Learning Disabilities and Universal Design

CSCI 497T/597T

What is a Learning Disability?

- Learning Disabilities are disorders that affect the ability to understand or use spoken or written language, do mathematical calculations, coordinate movements, or direct attention.
  - Examples: Dyslexia, Dysgraphia, sometimes referred to as learning difficulties
- Cognitive/Intellectual Disability: involves problems with general mental abilities that affect functioning in two areas:
  - intellectual functioning (such as learning, problem solving, judgement),
  - Adaptive functioning (activities of daily life such as communication and independent living)
  - Examples: Autism, ADHD

Functional Categorization Facilitates Design

- Individuals with learning disabilities may have problems with tasks related to
  - Memory
  - Problem solving
  - Attention
  - Reading, linguistic, and verbal comprehension
  - Math comprehension
  - Visual comprehension

Memory

- Types of memory: working (immediate) memory, short-term memory, and long term-memory
- Design consideration: recognition rather than recall

Attention

- Learning difficulty due to distractibility rather than inability to process information.
- Some are highly creative and very productive in short bursts, with an abundance of energy and enthusiasm
- Design consideration: minimalist design

Universal Design for Learning (UDL)

- Engagement (Why): to tap into learners' interests, and increase motivation.
  - Recruit interest
  - Sustain effort and persistence
  - Self regulation
- Representation (What): to give learners various ways of acquiring information and knowledge
  - Perception
  - Language and symbols
  - Comprehension
- Action and Expression (How): to provide learners alternatives for demonstrating what they know
  - Physical action
  - Expression and communication
  - Executive functions

Universal Design in Technology

- Equitable
- Adaptable – configuration and usage patterns
- Simple, intuitive, minimalist design
- Metaphors and mental models
- Perceptible information
- Error prevention and tolerance
- Low physical effort
- Size and space for approach and use
- Evolutionary learning via help and tutorials

Cognitive Accessibility in WCAG

- Existing W3C guidelines
  - 1.3 Adaptable, 1.4 Distinguishable
  - 2.2 Enough time, 2.4 Navigable
  - 3.1 Readable, 3.2 Predictable, 3.3 Input assistance
- Some cognitive accessibility user needs are not addressed in existing W3C standards.
- W3C is actively working to provide additional guidance on cognitive accessibility

Discussion

- What features would make a system inclusive?
- How to prepare computing professionals for building inclusive systems?

The UN Convention on the Rights of Persons with Disabilities recognizes access to information and communications technologies, including the Web, as a **basic human right.**

References

- Cognitive Disabilities
- Learning Disabilities
- Cognitive Accessibility at W3C
- Universal Design for Learning
- The 7 Principles of Universal Design