Where should the sprinkles go?

Co-design strategies for baking equity into public engagement experiences

ASTC 2021 - Thursday, October 7th
Facilitators: Sherry Hsi & Darrell Porcello
BSCS Science Learning | Children’s Creativity Museum
Land Acknowledgement

The land I live and work on in California is the traditional territory of the Muwekma Ohlone and Chochenyo Tribes.

https://native-land.ca/
Focusing question

How can we co-design for equity in learning and public engagement experiences in our institutions and for our audiences?
Co-design

A process to bring diverse stakeholders with diverse perspectives to work together to create something that meets their shared needs.

- All relevant stakeholders are involved in the design
- Active collaboration between users and designers
- Users are the experts of their own experiences

- Boosts collaboration
- Increases openness to innovation and change
- Leads to more credible and equitable solutions
Programs & Presenters

Making Waves with Radio
- Colin Dixon, BSCS Science Learning
- Gustavo Hernandez, Watsonville Environmental Science Workshop

Community STEM Initiative
- Ali Jackson, Sciencenter

Science Together
- Max Cawley, Museum of Life & Science
- Imani Vincent, Families Moving Forward

NISE Network
- Darrell Porcello, NISE Network / Children’s Creativity Museum

Session Resources: bit.ly/cupcakeastc
Putting Shared Values “in the Batter”

Building a Foundation of Values for Design

This work is supported by the National Science Foundation under grant DRL - # 2053160
How can we engage in meaningful, equity-oriented and participatory design with community members, when many institutions, many products - many communities - are involved (and timelines are short)?
we should teach radio...

...because people need to understand and feel empowered to use and modify the technologies flooding into life and society. [A]

...because radio bridges the divide between invisible and tangible aspects of digital communication. [P]

...because radio provides a hands-on, relevant way to engage the public in technology-related social issues. [C]

...because future jobs depend on understanding them. [M]

...because the ubiquity of radio is a resource for scalable yet responsive learning experiences. [F]

...because radio technologies can be used to solve current and future problems. [D]

...because radio technologies like mobile phones are common, so they can make participation in learning more accessible and equitable. [K]

...because the benefits and harms of radio technologies aren't distributed equitably and have the potential to perpetuate economic and environmental injustices. [J]

...because it gives educators the chance to critically engage with the blackboxes of science and technology. [E]

...because everybody should have a voice in deciding how radical technologies get developed and regulated. [L]

...because we want people to become innovators. [C]

...because radio technologies will expand possibilities for our lives and society. [N]

...because everybody uses radio in some way, so radio can help youth bring their experiences and interests to museums. [D]

...because radio technology is more common than people realize. (Most people don't know Bluetooth is radio)

...because radio concepts can help educators engage students in a wide range of other STEM concepts and practices. [H]

...because everyone regardless of background, should have knowledge, access, and capacity to be producers of and with radio technologies. [I]

Thinking of something that's not here? Add a green sticky!
Radio4What Workshops

1. **Introduction** to project, design process and radio frequency technologies today

2. “**Envisioning**” exercise

3. Values “**heatmapping**” and discussion (in 2 rounds)
   - Round 1: 5 cards on the table
   - Round 2: 2 cards with stars
# Round 1 Workshops

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Organization Type</th>
<th># adults</th>
<th># youth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Science Center</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Science Center</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3.</td>
<td>Community-Based Science Program</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Community-Based Science Program</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>Project Team</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>6.</td>
<td>Science Center</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>Science Center</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>8.</td>
<td>Community-Based CS Program</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>9.</td>
<td>Community-Based Education Program</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>****</td>
<td><strong>35</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>
Vote for 2

...because people need to understand and feel empowered to use and modify the technologies flooding into life and society. [A]

...because it's fun to learn about invisible phenomena that surround us everyday. [B]

...because everyone regardless of background, should have knowledge, access, and capacity to be producers of and with radio technologies. [I]

(nominated cards here)

...because radio technologies like mobile phones, are common, so they can make participation in learning more accessible and equitable. [K]

...because radio technology is more common than people realize. (Most people don't know Bluetooth is radio!) [L]

...because everybody uses radio in some way, so radio can help youth bring their experiences and interests to museums. [D]

...because radio technologies can be used to solve current and future problems. [O]

...because we want people to become innovators. [G]

...because it gives us access to knowledge in forms and with the technologies of science and knowledge. [R]

...because the ubiquity of radio is a resource for sustainable development, education, and community building. [F]

...because radio technologies can help create a bridge between communities and diverse voices that have not been heard before. [M]
...because people like music; people like to show and tell using their own media, SnapChat, TikTok...
Cards on the Table - Values

- Improving informal science education:
  - Educators: 6
  - Demo Team: 4
  - Youth: 7

- Equity and Social Justice:
  - Educators: 18
  - Demo Team: 9
  - Youth: 10

- Joyful and agentive learning:
  - Educators: 9
  - Demo Team: 11
  - Youth: 7

- Technological and Social Innovation:
  - Educators: 9
  - Demo Team: 4
  - Youth: 7
Making Waves Design Values

We believe we can improve informal science education by...

- cultivating mutual learning and empowering ISE leaders, designers and educators to adapt resources to their communities and goals
- supporting informal science education with teaching strategies and just-in-time supports to build capacity in new socioscientific topics
- building capacity to create interactive learning experiences connected to real-life issues and phenomena

**Equity & Social Justice**

We believe we can work to make society more just and equitable by...

- meaningfully engaging with people and perspectives that have been historically marginalized from educational institutions
- explicitly countering stereotypes about who is capable of technological innovation
- showing connections between STEM concepts and technologies and community life
- making visible ways that benefits and harms of technology are unfairly distributed across society

**Joyful & Agentive Learning**

We aim to foster joyful & agentive learning that...

- sparks curiosity and motivates continued learning
- feels rich and relevant to learners
- fosters a sense of ownership - a feeling that one can use, modify or produce technology for one’s own purposes
- inspires learners to share learning with family and friends

**Technological & Scientific Innovation**

We hope to foster technological and societal innovations by...

- demonstrating that technology and society shape each other and that everyone plays a role in our socio-technological futures
- making more transparent the technologies we encounter in our day to day lives
- helping young people become innovators prepared to participate in technological development and workplaces
Colin Dixon, Sherry Hsi & Seth VanDoren
BSCS Science Learning
cdixon@bscs.org

Gustavo Hernandez
Watsonville Environmental Science Workshop
gustavo.hernandez@cityofwatsonville.org
From Accessibility toward Belonging: Collaborative Development for Community STEM
<table>
<thead>
<tr>
<th><strong>TRANSACTIONAL ENGAGEMENT</strong></th>
<th><strong>TRANSITIONAL ENGAGEMENT</strong></th>
<th><strong>TRANSFORMATIONAL ENGAGEMENT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outreach</strong></td>
<td><strong>Consulting</strong></td>
<td><strong>Involving</strong></td>
</tr>
<tr>
<td>Some community organization involvement</td>
<td>More community involvement</td>
<td>Better community involvement</td>
</tr>
<tr>
<td>Communication flows from one to the other, to inform</td>
<td>Communication more back and forth, answer seeking</td>
<td>Communication flow both ways, participatory</td>
</tr>
<tr>
<td>Provides community with information and experiences</td>
<td>Feedback from the community</td>
<td>Community involved on issues, topics, format and content</td>
</tr>
<tr>
<td>Entities co-exist</td>
<td>Entities share information</td>
<td>Entities cooperate</td>
</tr>
<tr>
<td>Outcomes: establish communication channels and venues for outreach</td>
<td>Outcomes: develops connections</td>
<td>Outcomes: Visibility of partnership, established modes of cooperation</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Collaborating</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community involvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bi-directional communication flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community is integrated in each aspect of the project from development to implementation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcomes: Deeper community sense of belonging and ownership over the experiences and learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Sharing Leadership</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strong multidirectional relationships</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final decision making is community level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strong partnership structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcome: Deeper community sense of belonging and ownership over the experiences and learning</td>
</tr>
</tbody>
</table>

Less shared leadership

More shared leadership
Try this,
Think about where you most often fall in terms of outreach, consulting, involving, collaborating, and sharing leadership in your program development. Quickly, try to generate a specific example of programming at your organization for each of these categories.

<table>
<thead>
<tr>
<th>Outreach</th>
<th>Consulting</th>
<th>Involving</th>
<th>Collaborating</th>
<th>Sharing Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td>Example:</td>
<td>Example:</td>
<td>Example:</td>
<td>Example:</td>
</tr>
</tbody>
</table>


Cohort-based STEaM Program

- Project-based learning
- Staff mentors
- Participants leads learning
- Family engagement
- Participant experts
Reflect: How can you authentically involve community partners and participants in planning, implementing, and sustaining your program?

Ali Jackson, Director of Programs & Partnerships
ajackson@sciencenter.org
INVESTMENT
ASK
ASSESS
MEET PEOPLE WHERE THEY ARE
ACCESSIBILITY
DISCOMFORT
SUSTAINABILITY
Nanotechnology and Society:
A Practical Guide to Engaging Museum Visitors in Conversations

By Jameson Wetmore, Ira Bennett, Ali Jackson, and Brad Herring
Values are a great place to start when building a relation with participating audiences and experts you might want to involve in co-design projects.
Encouraging conversations helps us carefully think through our values as individuals and as larger communities to make better decisions about the technologies we research, buy, and use.

Museum conversations can help visitors see links between their values and the technological systems they encounter and encourage them to think about where we are and where we want to go as a society.

**Two Approaches to Engaging Visitors**

**Demonstration:**
- Scientist/educator has knowledge and expertise to share
- Visitors discover phenomena and laws of nature
- Facilitator communicates facts
- Visitors ask questions and receive answers
- Promotes basic goal of public understanding

**Conversation:**
- Everyone has their own values and perspectives to share
- Facilitators and visitors consider facts and values
- Facilitators and visitors ask questions and receive responses
- Visitors form opinions and explore ideas
- Promotes basic goal of public engagement
Are you still you? Sit down when you aren't sure.

A. You are fitted with a prosthetic arm with fine control through nerve impulses.
B. You are implanted with a deep brain stimulation system that stops tremors but also causes a personality change.
C. You use a neuroenhancement device that dramatically boosts your memory well beyond human capacity.
D. You are in a coma on life support and can only communicate through a neuroimaging device that interprets live data through a population-level dataset.
E. Your tissue is used to grow a human brain organoid that has to be implanted in a host animal for long-term observation.
Scribble Bot
Imagination, Creativity, Reflection

Nano Around the World card game

Exploring the Solar System: Asteroid Mining

Are you still you? Sit down when you aren’t sure.

A. You are fitted with a prosthetic arm with fine control through nerve impulses.
B. You are implanted with a deep brain stimulation system that stops tremors but also causes a personality change.
C. You use a neuroenhancement device that dramatically boosts your memory well beyond human capacity.
D. You are in a coma on life support and can only communicate through a neuroimaging device that interprets live data through a population-level dataset.
E. Your tissue is used to grow a human brain organoid that to be implanted in a host animal for long-term observation.

CONVERSATION
Role Playing

Imagination, Peer pressure

Drawing, Role Playing

Stand Up Sit Down Icebreaker

Exploring the Solar System: Asteroid Mining
Coming soon from the NISE Network

Diversity, Equity, Accessibility, and Inclusion Toolkit

Sections on:
- Equity and Inclusion in Community Engagement
- Culturally Responsive Programs
- Collaborative Program Development
Thank you to our Funders

Making Waves with Radio is supported by the National Science Foundation under Award Number 2053160. The work presented here from the NISE Network was supported by the National Science Foundation under Award Numbers 0532536, and 0940143, DRL 1421179, and DRL 1612482. Any opinions, findings, conclusions, or recommendations expressed in this guide are those of the authors and do not necessarily reflect the views of the National Science Foundation.

The NISE Network is also supported by NASA under cooperative agreement award numbers NNX16AC67A and 80NSSC18M0061. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Aeronautics and Space Administration (NASA).
Reflection questions for everyone

- Where have you seen co-design work well?
- How do we place values at the center?
- How do we resettle our intentions when designing towards equitable public engagement experiences?
- How might we distribute power across institutions?

Please join us in the Roundtable!