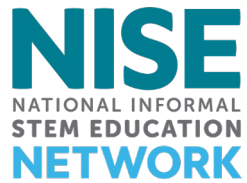




STEM **LEARNING**
ECOSYSTEMS



STEM Everywhere: Lessons from Four Diverse Ecosystems

October 2024



Rae Ostman

Research Professor

School for the Future of Innovation in Society

Arizona State University

PI, SciAct STEM Ecosystems



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Workshop goals

Presenters will share the findings from our inquiry across four projects.

Together, we will all learn about and share our experience related:

- Authentic STEM engagement and learning
- Diversity, equity, accessibility, inclusion, and belonging (DEAIB)
- Partnerships among organizations, groups, and community members



Workshop agenda

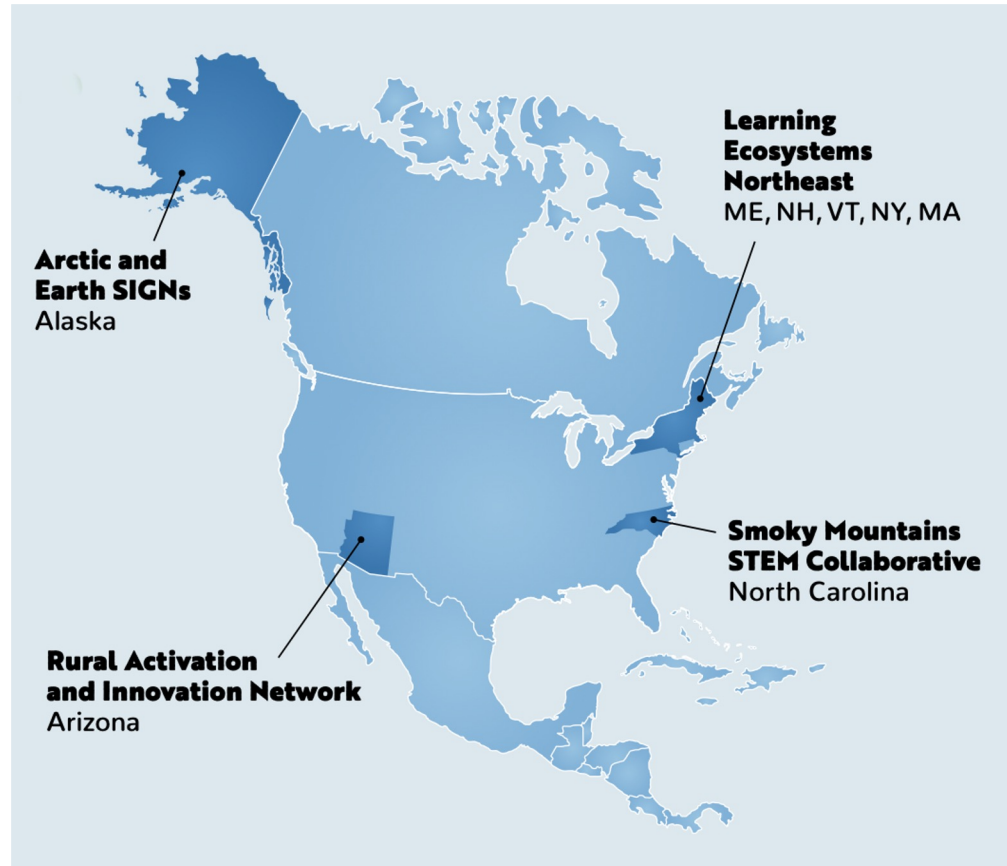
- 1:30 Welcome and overview (Rae)
- 1:45 Inquiry process (Allison)
- 2:00 Authentic STEM engagement (Randi)
- 2:30 Break *(change tables)*
- 2:45 Belonging (Kal) *(change tables)*
- 3:15 Community-wide partnerships (Randi and Kal)
- 3:45 Wrap-up and resources (Rae)
- 4:00 Adjourn

Each section of the agenda includes a presentation and an activity/discussion
We'll switch tables twice so you can talk to more people



SciAct STEM Ecosystems project

- **Collaboration** of several teams in NASA's Science Activation (SciAct) program
- **Inquiry** to learn about principles and practices of projects designed to broaden participation in STEM learning, using an ecosystems lens
- **Three key ideas** about intentional partnerships, DEaIB practices, and authentic STEM learning



INQUIRY



Allison Anderson

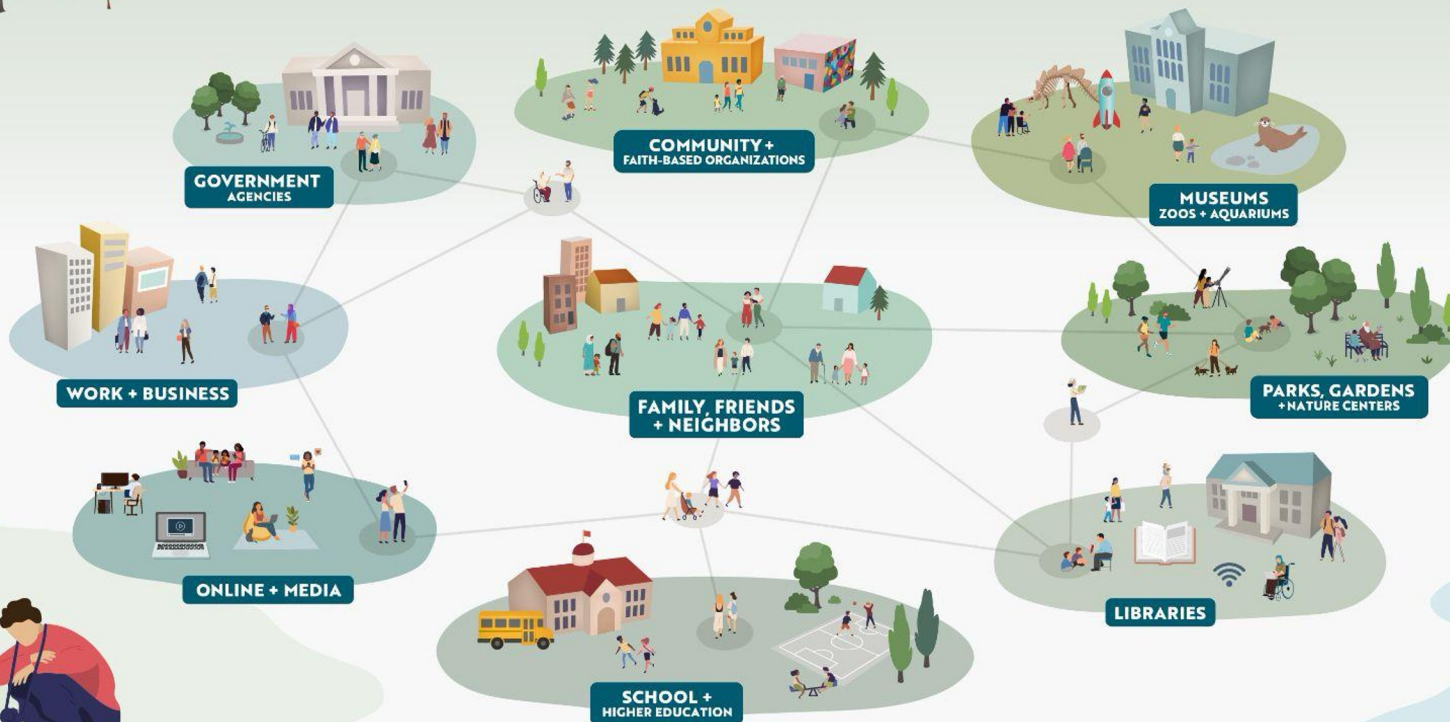
Research and Evaluation Associate
Museum of Science

Evaluator, SciAct STEM Ecosystems



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STEM Learning Ecosystems

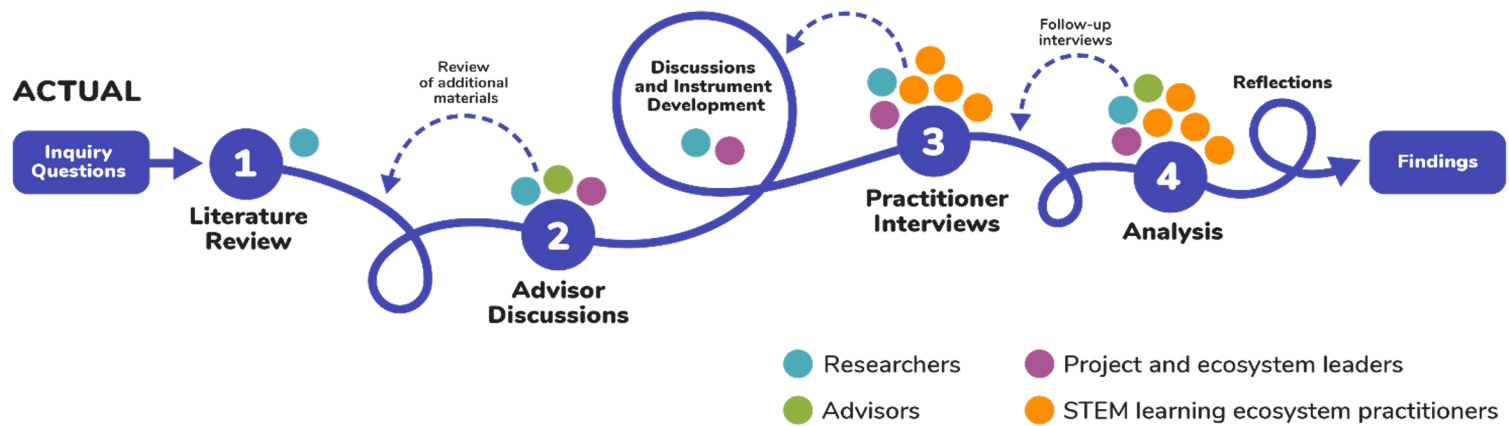


INQUIRY PROCESS

EXPECTED



ACTUAL



STEM Learning Ecosystems

KEY IDEAS

Community:

STEM learning ecosystems are built and sustained through intentional practices; thrive through reciprocal relationships; and are grounded in their geographic and cultural context.



Belonging:

Ecosystems can broaden participation by cultivating genuine relationships among individuals and organizations; creating a flexible and transparent culture; sharing programming and resources; and prioritizing diversity, equity, accessibility, inclusion, and belonging.



Engagement:

Authentic STEM engagement starts with understanding what is relevant to learners and communities, then creates connections to content through active learning experiences.



ENGAGEMENT

Randi Neff



Randi Neff

Project Coordinator, Smoky Mountain STEM
Collaborative

Southwestern Community College

Ecosystem connector, SciAct STEM Ecosystems



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WHAT IS LEARNING?



1. Take a moment to reflect on this question:
What represents learning to you?
1. Look through the cards in the deck and find a picture that relates to how you think about learning.
1. Show your picture to the others at your table and explain why it best represents learning for you.

Share out

What is learning?

- What are some of the ways you talked about learning in your groups?
- What do you notice about the different ideas that were shared?



STEM Learning Ecosystems

KEY IDEAS

Engagement

Authentic STEM engagement starts with understanding what is relevant to learners and communities, then creates connections to content through active learning experiences.



Authentic STEM Engagement

Relevance

Connects to identity and culture, promotes a sense of belonging, and fosters inclusion



STEM content

Includes community observations, scientific data, assets, and a range of expert perspectives



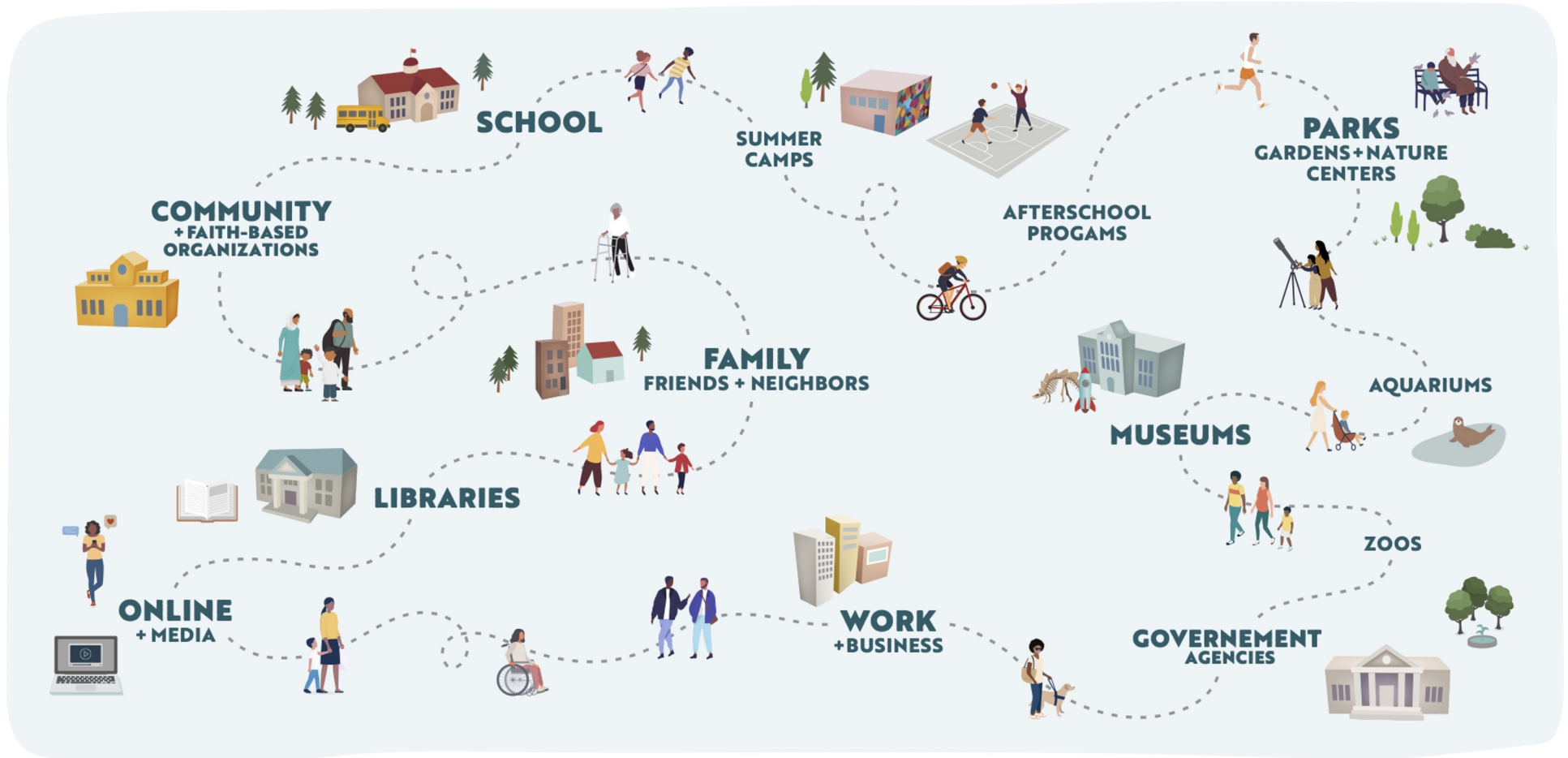
Experience design

Supports active learning, encourages dialogue, and builds on community strengths



STEM Learning Pathways

Varied journeys for learning across a lifetime



BELONGING

Kal Mannis

Arizona Science Center



Kal Mannis

Senior Director for Rural Engagement and Outreach
Arizona Science Center

Project Director - Rural Activation and Innovation
Network (*RAIN*)

Collaborator - SciAct STEM Ecosystems



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STEM Learning Ecosystems

KEY IDEAS

Belonging

Ecosystems can broaden participation by cultivating genuine relationships among individuals and organizations; creating a flexible and transparent culture; sharing programming and resources; and prioritizing diversity, equity, accessibility, inclusion, and belonging.



Diversity, Equity, Accessibility, Inclusion, and Belonging (DEIAB)

- **Diversity** refers to the ways in which people are similar and different, including identities, social positions, lived experiences, values, and beliefs.¹
- **Equity** means providing different people with fair access to resources so they can participate fully in society and meet their own needs.¹
- **Accessibility** means accommodating everyone along the continuum of human ability and experience.¹
- **Inclusion** is valuing diverse ideas, backgrounds, and perspectives and creating an environment of involvement, respect, and connection.¹
- **Belonging** refers to the feeling of being connected to a community, place, or situation, and being supported and welcomed there.

¹Garibay, C. & Olson, J. (2020). CCLI National Landscape Study: The state of DEI practices in museums. Cultural Competence Learning Institute.

Structure and design

STEM learning ecosystems support diversity, equity, accessibility, inclusion, and belonging (DEAIB) through their:

- Organizational structures and culture
- Relationships and communication
- Resources and activities



DEAIB PRACTICES



Choose one term. Think about how it relates to your work and how you'd like to build on what you've done so far:

- **Diversity** refers to the ways in which people are similar and different, including identities, social positions, lived experiences, values, and beliefs.
- **Equity** means providing different people with fair access to resources so they can participate fully in society and meet their own needs.
- **Accessibility** means accommodating everyone along the continuum of human ability and experience.
- **Inclusion** is valuing diverse ideas, backgrounds, and perspectives and creating an environment of involvement, respect, and connection.
- **Belonging** refers to the feeling of being connected to a community, place, or situation, and being supported and welcomed there.

Discuss with others at your table.

Share out

DEAIB practices

- What ideas surfaced during your conversation?
- Did you think about your work differently when you focused on just one term at a time?



COMMUNITY

Randi and Kal

STEM Learning Ecosystems

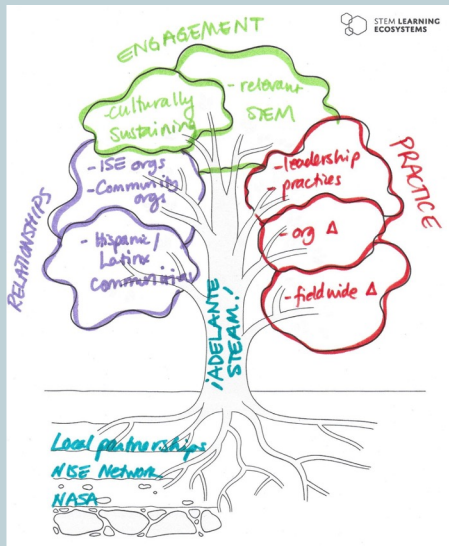
KEY IDEAS

Community

STEM learning ecosystems are built and sustained through intentional practices; thrive through reciprocal relationships; and are grounded in their geographic and cultural context.



PROJECTS & PARTNERSHIPS



1. Choose a project or partnership.
1. Create a drawing that shows some of its key elements. You can use the tree or watershed illustration or make your own.

For example, with a tree you could include:

RESOURCES in the roots

GOALS in the leaf clusters

ACTIVITIES in the branches

1. Spend a few minutes on your drawing, then share it with others at your table.

Share out

Projects and partnerships

- Did this activity help you think about or communicate your work in a different way?



WRAP UP
Rae

Resources

<https://www.nisenet.org/stem-learning-ecosystems>

SciAct STEM Ecosystems:

- Overview and findings
- Videos and conversation guide
- Activities
- Graphics

Plus other resources @ nisenet.org

- Engagement materials
- Professional learning
- Newsletter



NISE NATIONAL INFORMAL
STEM EDUCATION
NETWORK

Final reflection

- What is one reflection or takeaway you have from today's workshop?
- What is one next step you'd like to do to follow up from this experience?





STEM **LEARNING ECOSYSTEMS**



INVESTIGATORS

Rae Ostman Arizona State University (PI)

Paul Martin Arizona State University (co-I)

Matt Cass Southwestern Community College (co-I)

Elena Sparrow University of Alaska Fairbanks (co-I)

EVALUATORS

Liz Kollmann Museum of Science (evaluator)

Allison Anderson Museum of Science (evaluator)

Ann Atwood Museum of Science (evaluator)

ECOSYSTEMS

Arctic and Earth SIGNs

Learning Ecosystems Northeast

Rural Activation and Innovation Network

Smoky Mountain STEM Collaborative

Thank you



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