

# ISLAND

# 2018

**9th Annual Independence Science  
Learning a New Direction  
Conference on Disability**

**Princeton Center for Complex Materials  
Friday & Saturday, September 14-15, 2018**

70 Prospect Ave,  
Princeton, NJ 08540

**Sponsored by:  
Princeton Center for Complex Materials  
Independence Science, LLC**



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## **Conference Mission**

The IsLAND conference on Disability serves to inform and connect educators and future educators to the latest assistive technology, while exploring alternative teaching methods and simple access solutions for learning. Multi-sensory and hands-on approaches are emphasized during this conference in order to generate elevated student interest in classroom material and, thus, improve concept development. Symposium topics also include factors that contribute to Science, Technology, Engineering, and Mathematics (STEM) underrepresentation and strategies for increasing representation among students with disabilities.

## Schedule of Presentations – Saturday, September 15, 2018

The following presentations are scheduled for the 2018 ISLAND Conference.

**Dr. Jason White.** WCAG 2.1 Meets STEM: Application, Interpretation, and Challenges for Further Standard Development. *Educational Testing Service.*

**Jason Martin.** Teaching Basic Cryptography Concepts Using Braille and Large Print Manipulatives. *Alabama School for the Deaf & Blind.*

**Michael Hingson.** Using Remote Assistance to Provide Access to STEM Laboratory Classes. *Aira.*

**Dr. Roseanne Hoffmann.** The SALS App: Making Chemistry Accessible With iOS Devices. *American Printing House for the Blind.*

**Ken Perry.** Changing STEM with the Graphiti: A Tactile Graphic Display. *American Printing House for the Blind.*

**Dr. Michael Kolitsky.** Making 3D printed and 3D laser-cut audio-enriched tactile STEM templates. *University of Texas at El Paso.*

**Dr. Todd Pagano.** A Post-Secondary Degree Program that Maximizes Deaf/Hard-of-Hearing Student Success. *Rochester Institute of Technology/ National Technical Institute for the Deaf.*

**Dr. H. David Wohlers, Caitlyn M. McGuire, and Jessica L. Michael.** Teaching Introductory Chemistry Laboratory Courses to Blind Students at Truman State University. *Truman State University.*

**Dr. Lillian A. Rankel & Marilyn Winograd.** Fun Science Activities for Children.  
*Teacher of the Blind.*

**Anna Volker.** AstroAccess: Creative Approaches to Disability Inclusion in  
STEM. *Ohio State University.*

**Robert Jaquiss.** A Review of Tactile Graphics Repositories. *American  
Thermoform Corporation.*

**Dr. Donald Lubowich.** Edible Astronomy Demonstration and Laboratory  
Activities. *Hofstra University.*

## Conference Schedule – Friday, September 14, 2018

**6:30 PM** Evening Reception

**7:30 PM** Michael Hingson: *Conference Keynote*  
*Thunder Dog book-signing @ 8:30 PM*

**9:00 PM** *Adjourn*

## Conference Schedule – Saturday, September 15, 2018

**8:30 AM** Breakfast

**9:05 AM** Dr. Daniel Steinberg and Dr. Cary Supalo: *Welcome and Introductions*

**9:15 AM** Dr. Jason White: *WCAG 2.1 Meets STEM: Application, Interpretation, and Challenges for Further Standard Development*

**9:45 AM** Jason Martin: *Teaching Basic Cryptography Concepts Using Braille and Large Print Manipulatives*

**10:15 AM** *Morning Tea and Coffee*

**10:30 AM** Michael Hingson: *Using Remote Assistance to Provide Access to STEM Laboratory Classes*

**11:00 AM** Dr. Roseanne Hoffmann: *The SALS App: Making Chemistry Accessible With iOS Devices*  
*Rosanne Hoffmann. American Printing House for the Blind*

**11:30 AM** Ken Perry: *Changing STEM with the Graphiti: A Tactile Graphic Display*

**12:00 PM** Lunch

**1:15 PM** Dr. Michael Kolitsky: *Making 3D printed and 3D laser-cut audio-enriched tactile STEM templates*

**1:45 PM** Dr. Todd Pagano: *A Post-Secondary Degree Program that Maximizes Deaf/Hard-of-Hearing Student Success*

**2:15 PM** Dr. H. David Wohlers, Caitlyn M. McGuire, and Jessica L. Michael: *Teaching Introductory Chemistry Laboratory Courses to Blind Students at Truman State University*

**2:45 PM** Afternoon Tea and Coffee

**3:00 PM** Dr. Lillian A. Rankel & Marilyn Winograd: *Fun Science Activities for Young Children*

**3:30 PM** Anna Volker: *AstroAccess: Creative Approaches to Disability Inclusion in STEM*

**4:00 PM** Robert Jaquiss: *A Review of Tactile Graphics Repositories*

**4:30 PM** Dr. Donald Lubowich: *Edible Astronomy Demonstration and Laboratory Activities*

**5:00 PM** Dr. Cary Supalo and Dr. Daniel Steinberg: *Discussion and Concluding Remarks*

**5:15 p.m.** Adjourn

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Dr. Jason White

**Title/Affiliation:** Research Scientist/ Educational Testing Service

**Abstract Title: WCAG 2.1 Meets STEM: Application, Interpretation, and Challenges for Further Standard Development**

In June 2018, the World Wide Web Consortium (W3C) published *Web Content Accessibility Guidelines (WCAG) 2.1*, the first revision of this widely used standard to appear in a decade. Its predecessor, WCAG 2.0, has shaped recent efforts to improve the accessibility of the web, having been cited widely in public policy, including the revised regulations under section 508 of the Rehabilitation Act in the United States and the EN 301 549 standard for public-sector procurement of information and communication technology in the European Union.

WCAG 2.1 extends the standard by providing additional guidance intended to improve the accessibility of the web to people who have low vision, to those with learning or cognitive disabilities, and to users of mobile devices. The purpose of this session is to review new and existing provisions of WCAG that have implications for the accessibility of science, technology, engineering and mathematics (STEM) content. In doing so, questions of interpretation, and unsolved problems that could be addressed in future standard development efforts are explored. Examples are drawn from such fields as mathematics, computer science, and interactive science simulations.

ISLAND Conference 2018, Princeton University, NJ

**Presenter: Jason Martin**

**Title/Affiliation:** Assistive Technology Specialist/ Alabama Department of Rehabilitation Services

**Abstract Title: Teaching Basic Cryptography Concepts Using Braille and Large Print Manipulatives.**

Based on a cybersecurity curriculum adapted for a statewide Alabama transition program for students who are blind and visually impaired, this presentation is designed to give participants instructional methods and strategies to engage visually impaired students when learning the basics of symmetric key cryptography. Physical examples of custom braille and large print manipulatives will be provided for participants to keep and actively use during the presentation. Topics with instruction using adapted manipulatives include the history of encryption, the encryption and decryption process, and basic methods of information hiding. To promote braille awareness and disability advocacy, additional lessons designed for use within a general education STEM classroom will be explored, these will incorporate the use of the braille code with conventional methods of encryption and decryption.

ISLAND Conference 2018, Princeton University, NJ

**Presenter: Michael Hingson**

**Title/Affiliation:** Director of Aira Explorer Special Projects/Aira

**Abstract Title: Using Remote Assistance to Provide Access to STEM Laboratory Classes.**

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Dr. Rosanne Hoffmann

**Title/Affiliation:** STEM Project Leader/ American Printing House for the Blind

**Abstract Title: The SALS App: Making Chemistry Accessible With iOS Devices**

A new version of SALS (Submersible Audible Light Sensor) consists of a wireless light-detecting probe, Bluetooth® connected to the iOS SALS App. As in previous versions of SALS, changes in detected light are converted to changes in sound, the latter now rendered with iPhone or iPad audio. The SALS probe assists the student with visual impairment in a variety of science activities, including those involving liquids. For example, when the SALS probe is placed in a reaction vessel, changes in light intensity caused by a chemical reaction or color indicator change are converted to changes in tone in real time. The SALS app also provides options to store tones from experiments and the conversion of tones to Hertz for quantitative expression of data.

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Ken Perry

**Title/Affiliation:** Software Engineer/ Project Lead at American Printing House for the Blind

**Abstract Title: Changing STEM with the Graphiti: A Tactile Graphic Display**

Access to graphical STEM information is a significant challenge for people who are blind and visually impaired. With the increased dependency on technology in schools, the lack of access to on-screen and on-demand graphics is an impediment to learning for students with visual impairments. The Graphiti is a 40 row by 60 column multi-level tactile refreshable display that facilitates the use of STEM Graphical tools and viewing and manipulating of graphics.

Attendees will see a demonstration of the software and hardware features that include the ability to view graphics, edit graphics by touch, to scroll and zoom images, and the touch interface that allows the user to draw and erase graphics. In addition, the presenters will demonstrate some of the newest features that include working with a live camera or computer input using HDMI to access a Microscope as well as other tools.

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Dr. Mike Kolitsky

**Title/Affiliation:** Chief Executive Officer/ nextgenEmedia

**Abstract Title: 3D Printer and Swell Paper Audio-Enriched Tactile Templates Expand Access to Images from Microscopes and Human Anatomy Sections**

Audio-enriched tactile templates made from microscope images and anatomic sections were 3D printed or made using swell paper and then laid atop an iPad or iPad Pro so that a touch now generates an audio response providing information about the region being touched for the blind learner. 3D print files were made using PhotoToMesh with some 3D prints employing conductive filament and other 3D prints made to accentuate the edges of muscles and bones for easier determination of their location. Swell paper can also be employed in construction of audio-enriched tactile templates since it was determined that non-swollen regions on swell paper tactile graphics permit the passage of a finger electrical charge to the iPad or iPad surface whereas a black swollen region does not. How iPad and iPad Pro audio buttons were made will be demonstrated and hand-outs will include a functional swell paper audio-enriched tactile template.

ISLAND Conference 2018, Princeton University, NJ

**Presenter: Dr. Todd Pagano**

**Title/Affiliation:** Associate Dean for Teaching & Scholarship Excellence/  
Rochester Institute of Technology NTID

**Abstract Title: A Post-Secondary Degree Program that Maximizes Deaf/Hard-of-Hearing Student Success.**

A goal of the Laboratory Science Technology program at Rochester Institute of Technology's National Technical Institute for the Deaf is to produce Deaf and Hard-of-Hearing (D/HH) graduates with strong foundations in applied science, hands-on laboratory applications, and "soft skills" necessary for competitive employment as laboratory scientists. The program has achieved success through outreach, building industrial partnerships, curricular advancements, and student involvement in undergraduate research. Historically, D/HH students have lagged behind hearing peers in persistence rates to obtaining post-secondary degrees—leading to lower employment rates (and lower earnings when employed in science fields). The program has worked to narrow these gaps and has very strong persistence rates to graduation and places nearly all of its graduates into careers. Strategies and practices for making science curricula accessible, increasing student success, and sustaining the successful program will be discussed with the goal of renewing interest in broadening participation of D/HH individuals in the field.

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Dr. H David Wohlers, Caitlyn M. McGuire, and Jessica L. Michael

**Title/Affiliation:** Professor Emeritus/ Truman State University

**Abstract Title:** Teaching Introductory Chemistry Laboratory Courses to Blind Students at Truman State University.

This presentation illustrates how two blind students performed some of the experiments for the liberal arts nonmajors course (Chem 100) and the first semester general chemistry course (Chem 130) at Truman State University. By using LoggerPro software supplied by Vernier Software Company, the LabPro data acquisition hardware, and various probes and instruments available from Vernier, the CALS and SALS devices developed by the ILAB project at Penn State, along with other simple adaptations, blind students can, with limited intervention by a sighted assistant, complete the laboratory exercises posted at [chemlab.truman.edu](http://chemlab.truman.edu) for each course. Comments on particular alternative procedures and illustrations of adapted laboratory equipment are posted on the web page [ilab.psu.edu](http://ilab.psu.edu), which contains references to many more experiments, some of which are completely accessible to a blind student. This work has been made possible by two NSF grants from the Research in Disabilities Education program: HRD-0435656 "Techniques and Tools to Enhance Blind and Visually Impaired Students Participation in High School Level and General Chemistry Laboratory Classes," and HRD-0726417 RDE-FRI: Independent Laboratory Access for Blind and Low Vision High School Students in the Mainstream Science Classroom.

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Dr. Lillian A. Rankel & Marilyn Winograd

**Title/Affiliation:** Teacher of the Blind

**Abstract Title: Fun Science Activities for Young Children.**

Exposure to science and scientific method at an early age leads to success in future classes. Encouraging a multi-sensory approach to learning, the curriculum we will present includes numerous activities and strategies for introducing science to young children. Differentiated instruction will be discussed for children with varying abilities. Introducing science activities during the early childhood years incorporates essential skills. These essential skills include language development, following directions, math sense, and reading readiness.

The workshop we are proposing will be presented as a powerpoint that includes specific science activities appropriate for 3-8 year olds. This presentation will introduce various activities using multi-sensory approaches to learning, allowing kinesthetic opportunities. Successfully used **FUN** and engaging science activities will be displayed and teaching strategies shown. We will present ways in which special education teachers, paraprofessionals, and classroom teachers can work creatively together to include both multi-sensory learners and students with visual impairment in science activities. Participants will leave with new knowledge and resources.

The level of each activity presented can be differentiated for higher or lower ages, and the particular abilities of individual students.

Science activities don't have to be isolated. Using these strategies and activities encourages teaching and learning across the curriculum.

ISLAND Conference 2018, Princeton University, NJ

**Presenter:** Anna Voelker

**Title/Affiliation:** Ohio State University

**Abstract Title: AstroAccess: Creative Approaches to Disability Inclusion in STEM.**

I will share my work on 3D printing galaxies, a project lead by Carol Christian of the Space Telescope Science Institute. In order to make astronomy more inclusive of blind learners, scientific data from the Hubble Space Telescope is converted into 3D printed galaxies, some of which I will be bringing for the audience to feel first-hand. I will also discuss the use of theatre outreach for teaching science concepts to children on the autism spectrum. These inclusive acting games are designed to foster life skills that can have the potential to be more challenging for children with developmental disabilities, while simultaneously teaching science in a new and engaging way. I am extremely passionate about making science accessible to all people and I believe that more efforts need to be made in order to include people with disabilities in this field. People deserve to know that there is more than just room for them in science; there is a need for them. This talk will focus on effective and accessible science communication. I will also be sharing information on SciAccess, a Science Accessibility Conference that I am organizing at The Ohio State University on June 28 and 29, 2019.

ISLAND Conference 2018, Princeton University, NJ

**Presenter: Robert Jaquiss**

**Title/Affiliation:** American Thermoform Corporation

**Abstract Title: A Review of Tactile Graphics Repositories.**

Producers of tactile materials have a variety of materials and technologies from which to choose from. This hands-on presentation will allow the participants the opportunity to learn about and tactually examine materials produced using 2d and 3d technologies. Well known technologies such as capsule paper, Tiger graphics and Thermoform will briefly be covered. The bulk of the session will be dedicated to both additive and subtractive Rapid Prototyping technologies.

ISLAND Conference 2018, Princeton University, NJ

**Presenter: Dr. Donald Lubowich**

**Title/Affiliation:** Department of Physics and Astronomy/ Hofstra University

**Abstract Title: Edible Astronomy Demonstration and Laboratory Activities.**

I adapt edible astronomy/Earth and Space Science activities into hands-on laboratory learning experiences for students who are the blind or have low vision. These tasty hands-on demonstrations and activities use chocolate chips, cookies, marshmallows, popcorn, candy, bagels, potato chips, frosting, and pizza to promote understanding of scientific concepts, principles, and phenomena. I demonstrate differentiation (marshmallows, nuts); planetary formation (make a round planet from square starburst candies); plate tectonics (crackers with peanut butter and jelly); convection (soup with noodles, soda); radioactivity and radioactive dating (popcorn); solar radiation at the earth's surface (solar heating of coffee/hot chocolate); lunar phases (black and white cookies, Oreos); lunar crater formation (dropping candy into cocoa and flour); mud flows on mars (melted chocolate poured on cake); Martian structure with a three-layer beam dip - surface layer salsa (rocks) with grated cheese (dust), permafrost layer sour cream, interior bean dip (scooped up to analyze with taco chips); comets (Hostess snowballs, tartufo, cake); black hole accretion disk model (bagels or donuts with ice cream cones and Twizzlers licorice sticks); constellations patterns with chocolate chip cookies; formation of the galactic disk (pizza); open curvature of space (Pringles potato chips); the expansion of universe (big-bang chocolate-chip cookies with M&M galaxies).