

Accessible Informal STEM Learning Experiences (ISE) with Neurodivergent Audiences

Kelly Riedinger



Grayson Ponti



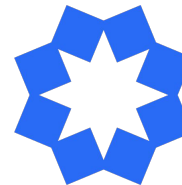
Ibrahim Dahlstrom-Hakki
Zac Alstad, Joey Macek



Suzy Letourneau



Wendy Martin
Sam Tumolo



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Session Agenda

Welcome and Framing the topic: 5 minutes

Project overviews: 30 minutes

Questions and Discussion: 25 minutes

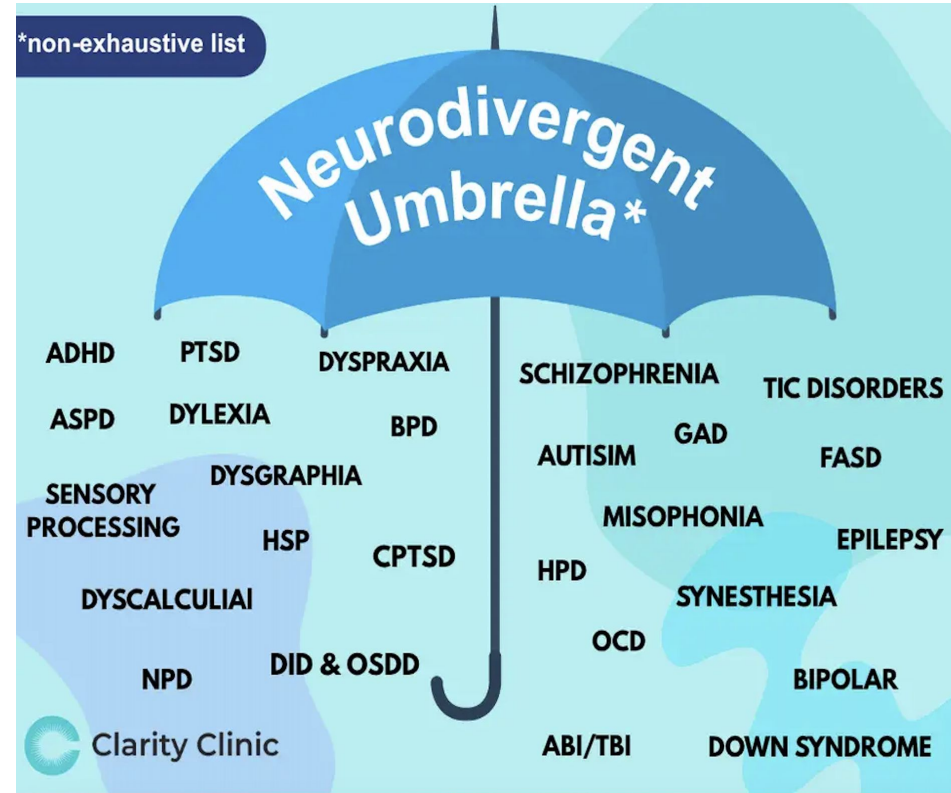
Neurodiversity

- The reality that it is natural for human minds to work differently, resulting in people experiencing and interacting with the world in different ways
- Refers both to the biological fact and to the social movement around it.
- A departure from the deficit model that views neurological differences in terms of disability
- Recognizes there is no right way of thinking, learning and behaving, and these variations are a strength



Neurodivergent

- Individuals whose neurological functions and behavior patterns fall out of what is considered typical by society
- While all people fall under the neurodiversity umbrella, around one in five people are considered neurodivergent
- Often used interchangeably with Autism Spectrum Disorder but in reality encompasses all neurological disorders





Modeling Zoos and Aquariums as Inclusive Communities of Science for Autistic Individuals

The project is designed to promote inclusion for autistic individuals across the full zoo/aquarium experience including:



The general visit experience



Programs, events, exhibits, and the design of learning spaces



Volunteer, internship, and employment opportunities

The project also aims for this work to be institution- and field-wide.





Modeling Zoos and Aquariums as Inclusive Communities of Science for Autistic Individuals

Key project activities:

- Ongoing research studies: literature review, state of the field study & autism community study;
- A research-informed toolkit for zoo/aquarium practitioners;
- Community of practice of zoo/aquarium practitioners.



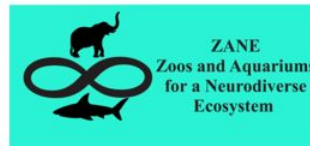
Modeling Zoos and Aquariums as Inclusive Communities of Science for Autistic Individuals

- Zoos and aquariums are doing a lot for neurodiversity in guest accessibility but much growth is left in terms of neurodivergence in employment.
- Over-reliance in industry of sensory certifications- don't properly address the interpersonal interaction dimension.

Inclusive Workplaces for Individuals with Developmental Disabilities in Informal STEM Education (IWISE)

The project is a community-based participatory project to explore the following research question:

What is the experience of neurodivergent individuals working as employees, interns and volunteers at zoos/aquariums as the organizations change to implement inclusive employment practices?



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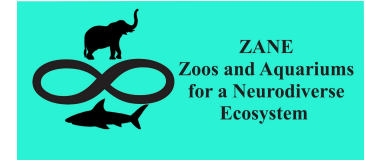
Inclusive Workplaces for Individuals with Developmental Disabilities in Informal STEM Education (IWISE)

- All neurodivergent individuals have different perspectives, beliefs and communication styles.
- Validating all of their perspectives and finding the threads between them is important.
- Has aimed to make inclusive project team practices (consistent format/project team norms, shared decision making processes).



Beyond Access: Examining the implementation of approaches and tools in informal STEM learning environments including neurodivergent and intellectually, developmentally disabled individuals

- First of its kind collaboration between zoos, aquariums, science centers, children's museums and botanical gardens to foster application of neurodivergent affirming practice.
- Expands on foundation from MoZAICS, particularly in expanding the community of practice, revising the toolkit and studying implementation.



Beyond Access: Examining the implementation of approaches and tools in informal STEM learning environments including neurodivergent and intellectually, developmentally disabled individuals

- A brand new and evolving initiative
- Commonalities and differences across the professional organizations, how they're handling accessibility and the strategies they use to engage their members in professional learning.

NeuroVivid

A MAKER EXPERIENCE FOR ALL BRAINS



NeuroVivid: Developing and Testing a Maker Experience to Build Interest in Careers in Brain-Computer Interfaces Among Neurodivergent Youth, is an innovative BCI maker experience designed by and for neurodivergent youth. Participants learn how their brains work through fun, hands-on activities and interactive demonstrations that include coding, circuitry, and brainwave-powered headsets that let them control objects with their minds.

Project Team:

- Ibrahim Dahlstrom-Hakki (PI)
- Jodi Asbell-Clarke (Co-PI)
- Zac Alstad (Co-PI)
- Tara Robillard
- Erin Bardar
- Mia Ong
- Kelly Paulson
- Wendy Martin (EDC)
- Sam Tumolo (EDC)



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Co-Design

- Include neurodivergent youth in all aspects of work
- Meetings at least weekly
- Provide professional development opportunities to co-designers
- Foster a supportive counter space



JOIN OUR CO-DESIGN TEAM!

We are seeking teens or young adults (ages 13-30) who identify as neurodivergent, autistic, ADHD, or having dyslexia for a paid 8-week summer internship.

-  Co-design activities for a museum maker program that focuses on learning about the brain through technology.
-  Help ensure activities are fun, engaging, and accessible to a broad audience, including neurodivergent learners.
-  This is a virtual position. High-speed internet is required.



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NeuroVivid Co-Design Team

A MAKER EXPERIENCE FOR ALL BRAINS

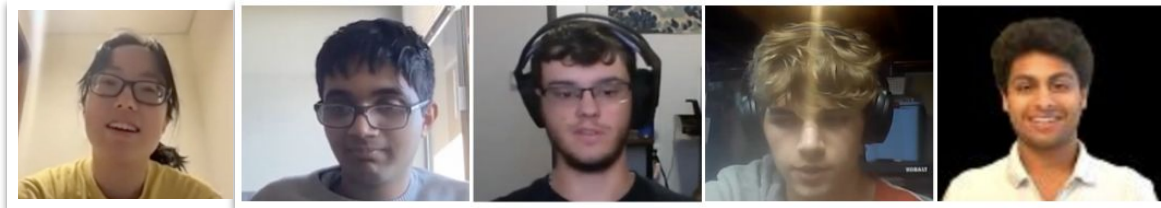
Cohort 1 (Summer)

Onyeka, Lauren, Nyss, Dash, Ziyad, Andrew, Nick



Cohort 2 (Fall)

Pearl, Hridhay, Andrew, Joey, Arjun, Onyeka, Dash, Ziyad, Andrew, Nick



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NeuroVivid

A MAKER EXPERIENCE FOR ALL BRAINS



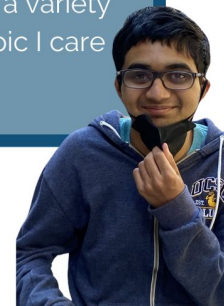
I like working as part of a team because...

"...I feel excited about exchanging ideas with others and like working together towards getting a task done. I am a part of a group that is inclusive and focused on results."



Working with the NeuroVivid co-design team...

"...has challenged and expanded my abilities to think critically about accessible education for a variety of learners which is a topic I care deeply about."



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NeuroVivid

A MAKER EXPERIENCE FOR ALL BRAINS

Camp in Action



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Neurodiversity & Universal Design for Learning

Co-design of engineering design activities with autistic youth across 3 sites

Developing recommendations for museums using Universal Design for Learning principles

Studying impact on belongingness and engineering design practices



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**J. Sickler
CONSULTING**

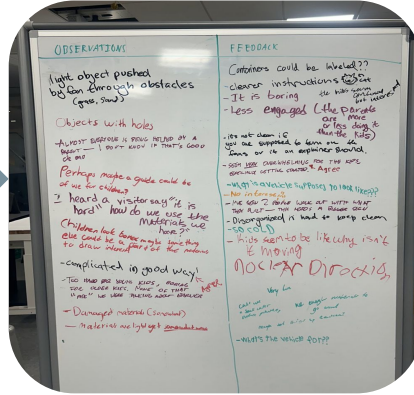


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Co-design Process



Test activities



Gather feedback



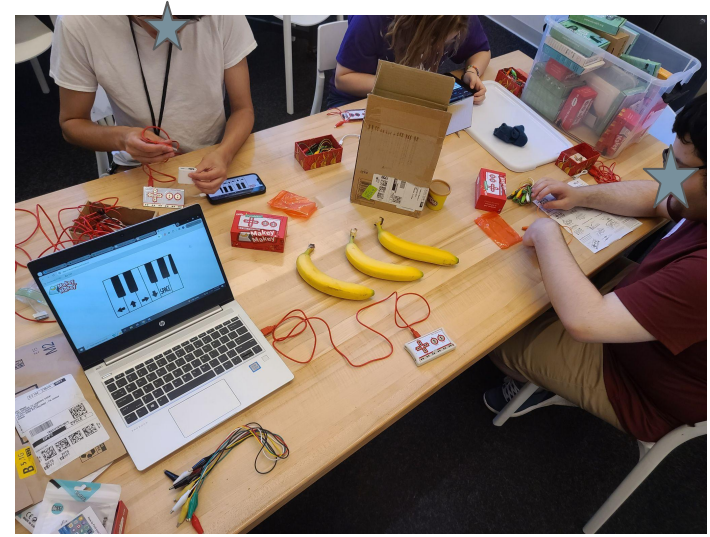
Decide what to iterate



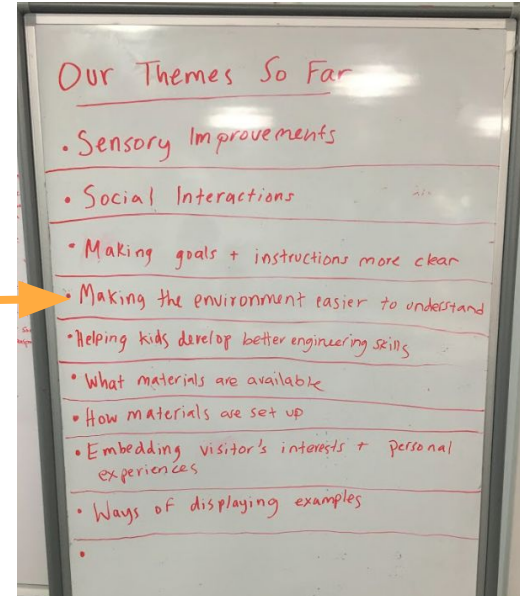
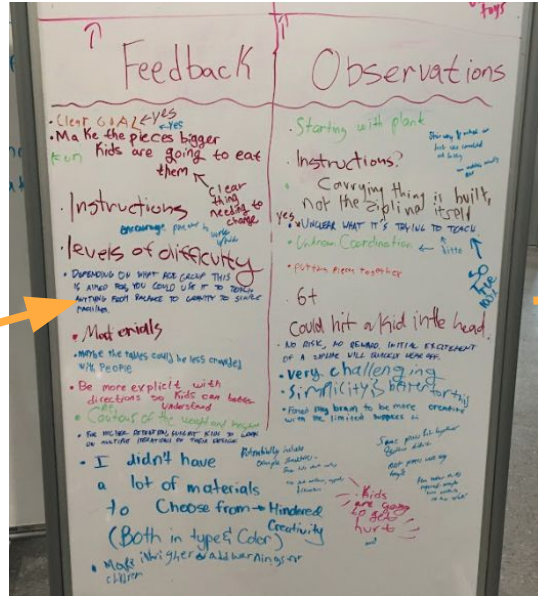
Build prototypes

Co-designed Activities

- Makey Makey video game controllers
- Invention challenge (“Help Wanted”)
- Rube Goldberg machines (“Chain Reaction”)
- Balance Sculptures



Testing Activities & Compiling design recommendations



Neurodiversity and Universal Design for Learning (NUDL) Framework

Foster Belongingness and Agency as a Foundation for Learning

Anticipate diversity in learning preferences/needs

Make accommodations available to all

Describe differences as expected and valued

Help learners adjust their environments

Communicate Goals & Expectations

Express goals and parameters right away

Offer examples to show what's possible

Establish familiar routines

Offer explicit guidance with visuals and words, and low-stakes skill-building activities

Build Autonomy

Provide a wide range of entry points and ways of approaching each activity

Encourage learners to make choices

Balance providing suggestions and leaving room for experimentation

Sustain Engagement

Break up complex tasks into smaller steps

Scaffold iteration and encourage trying again

Provide structure for engaging with others in different ways

Connect to learners' interests, relevant STEM topics, and everyday life

Reflect and Transition

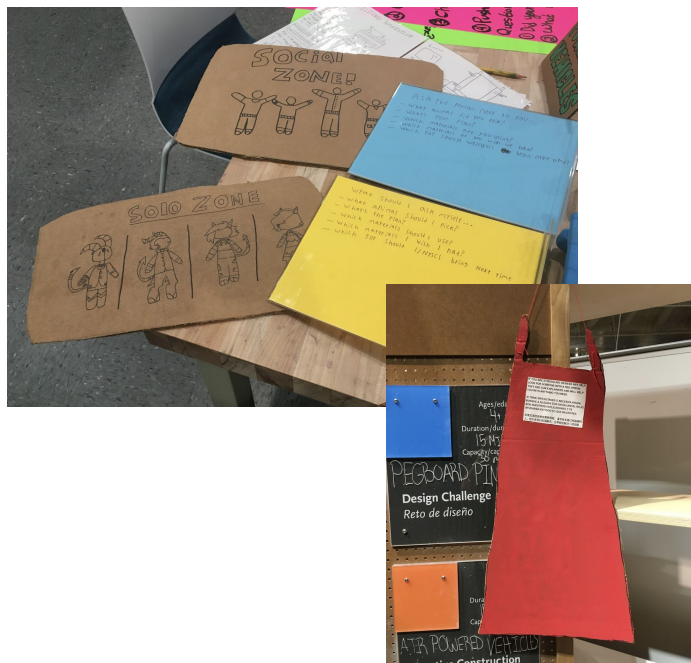
Encourage learners to reflect on what they did before moving on

Provide ways to share and celebrate what learners do

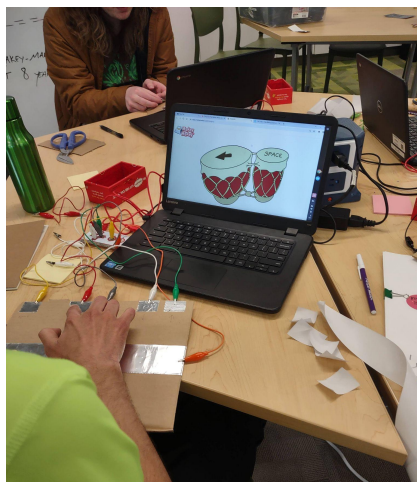
Suggest activities to try next based on learners' interests

Stories from our work: Benefits of UDL approaches

Provide structure for engaging with others in different ways



Offer examples to show what's possible



Offer guidance with visuals and words



Acknowledgments

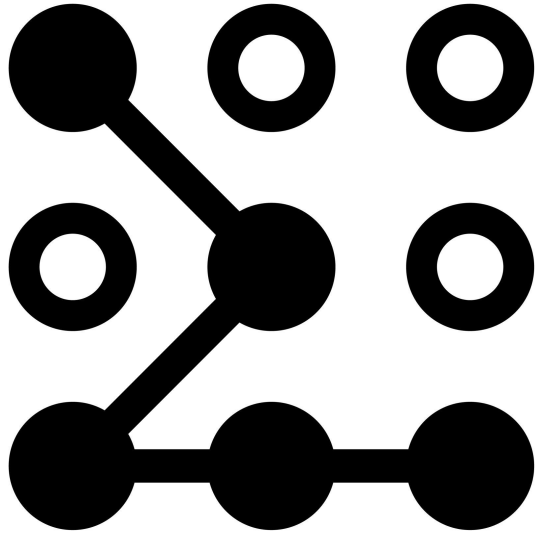


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Contact: Suzy Letourneau, sletourneau@nysci.org
Wendy Martin, wmartin@edc.org



Tell us your stories!



Make connections!

Any questions?

Any answers?



Thank You!

- Kelly Riedinger, Oregon State University: kelly.riedinger@oregonstate.edu
- Ibrahim Dahlstrom-Hakki, TERC: ibrahim_dahlstrom-hakki@terc.edu
- Suzy Letourneau, New York Hall of Science: sletourneau@nysci.org
- Wendy Martin, EDC: wmartin@edc.org
- Sam Tumolo, EDC: STumolo@edc.org
- Zac Alstad, TERC: zac_alstad@terc.edu
- Grayson Ponti, Zoos and Aquariums for a Neurodiverse Ecosystem (ZANE): graysonponti@zanezoo.org



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