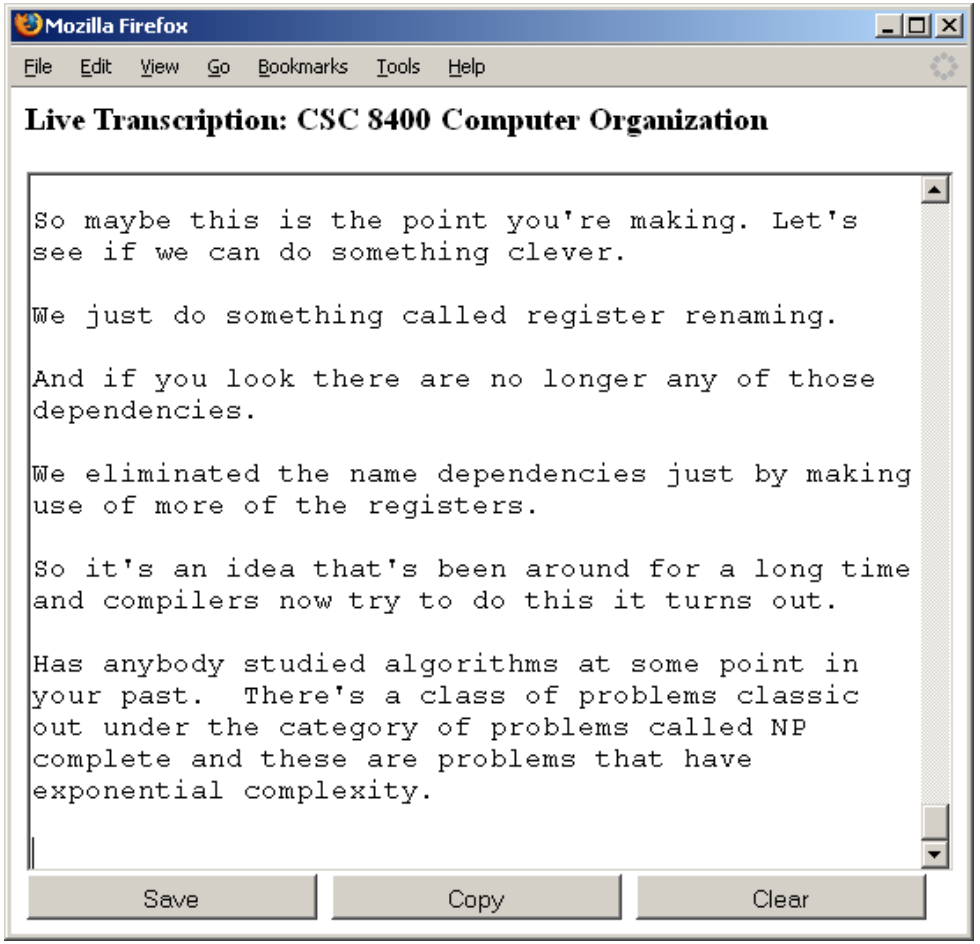
HandTalk

- Detects system-specific gestures
  - Not related to ASL
- Detects finger-spelling alphabet
- HandTalk Demo

Sarji et. al. HandTalk: Assistive Technology for the Deaf, Computer Magazine July 2008

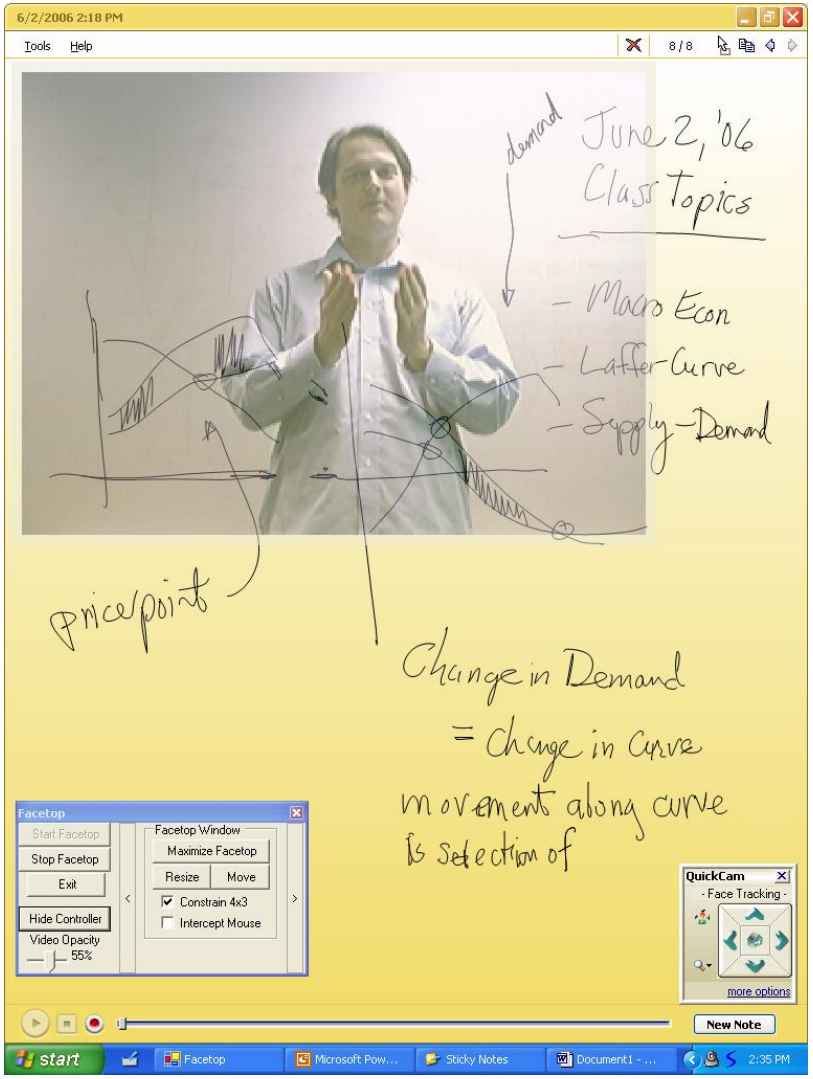
Automatic Voice Transcription

- Instructor trains the system on own voice prior
- Still research (high error rates)
- Not a captionist



Facetop Tablet

- Digital Ink and Video
- Reduces Visual Dispersion
- Increases participation (note-taking)



Facetop Tablet: Miller *et al.* ASSETS 2006.

SignLink Studio

- ASL is visual and dependent on time.
- Videos are unlike text – can't easily link
- Example Webpage completely in ASL
  - ASLPah

Lee et al. **Creating Sign Language Web Pages.** International Conference on Computers Helping People with Special Needs 2004

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MobileASL: mobileasl.cs.washington.edu

DHH Cyber Community: dhhcybercommunity.cs.washington.edu