NISE
NATIONAL INFORMAL
STEM EDUCATION
NETWORK

Making Earth and space science relevant to specific audiences and adapting to local needs

Speakers

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What is Relevance?

<u>Relevance</u> is any connection a person makes between a topic or activity and their lives and experiences or broader societal issues. This may include: applying theory to practice, relevance to local issues, relevance to everyday applications, and relevance to current topics.

Relevance, Local Needs and Relationships

Dr. Laura Peticolas

Sonoma State University

Relevance & Local Needs

Relevance & local needs can be "simple," though not easy (h*ypothetical examples)*

- Long-time board member works wants museum to collaborate on earth and space topics with an afterschool program for the blind
- Request by homeschooling community to enhance science center's earth & space activities with scientist engagements

Sonoma State's Ms. Wandling and Professor Cominsky (left) and Emeritus Dr. Spear (right) are examples of faculty and staff who support STEM outreach.

Engaging Local Scientists

- What Earth and Space Science topics are locally relevant?
- Local scientists can…
  - Connect to local science: ecosystem(s), sky-views, weather
  - Review activities for scientific accuracy
  - Connect to the community and inspire audiences

NASA scientists, Drs. Roopesh Ojha and Alexander Reustle, do a pulsar activity with local home school communities in Seattle, WA.

Relevance & Local Needs

Relevance & local needs can be challenging when addressing them triggers strong negative emotions

(*hypothetical examples)*

- Local Indigenous* community's resources polluted by local energy companies
- Local Indigenous community's historical trauma when removed from land
- African American community's historical traumas from violence against them and slavery of their ancestors
- Black African American's every day encounters with racism
- Economically disadvantaged families desire your efforts, but have no time and no money to engage with you

**Indigenous refers to the first people to a region of land. The term encompasses the following communities: American Indian, Alaska Native, Native Hawaiian and Indigenous Pacific Islander.*

Relationship and Trust

- “Specific audiences” are community-dependent
- Building relationships and trust enables honest conversations
- Earth and space science relevance can then be collaborative and sustainable

Dr. Nancy Maryboy, President Indigenous Education Institute; Ka’iu Kimura, Director ‘Imiloa Astronomy Center; Dr. Tim Spunk, Director Ed and Public Engagement Associated Universities, Inc.

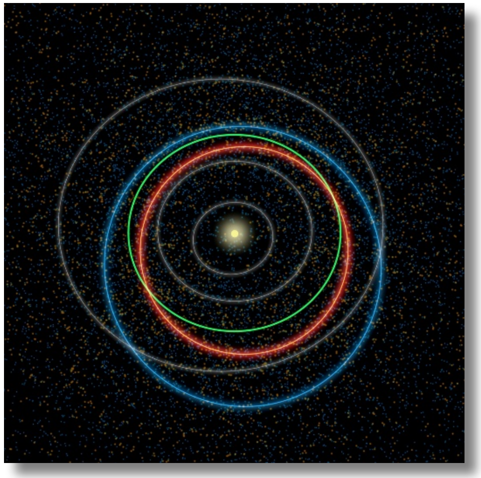
Best Practices

- Determine what specific audience you want to work with
- Research historical and current challenges and stories of perseverance
- Connect through your networks
- Find organizations where members of this audience work and play, if possible
- Cold call & visit organizations
  - Find people with whom you feel comfortable working
  - Find people who want what you have to offer
- Modify or create curriculum together with these specific audience members
- Pay collaborators for their time

Astronomy moments

When the Moon's effect on tides became real to me.

Know & Value Learners' Ideas



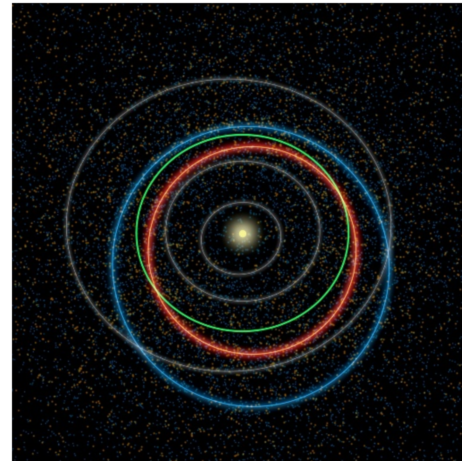
Astronomy & Space Science Concept Inventory (Sadler et al, 2009)

(Grades 7-12)

Which shows the order from fewest stars to most stars:

a. galaxy > universe > solar system	**12%**
b. galaxy > solar system > universe	**18%**
c. solar system > universe > galaxy	**18%**
d. solar system > galaxy > universe	**42%**
e. universe > solar system > galaxy	**10%**

Know & Value Learners' Ideas



Astronomy & Space Science Concept Inventory (Sadler et al, 2009)

(Grades 7-12)

Our solar system contains:

a. One average star	**32%**
b. Several stars spread across space	**50%**
c. One older, dim star & one, younger, bright star	**9%**
d. Three stars	**4%**
e. No stars	**5%**

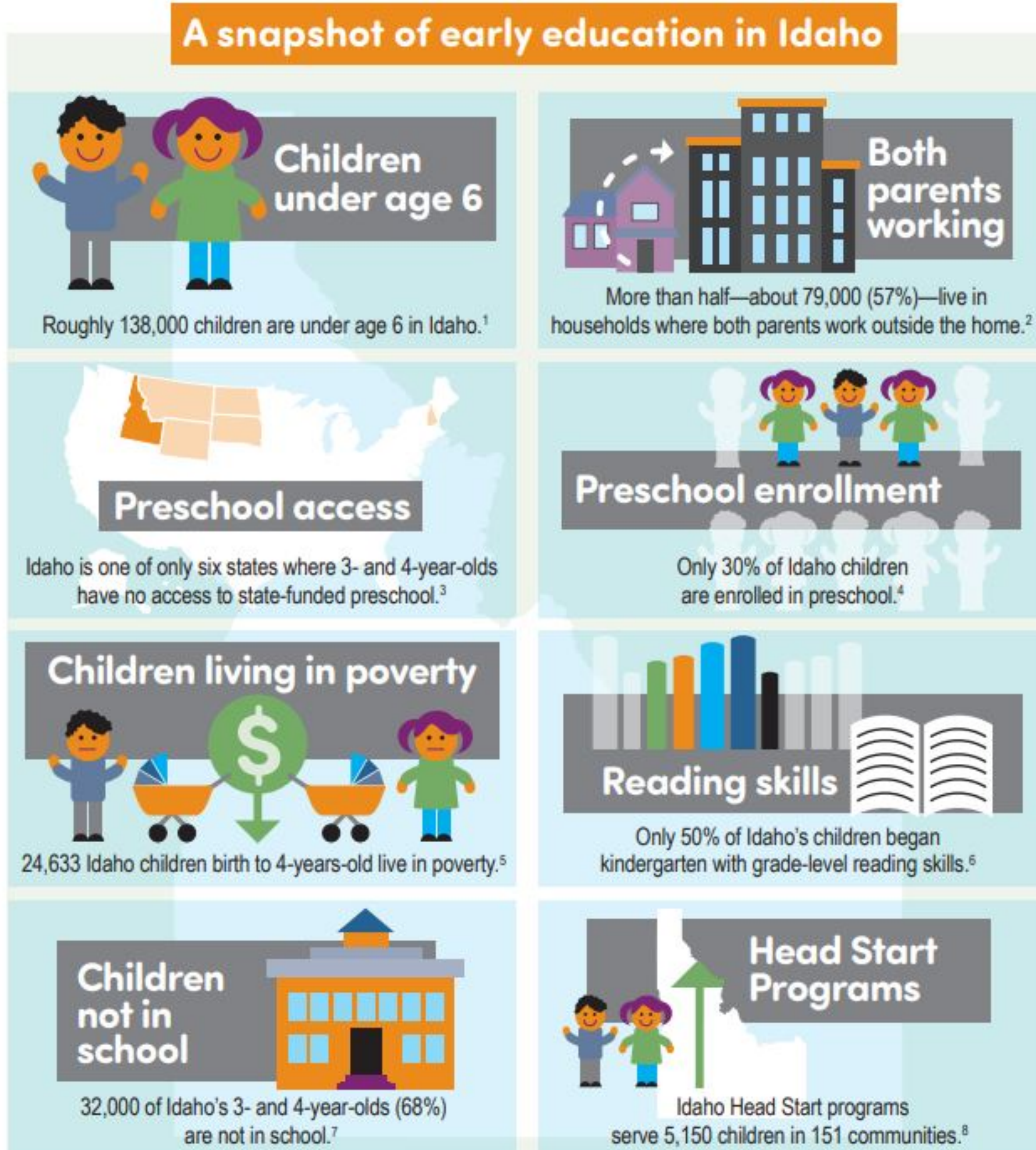
Stories through time and place

So many ways that people know and love the cosmos.

NASA, ESA, G. Dubner (IAFE, CONICET-University of Buenos Aires) et al.; A. Loll et al.; T. Temim et al.; F. Seward et al.; VLA/NRAO/AUI/NSF; Chandra/CXC; Spitzer/JPL-Caltech; XMM-Newton/ESA; and Hubble/STScI

DISCOVERY
Center of Idaho

EARLY STEM
IDAHO STEM ACTION CENTER



Snapshot provided by Idaho Association for the Education of Young Children

Young Discoverers
Families with children ages 2-5

- Each lesson is designed to be child-led and incorporate the family in the process as co-learners
- Inquiry-based learning for pre-K is based on "Three E's"
  - Explore (play, engage, question);
  - Experiment (predict, test, observe);
  - Express (discuss, share, develop new questions)
- Integrates literacy, executive functioning, social/emotional learning with hands-on STEM exploration

DISCOVERY Center of Idaho

Earth & Space Science Connections

- Hike & Seek Moon
  - Learn how we (scientists!) can use magnifying tools to see things that are otherwise too far away
- Craters on the Moon
  - Learn how impact craters form and why some planets and moons are more likely to have them than others
- Rocket Blast Off
  - Learn what kinds of scientific tools astronauts use to observe, record and make hypothesis about the universe

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on the Flathead Reservation

EARTH AND SPACE SCIENCE ON THE FLATHEAD INDIAN RESERVATION

Caitlin Ervin, spectrUM Discovery Area

We are committed to empowering and inspiring the Flathead Indian Reservation and its youth to strengthen their community by making STEAM and higher education a part of their world.

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SCIENCE LEARNING TENT

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Solar

Studying what feels relevant to museum visitors

What we've learned through three NISE Network projects

NISE
NATIONAL INFORMAL STEM EDUCATION NETWORK

Allison Anderson and Zdanna King

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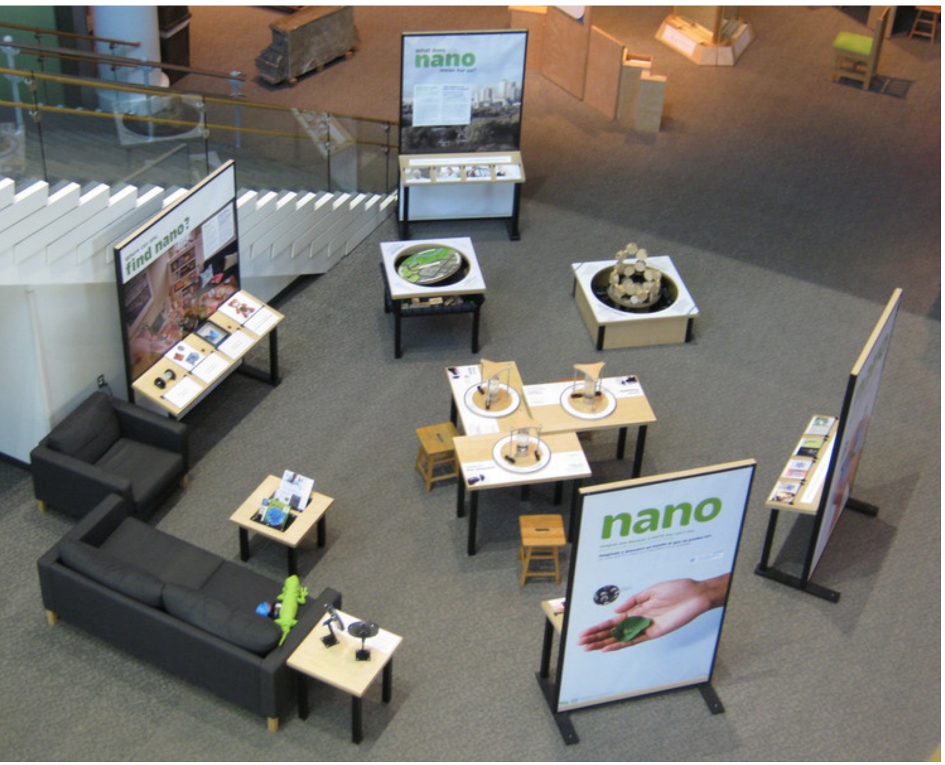
Museum of Science.

NISE Network Partner Meeting
Tempe, Arizona - February 15, 2019

Science Museum of Minnesota

Nano mini-exhibition: Summative evaluation



Nano mini-exhibition

59% of visitors felt there was a connection between the *Nano* exhibition and their daily lives. (Svarovsky et al., 2013)

Nano mini-exhibition: Relevance research study

How do visitors use, interact with, and talk about the exhibit components within the *Nano* exhibition to learn about the relevance of nano to their lives?

Nano mini-exhibition: Relevance research study

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Defining types of relevance
(Kember, Ho, & Hong, 2008)

- Applying theory to practice
- Relevance to local issues
- Relevance to current topics
- Relevance to everyday applications
  - Use/Application
  - Prior experience or knowledge
  - Relation to a friend/family

Nano mini-exhibition: Relevance research study

- Main findings
  - All visitor groups found relevance in the exhibition.
  - The most common kinds of relevance were around current topics and everyday applications.
  - Visitor groups found relevance through internal connections to *Nano* content and bringing in their own external examples.
  - Visitor groups most commonly made relevance connections at panel components.

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  - Visitor groups most commonly made relevance connections at panel components.
- Implications
  - Including content about **applications** and **societal issues** may lead visitors to find relevance
  - Content about applications may help visitors bring in their own examples, while content around societal issues may not

EXPLORE SCIENCE
Let's Do Chemistry

Explore Science: Let's do Chemistry!

Researching interest, relevance, and self-efficacy

How should hands-on activities, events, and trainings be designed to increase visitors' positive attitudes about interest in, relevance of, and self-efficacy around chemistry?

Explore Science: Let's do Chemistry!

Researching interest, relevance, and self-efficacy

How should hands-on activities, events, and trainings be designed to increase visitors' positive attitudes about interest in, **relevance of**, and self-efficacy around chemistry?

*"**Relevance** relates to visitors being able to recognize connections between the chemistry content and/or aspects of the activity and their own lives. This also could include visitors making connections to much larger societal issues that can be addressed and/or caused by chemistry."*

Explore Science: Let's do Chemistry!

Researching interest, relevance, and self-efficacy

- Initial findings
  - To increase feelings of **relevance** about chemistry, attention should focus on the **content** included in the activity.
  - Particularly, activities should include **connections to everyday life** or **applications and uses** of chemistry.
  - When facilitating activities, facilitators should try to **deepen understanding** through techniques that that encourage and support meaning-making.

Explore Science: Earth & Space
Toolkit findings

Earth and space topics were more relevant for families after trying the activities.

- **Most adults (72%, n=237) felt that Earth and space topics were "more relevant" to their group's life and experiences after trying the activities.**

Explore Science: Earth & Space
Toolkit findings

120 Children responded to the fill in the blank question, “These activities reminded me of __”

- Their responses were focused mostly on related content, with one in ten sharing a more personal connection they had made.

Space content (33%)
- “The moon and gravity.”

School (20%)
- ”When I went to science and at school.”
- ”Science class, but funner.”

Personal Connections (11%)
- ”My friend’s mom, because she studies space.”
- “My room.”
- “A book I read.”

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Thank You

This presentation is based on work supported by the National Science Foundation under Grant Numbers DRL-0940143 and DRL-1612482. Any opinions, findings, and conclusions or recommendations expressed in this presentation are those of the authors and do not necessarily reflect the views of the Foundation.

This material is based upon work supported by NASA under cooperative agreement award numbers NNX16AC67A and 80NSSC18M0061.

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