From Modest to Moonshot:
What’s Next for Museum R&D?

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Chip Lindsey  Children’s Museum of Pittsburgh
Josh Gutwill  Exploratorium
Tom Rockwell  Exploratorium
Liz Kunz Kollmann  Museum of Science, Boston
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Session overview

• Briefly define Museum R&D
• Motivate the session — why are we here?
• Present R&D plans from CAISE and 3 museums
• Generate and share new R&D ideas together
• Record our ideas for posting by CAISE
What is Museum R&D?

Focus: Visitor Experience / Learning

Research

Research with Development

Learning from Practice
R&D is a way for us to learn

• Improve specific exhibits or programs

How can this design be optimized?
R&D is a way for us to learn

• Improve specific exhibits or programs
• Develop Institutional understanding

How does Productive Struggle affect learning?

What are our Audience Segments?
R&D is a way for us to learn

• Improve specific exhibits or programs
• Develop Institutional understanding
• Field-wide knowledge

What is STEM Identity?

Which exhibit designs engage girls?
Share R&D Topics

Jamie Bell

Lisa Brahms & Chip Lindsey

Liz Kunz-Kollmann & Christine Reich

Tom Rockwell (& Josh Gutwill)
InformalScience.org is a collection of project, research, and evaluation resources designed to support the informal STEM education community in a variety of learning environments.

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GO
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Any opinions, findings, and conclusions or recommendations expressed are those of the speakers and do not necessarily reflect the views of NSF.
Sample of current NSF AISL-Funded Museum R & D (2019)

- **Audiences:** Latinx, American Indian, Alaska Native, early learners, families, older adults, girls, people with disabilities, women transitioning from the justice system

- **Youth:** career awareness, best practice for outcomes, longitudinal impact

- **STEM topics:** water, ocean literacy, snow, light, exoplanets, food, engineering, robotics, imagination

- **Approaches/settings:** making and tinkering spaces, exhibits, podcasts, STEAM, non-science-related art, planetarium shows

- **Constructs/theory:** intersectional identity, resilience, cultural competence, inclusivity, authenticity, constructivism, DBR & DBIR
What is STEM Identity, Interest, & Engagement?

35 experts share their projects, perspectives, resources, and advice related to how these phenomena show up with diverse audiences in different contexts.

WHAT IS STEM INTEREST?
We interviewed 10 researchers to learn how they’re thinking about it.

The National Research Council consensus report “Learning Science in Informal Environments” (2009), which was based on a review of the literature to date, posited that “people’s informal environments of experience, engagement, interest, and motivation to learn about phenomena in the natural and physical world” serve as six strands of informal science learning. In 2014, the American Association for the Advancement of Science (AAAS) Center for Public Engagement with Science and Technology identified “viewers, interest, and motivation” around STEM topics as an important avenue for engagement activities. For many designers, evaluators, and researchers, these strands and developments affirmed a long-held claim that catalyzing interest is one of the key strengths of informal STEM learning and engagement experiences.

But what do we mean by “interest”? In 2018, our Experiences and Measurement Task Force used a sample of U.S. STEM educators and researchers, science communication scholars, and media professionals to share their interest in and work with these complex and rich topics.

Start with our interview, then dive into the diverse perspectives below. Looking for more resources? Explore our catalog of interest-related projects, research, and evaluations, or check out other interview series on identity and engagement.

A Download the Interview

informalscience.org/interest
Accessing Peer-Reviewed Literature on EBSCO

Full text of more than 2,000 peer-reviewed journals like Curator: The Museum Journal, Science Education, Cultural Studies of Science Education, and Science Communication.
How do we create the conditions to notice opportunities for learning?
How do we create the conditions to notice document, reflect, respond and design to support opportunities for learning?
values-based reflective practice
<table>
<thead>
<tr>
<th>LEARNING PRACTICE</th>
<th>PRACTICE DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>INQUIRE</td>
<td>Learners' openness and curious approach to the possibilities of the context through exploration and questioning of its material properties.</td>
</tr>
<tr>
<td>tinker</td>
<td>Learners' purposeful play, testing, risk-taking, and evaluation of the properties of materials, tools, and processes.</td>
</tr>
<tr>
<td>seek &amp; share resources</td>
<td>Learners' identification, pursuit, and sharing of expertise with others, including collaboration and recognition of one's own not-knowing and desire to learn.</td>
</tr>
<tr>
<td>hack &amp; repurpose</td>
<td>Learners' harnessing and repurposing of materials, tools, and processes to modify, enhance, or create a new product or process. Includes disassembling objects property from familiar use.</td>
</tr>
<tr>
<td>express intention</td>
<td>Learners' discovery, evolution, and refinement of personal identity and interest areas through determination of short and long-term goals. Includes learners' responsive choice, negotiation, and pursuit of goals alone and with others.</td>
</tr>
<tr>
<td>DEVELOP FLUENCY</td>
<td>Learners' development of comfort and competence with diverse tools, materials, and processes; developing craft.</td>
</tr>
<tr>
<td>SIMPLIFY to complexify</td>
<td>Learners' demonstration of understanding of materials, and processes by connecting and combining component elements to make new meaning.</td>
</tr>
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**values-based reflective practice**
small bets methodology
small bets methodology
social emotional learning
From modest to moonshot: What’s next for museum R&D?

2019 ASTC Conference
Toronto, ON, Canada
Christine Reich and Elizabeth Kunz Kollmann
September 22, 2019
Overarching goal

Excite, empower, and engage everyone to be the thinkers and innovators needed to shape our future
How do we empower everyone to leverage STEM ways of thinking and take action to shape a better future?
How do we empower everyone to leverage STEM ways of thinking and take action to shape a better future?

How do we empower everyone to see themselves as STEM learners?
How do we empower everyone to leverage STEM ways of thinking and take action to shape a better future?

How do we leverage STEM ways of thinking to imagine a better future?
How do we empower everyone to leverage STEM ways of thinking and take action to shape a better future?

How do we create STEM experiences where everyone feels supported to learn?
Thank you

Contact information

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The Exploratorium R&D Agenda
A Focus for Our Future

From Modest to Moonshot: What’s Next for Museum R&D?
ASTC, September 22, 2019
The R&D Agenda expresses our organization’s learning intentions and provides direction to help us prioritize our activities over the next few years.
Advancing Inquiry: Broadening and Deepening Inquiry-Based Learning Experiences
Advancing Inquiry

What new topics and new modalities of engagement beyond phenomena-based interactive exhibitry, successfully compel people to think more critically?

How can we inspire people to go deeper in their line of inquiry—seeing a thought through from initial idea to evaluating evidence to interpreting outcomes?

What new professional learning practices lead to greater reach, new audiences, and innovative partnerships?
Exploring Identity:
Understanding the Self in Biology, Psychology and Society
Exploring Identity

What new scientific phenomena and designed interactions enable people to expand the way they understand overlapping biological and social selves?

How can informal learning experiences centered on the role of social identity illuminate inequities and advance social justice?

How can we develop our practices to be more welcoming, representative, and just toward diverse audiences and collaborations?
Engaging Ecology

What communication strategies catalyze people to be more open, engaged, and positive in response to environmental issues?

What tools can we build to enable public and professional audiences to become change agents and successful collaborators addressing the most pressing environmental issues of our times?

What new professional learning practices lead to greater reach, new audiences, and innovative partnerships?
Fostering Civic Agency:
Enabling Individuals to Impact Their Physical and Social World
Fostering Civic Agency

How do we identify, convene, learn from, and inspire different groups of people—policy-makers, scientists, artists, community members, etc.—to collaboratively envision and construct a mutually beneficial and just society?

How do we learn from and support diverse communities in inclusive and welcoming ways that inspires open-minded learning, thinking, dialogue, and decision-making skills?

How do we measure and assess how effective our different strategies are in instilling a greater sense of agency in individuals and accessibility in institutions to affect change?
Generate new ideas

• R&D Questions
  – Your institution is pursuing
  – You’d like to pursue
  – You’d like someone to pursue
Categorize new ideas

- Research (practice)
- Research (knowledge)
- Moonshot
- Modest
- Design for disability
- Religion & science
- Museum Exclusion
- Label studies