

Using Technology to Support Universal Design in Science



Samantha Langley-Turnbaugh
University of Southern Maine

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Session Outcomes

Participants will gain an understanding of:

- How students with varied abilities can access STEM course components and materials through technology (adaptive and assistive)
- How the incorporation of digital media supports universal design
- Where to find basic information about product accessibility

EAST- 2 Goals

- Increase the number of students with disabilities that enter STEM majors in college, focusing on Maine
- Increase number of students that successfully complete those degrees
- Increase the number of STEM faculty and high school teachers trained in learning strategies for students with disabilities, universal design in course design/ delivery, and educational technology
- Develop a collaborative community of support for SWD within and among high schools and higher education institutes in Maine.



Increase the number of students with disabilities receiving degrees in science, technology, engineering, and mathematics (STEM) and ultimately entering STEM careers.

High schools:

- High School Science Institutes/Camps
- Transition Planning

Higher Education:

- STEM Learning Community
- Undergraduate Research Fellowships
- Mentoring
- Peer Tutors
- Professional Development

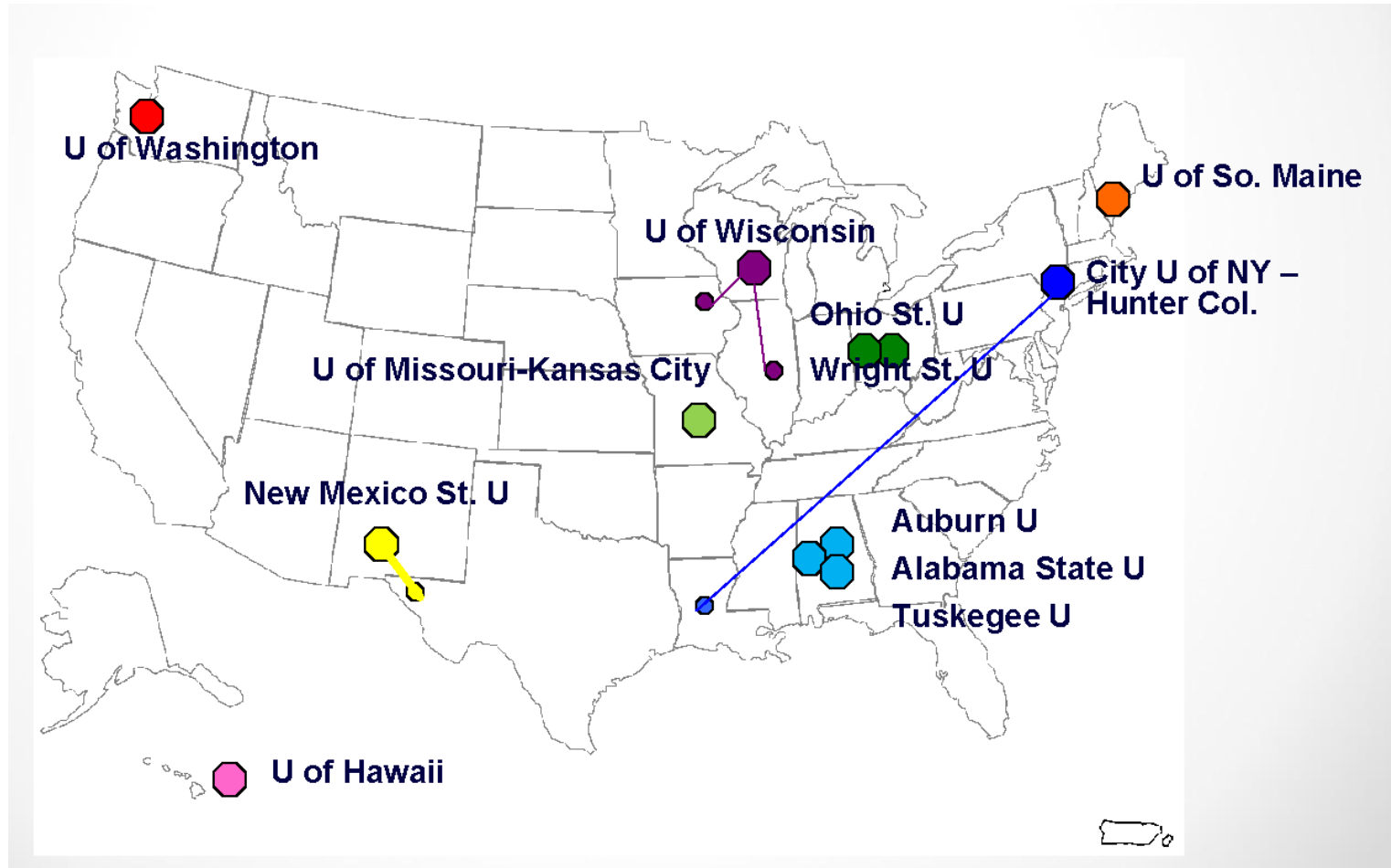


National Science Foundation

Research in Disabilities Education

Division of Human Resource Development

Alliances for Students with Disabilities in STEM 2009



EAST-2 Opportunities for high school students

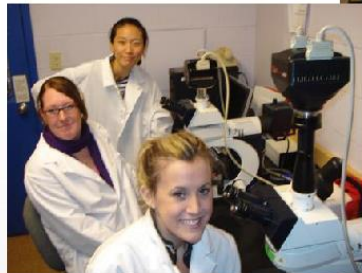


Get a jump on college success – join the EAST-2 STEM Learning Community!

- Get support navigating the college experience
- Connect with peers, faculty, and industry professionals
- Improve your study skills and learn new ones
- Improve your math, chemistry, & physics grades



Undergraduate Research Fellowships and Internships



Role of Technology in UDL

- Makes the classroom more accessible to the greatest number of learners
- Enhances good teaching
- Reduces the needs for accommodations

The Key Concept

Providing flexibility by using technology does not change the content of the curriculum. It broadens access by offering various means of learning.

Technology's Role in the Universal Design Framework

- Enables and accommodates *physical* access
- Facilitates *social* construction of knowledge
- Provides for multiple means of *learning*

Assistive Technology (AT)

“...any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.”

- 29 U.S.C. Sec 2202(2)

(A device, software program, or app that helps an individual to accomplish a task that would otherwise be impossible.)

Assistive Technology (AT)

It is usually when we talk about “high tech” options that we start talking about assistive or adaptive technology

Most people believe assistive technology is only for students with disabilities. This is not true. The use of assistive technology can benefit all learners.

Designing for Variability

Learners access, process, and communicate information in varied ways. Some of this variability is due to differences in:

- Sensory abilities
 - Seeing, hearing
- Physical abilities
 - Motor skills
- Learning and cognitive abilities
 - Visual-spatial, visual-verbal, language and phonological processing

Technology can be “Low Tech”

Calculator

Electronic Spell Check

Talking balances

Manipulation of font style, color, size

Tape recorder

Beeper/Buzzer - Time management

Technology can be “High Tech”

Computers with print-recognition software that "read" text aloud

Microsoft accessibility [Microsoft](#)

Apple accessibility [MAC](#)

Speech recognition systems that turn oral language into written text, [Dragon Naturally Speaking](#)

High Tech Assistive Technology Devices

- Talking [calculators](#) that assist people with math difficulties
- [AT Devices for Students Struggling in Math](#)
- Software that predicts and edits words and [grammar](#) for people who are prone to language difficulties.



High Tech Assistive Technology Devices

Assistive technology tools for organization and memory

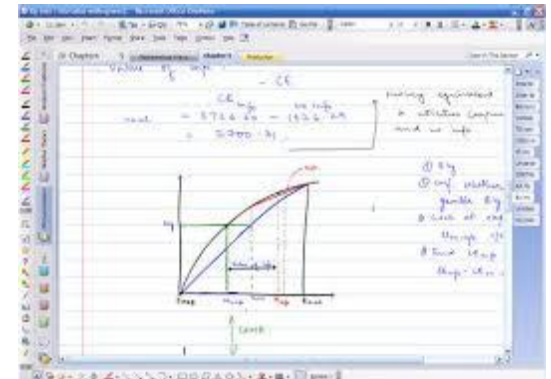
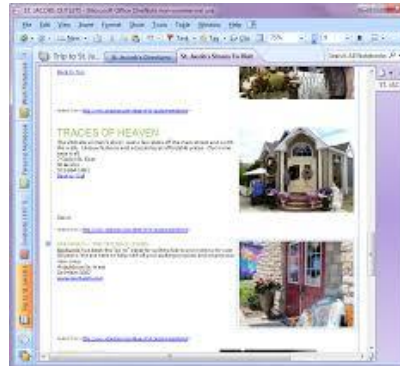
- Digital Pen for note taking

<http://www.livescribe.com/en-us/>



- PC/MAC Electronic notebook

<http://office.microsoft.com/en-us/onenote>



STEM Labs...

- Meters and probes with [audible readout](#)
- Talking thermometers, and balances
- Laboratory glassware with raised numbers
- Digital voice recorder
- Digital camera



Accessible Digital Text Documents

Can be read by all, regardless of mode of access.

- Students who:
 - Are sighted and read from the screen or choose to print it.
 - Who are blind and use screen reading software
 - Who have learning disabilities and use text-to-speech/literacy support software
 - Who have a physical disabilities and use switch-scanning software

Digital Text

- Malleable
 - Font, text size, color contrast, white space.
- Transformable
 - Converted to speech, audio file, braille.
- Transferrable
 - Copied and pasted to a student's preferred word processor or specialized program.

Examples: “.txt,” “.doc,” “.cwk,” “.rtf,” “ppt,” “html”

Text-to-Speech Software

Reads digital text aloud and includes additional scaffolds and features

- Basic options
 - Voice
 - Speed, volume, character
 - Highlighting
 - Color, word-by-word, sentence-by-sentence, etc.
 - Magnification
 - Color contrast
- Advanced options
 - Text and voice note insertions
 - Instant on-demand dictionary features
 - Study skills features

Accessible Content Media Online Digital Libraries for Science

- National Science Digital Library www.nsd1.org
- BiosciEdNet www.bioscienednet.org
- Digital Library for Earth System Education www.dlese.org
- Accessible Google <http://labs.google.com/accessible/>

Summary

- Universal design integrates best practices (i.e., what contemporary research tells us about how people learn) with technologies that support and promote learning in all aspects of educational environments:
 - Physical
 - Learning
 - Social
- In this framework, technology can transform teaching, learning, and assessment

Learner diversity is a resource



Together everyone achieves more!



The diversity of learners in the country's classrooms represents the future, and the future will reflect how well educators have included all students in the learning community today.

Resources

- <http://usm.maine.edu/ctel/accessibility-series>
- <http://www.washington.edu/doit/CUDE/>
- <http://www.cast.org/>
- <http://fod.msu.edu/oir/universal-design-learning-udl>
- <http://www.ist.hawaii.edu/training/>
- <http://accessproject.colostate.edu/>
- <http://disabilities.temple.edu/programs/ds/hEd3udl.shtml>
- <http://www.microsoft.com/enable/at/types.aspx>
- <http://www.apple.com/accessibility/osx/>
- <http://www.nuance.com/dragon/index.htm>
- http://shop.aph.org/webapp/wcs/stores/servlet/Product_Orion%20TI-84%20Plus%20Talking%20Graphing%20Calculator_1-07340-00P_10001_11051
- <http://www.washington.edu/doit/articles?342>
- http://archives.gadoe.org/DMGetDocument.aspx/Math_Chart_revised_8-10.pdf?p=6CC6799F8C1371F6CFC3EAE26FFD23831AA37596E6C907F54E26E070D9A5463C&Type=D
- <http://www.gingersoftware.com/>
- [Assistive Technology in Action
https://www.youtube.com/watch?v=YayaN9vwipU&list=UUOmFltelOXvXWs7TNJOwJ1g](http://www.youtube.com/watch?v=YayaN9vwipU&list=UUOmFltelOXvXWs7TNJOwJ1g)
- <https://www.youtube.com/watch?v=h47dK66qflo>
- <http://www.vernier.com/products/interfaces/talking-labquest/>
- <http://www.perkinselearning.org/accessible-science/thermoworks-talking-digital-thermometer-probe>
- <http://aim.cast.org/learn/accessiblemedia/allaboutaim/what#digital>
- <http://office.microsoft.com/en-us/word-help/check-for-accessibility-issues-HA010369192.aspx>
- <http://www.atia.org/i4a/pages/index.cfm?pageid=3859>
- <https://www.bookshare.org/>
- <http://www.learningally.org>
- <http://capture.maine.edu/Panopto/Pages/Viewer/Default.aspx?id=c5733306-e5be-4867-944a-ccaf1499eebd>



<http://usm.maine.edu/east>

Thank you!

Samantha Langley-Turnbaugh
langley@usm.maine.edu