

# Ice Jams, Fungi, Roly-Polys: Enhancing Knowledge to Enrich Science Talk

Soo-Young Hong (UNL CYAF, Principal Investigator)

Lisa Poppe & LaDonna Werth (NE Extension)

Sarah Paulos (NE Extension & UNL CYAF)

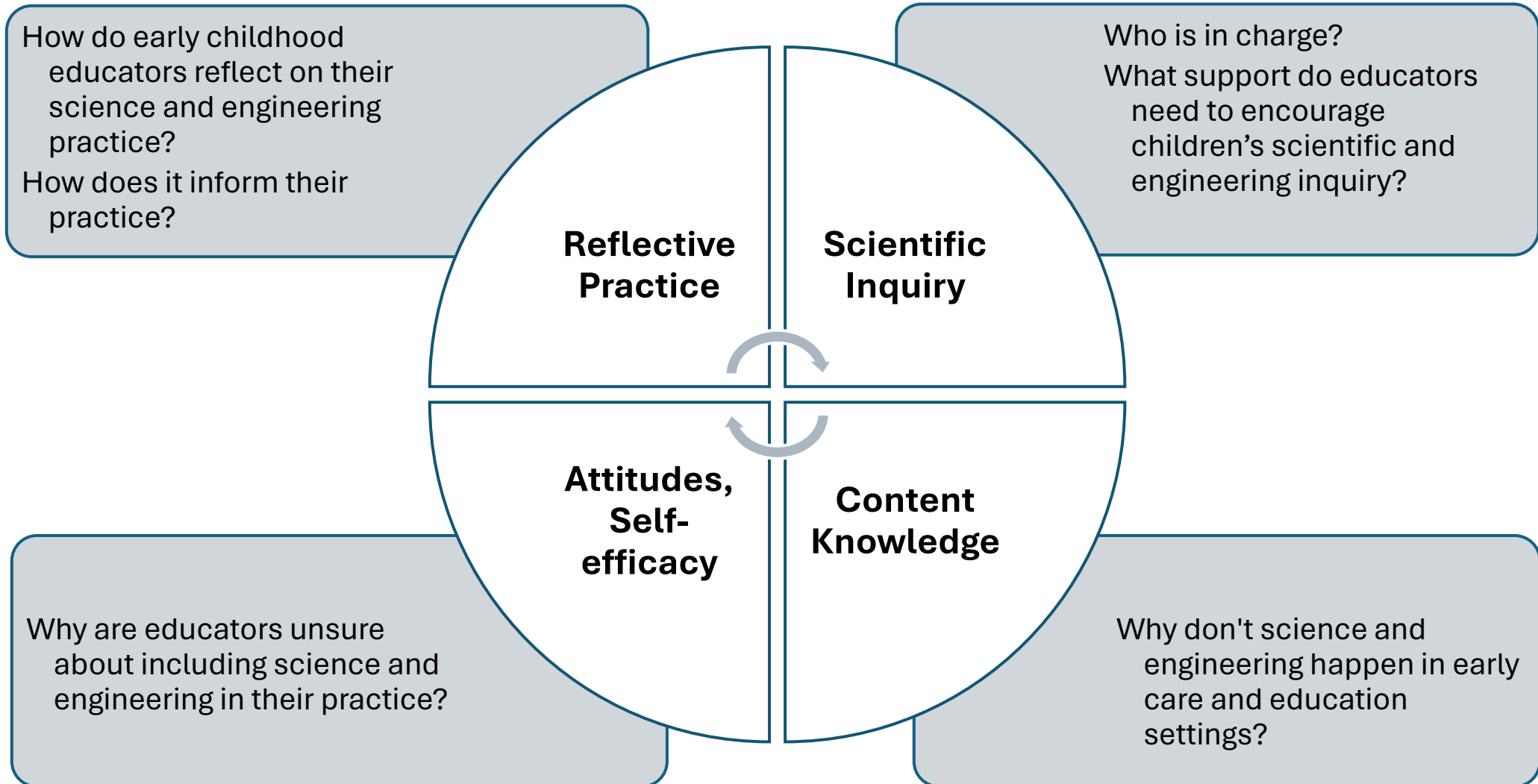
Maddie Pieper (UNL EDPS, Research Assistant)

## **Additional Project Members:**

Marianna Burks (UNL Biological Sciences); Doug Golick (UNL Entomology); Deepika Menon (UNL Teaching, Learning and Teacher Education); Christine Wittich (UNL Civil and Environmental Engineering); HyeonJin Yoon (UNL CYFS MAP Academy)



# Questions Pondered



Setting the stage...



# PreSTAR

## Preschool Science Talk in Action and Reflection

Soo-Young Hong (US, PI)  
Gisela Wajskop (Brazil, PI)

### **Additional Project Members:**

US: Erin Hamel, Anna Burton, Yuenjung Joo, Sarah Paulos, Yao Yao, Kejin Lee

BR: Patricia Pastorello, Debora Mclean

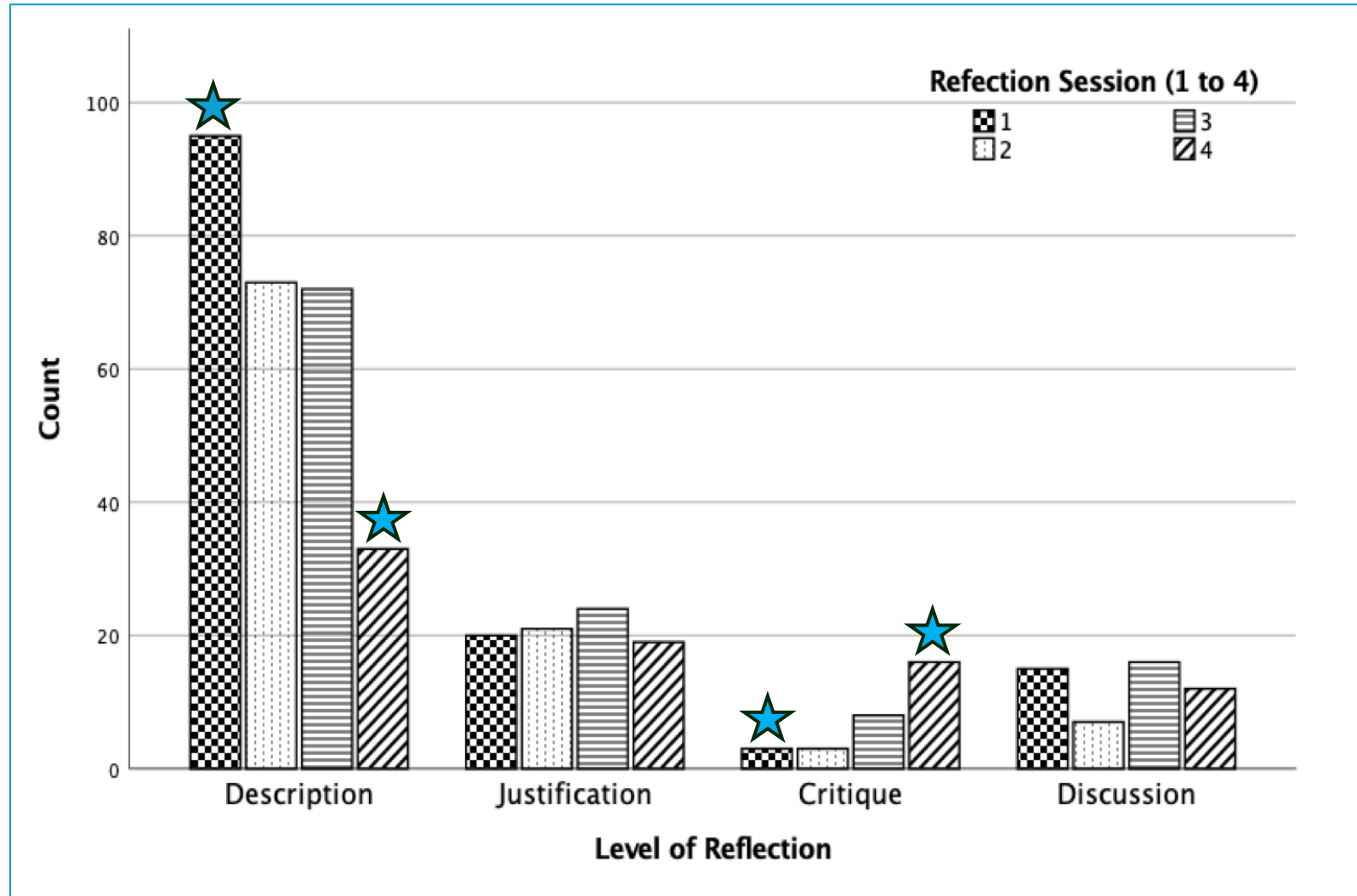


# Project Description

- Funded by University of Nebraska-Lincoln & Fundação Maria Cecilia Souto Vidigal (UNL – Brazil Pilot Impact Study)
- Participants: 8 preschool teachers
- Procedure and Data:
  - Pre- and post-intervention interviews and surveys
  - 4 observation sessions + 4 reflection sessions
    - Physical science concepts and science practice
    - Incorporation of ‘science talk’ in classroom interactions
    - Observations of and reflections on:
      - children’s interactions
      - teachers’ interactions with children



# Findings



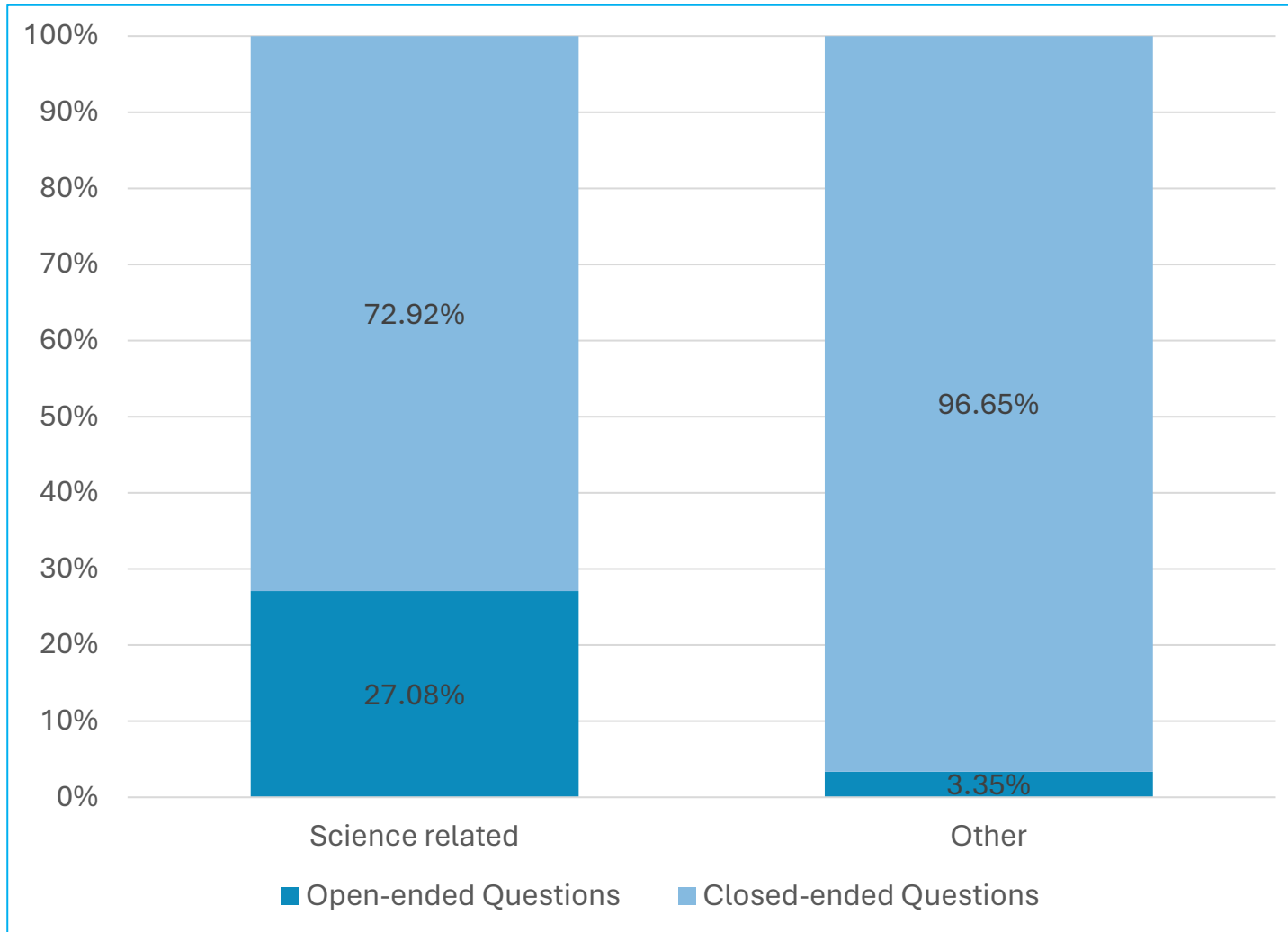
## Frequencies of Level of Reflection across Reflection Sessions

- 1=Description
- 2=Justification
- 3=Critique
- 4=Discussion

★ Significant differences in levels of reflection between session 1 and session 4

Hong, Hamel, Joo, & Burton (2023)

# Findings



Hamel, Joo, Hong, & Burton (2021)

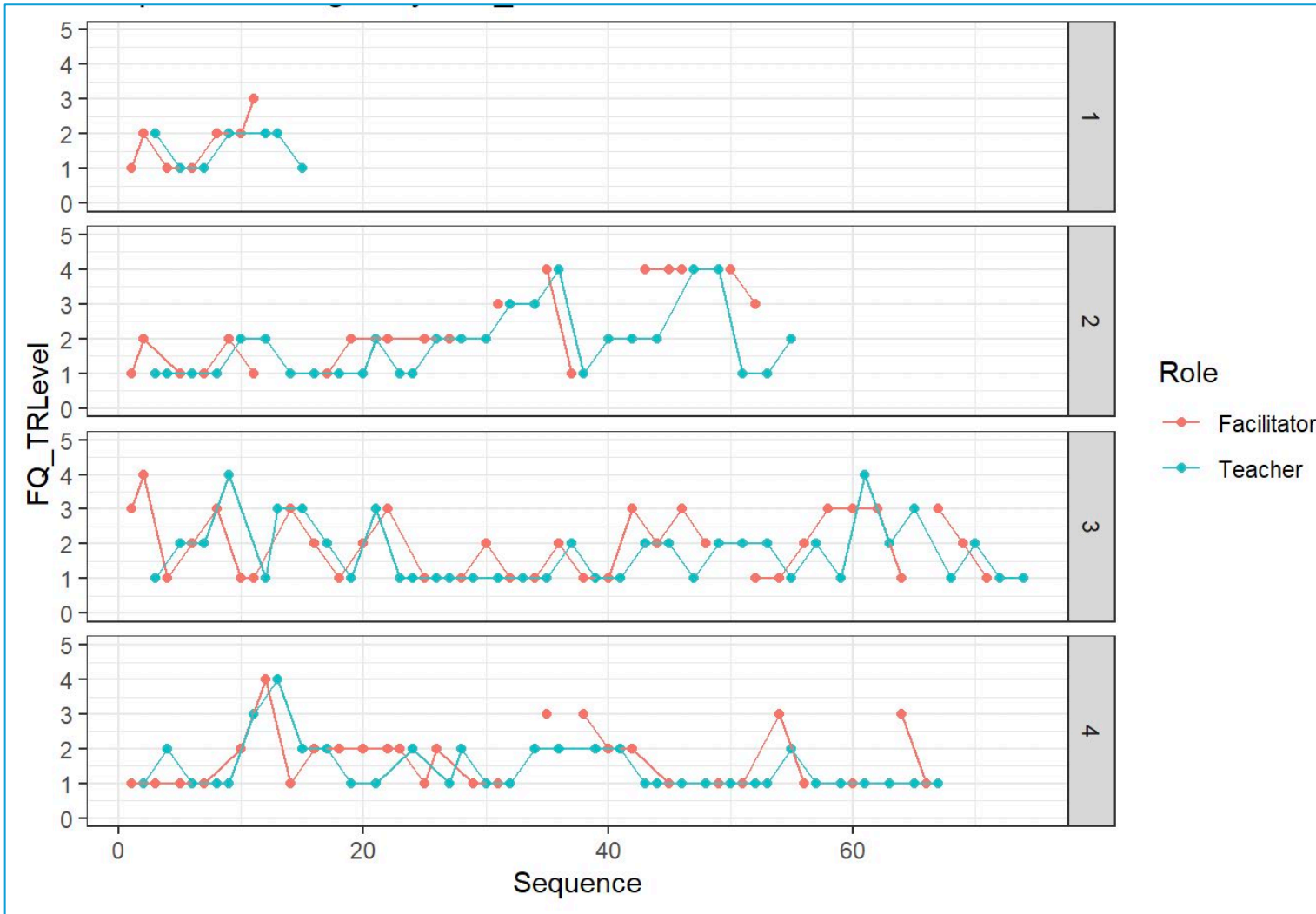
## Open-ended Questions

### Activity Types

- Science-related
- Other (non-science-related)

Preschool teachers were more likely to ask open-ended questions while engaging in science-related activities with children.

# Findings



## Facilitators' Level of Questions

- 1=Gathering Information
- 2=Eliciting Justification
- 3=Eliciting Critique
- 4=Inciting Discussion

## Teachers' Level of Reflection

- 1=Description
- 2=Justification
- 3=Critique
- 4=Discussion

Preschool teachers were more likely to use high-level reflections when provided with higher-level facilitation questions.

Hong, Wajskop et al. (in progress)



Enhancing Early Childhood Educators' Reflective Practice and Content  
Knowledge to Increase Children's Capacity for Science Talk  
NSF DRK-12 No. 2300676

# PreSTAR

## Preschool Science Talk in Action and Reflection

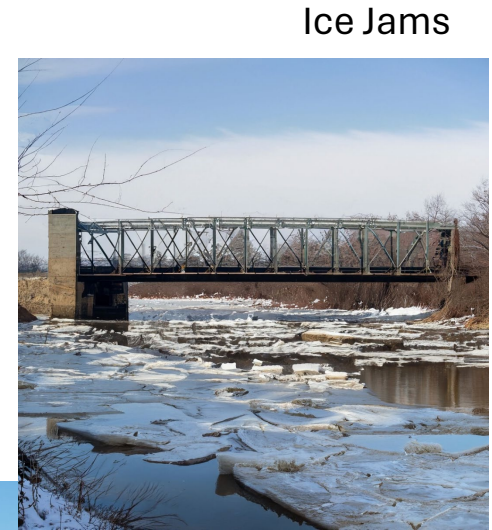
### Exploring Science and Engineering in Rural Nebraska



Roly-poly



Fungi



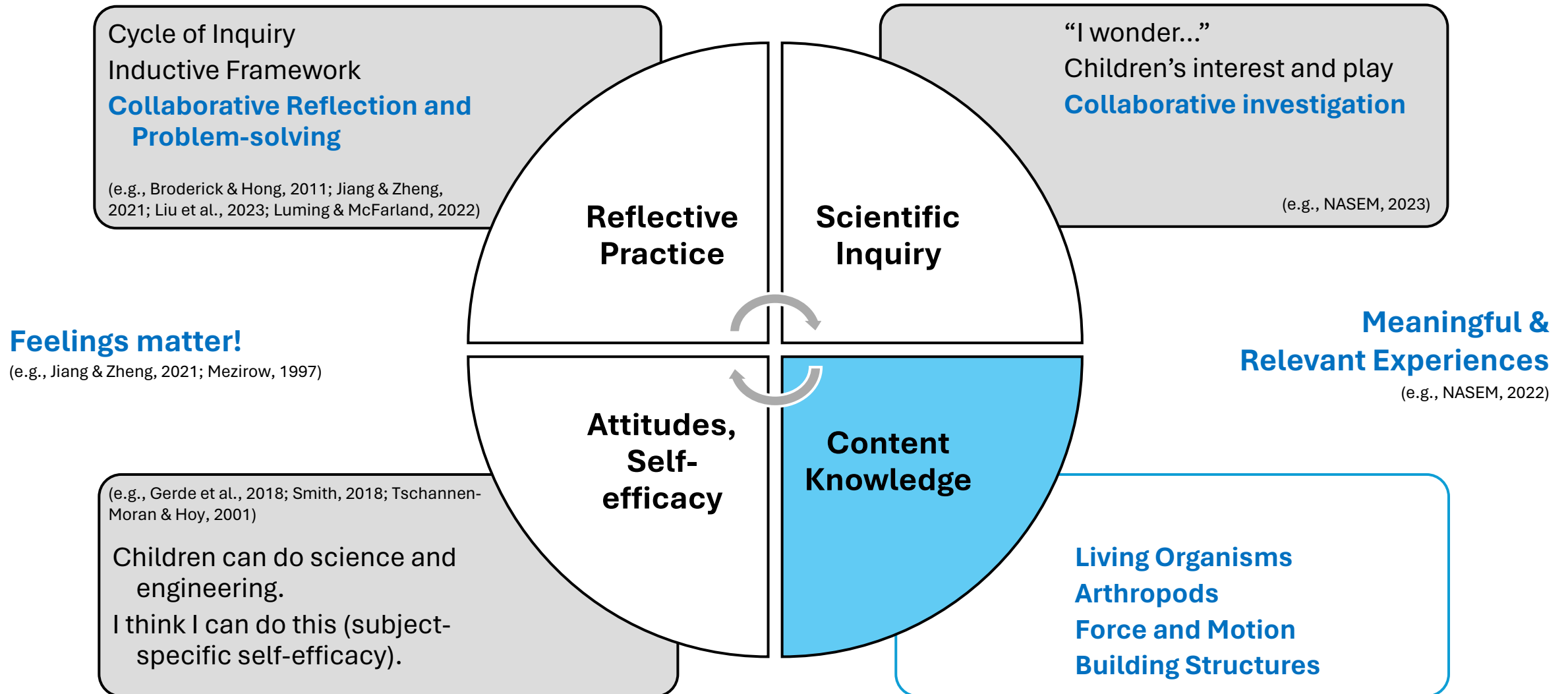
Ice Jams



Terraces



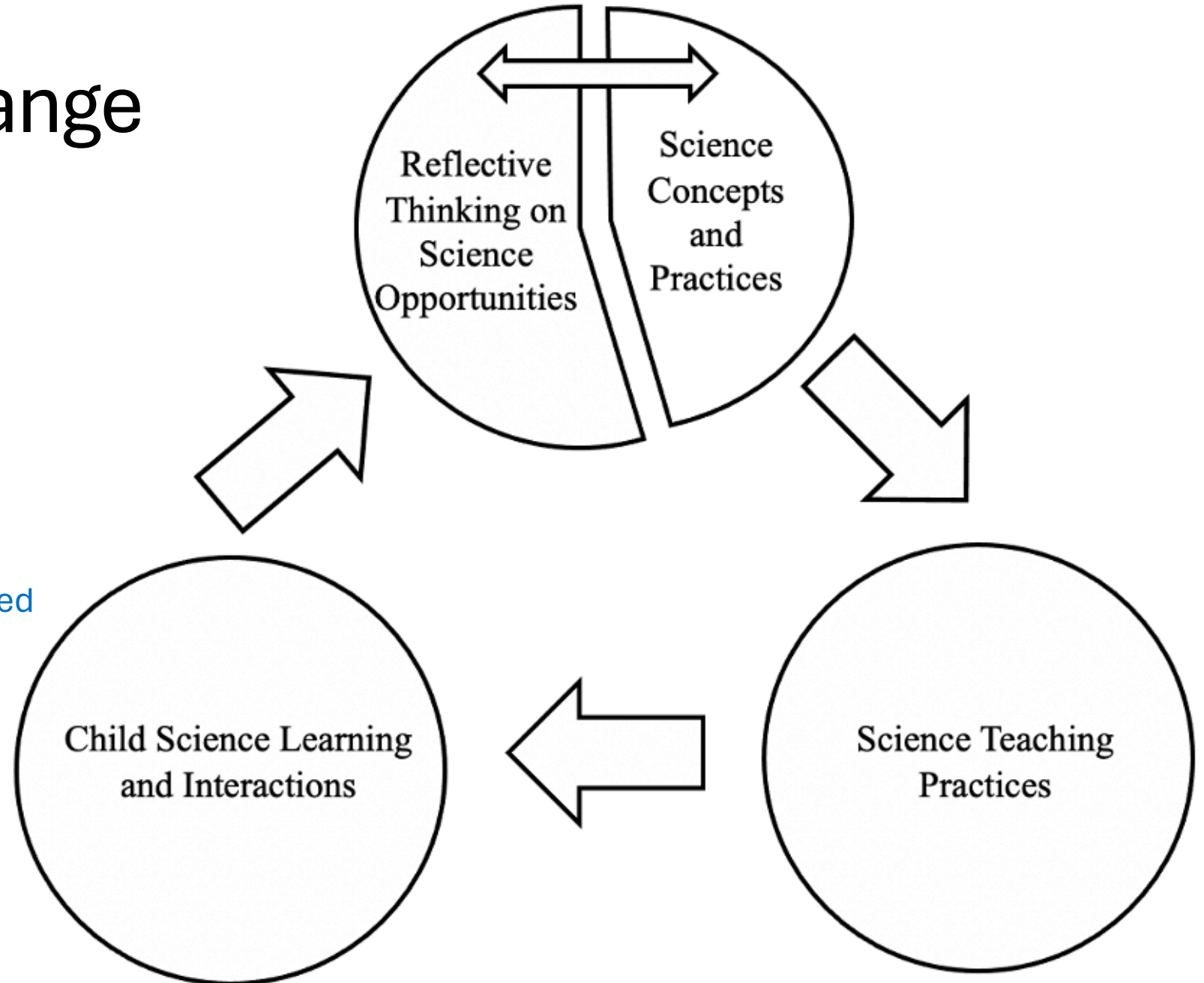
# Foci of Inquiry



# Theory of Change

## Intended Participants

- Early childhood educators working with children and families in [rural Nebraska communities](#)
- [Both center- and home-based](#) early care and education settings
- Preschool-aged children



# Study Design

1

- Pre-intervention assessments
  - Early childhood educators' self-efficacy and knowledge; Children's knowledge

2

- Professional Development (x 2)
  - Science and engineering content; Reflective practice; Cycle of Inquiry

3

- Observations and Reflections (x 6)
  - Children's interactions and play; ECEs' interactions with children

4

- Post-intervention assessments
  - Early childhood educators' self-efficacy and knowledge; Children's knowledge

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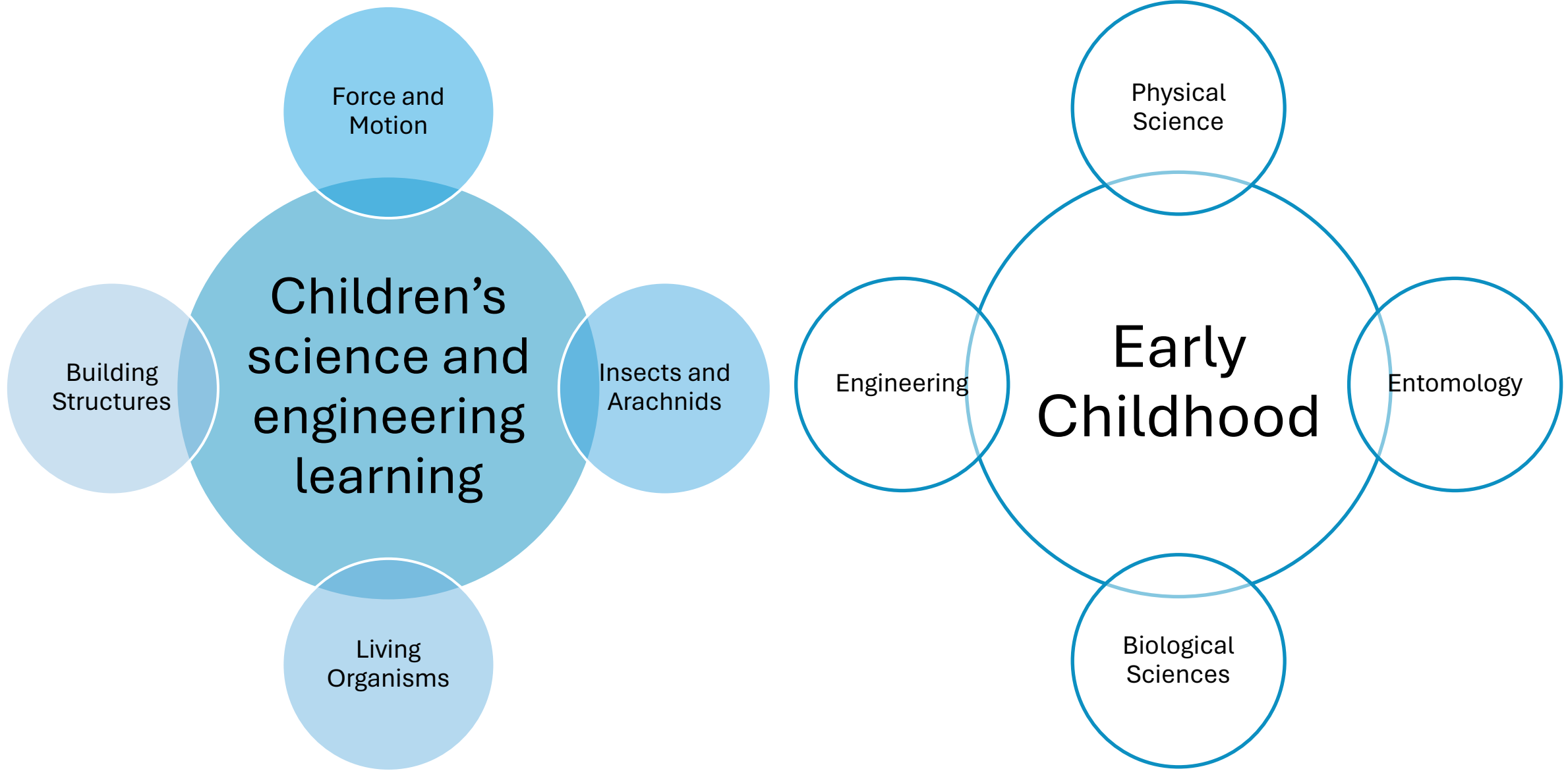
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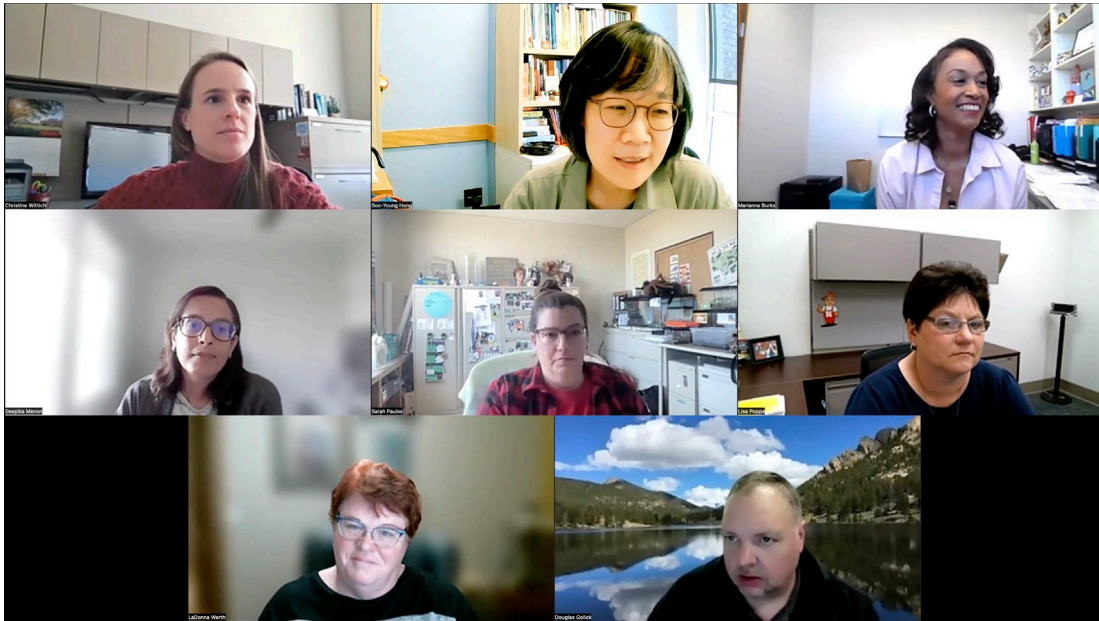
- Post-intervention assessments
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# Multidisciplinary Collaboration



# Collaborative Learning Sessions

- Science and engineering content sharing with adult learners



Living vs. non-living organisms (p. 16 of First Encyclopedia of Science)

- **Plants are living even though you may not see them move** (they move very slowly this really considered 'moving' though? They do not move, but they are alive. What would be some other examples like this?)
  - o They grow
  - o They eat (absorb nutrients)
    - They make their own food (photosynthesis)
  - o They breathe (they need air)
  - o Something about changes in their environment (temperature, light) – homeostasis
  - o They get rid of waste
- This could be made into a "checklist" of sorts for kids to practice with
  - o Has mass / weight (we can weigh living things)
  - o Living things that we wouldn't necessarily think as living?
    - o Examples: bacteria, fungus, mushrooms, etc.
    - o Viruses are not living because they need a host. They wait until they get picked up.

Arthropods

- A group of animals that have a hard outer layer or covering, kind of like an armor (an **exoskeleton**)
- Arthropods include **insects** (flies, beetles, butterflies, bees, ants, termites), **crustaceans** (crab, lobster, shrimp, roly poly / pill bugs – isopods(also sowbugs which are different, pillbugs and roly pollies can roll into a ball (or pill) and do not have appendages out their

What kind of forces are outside that can weather can there be outside?) (ex. Wind, storm)

- Could mimic this by having child build a small structure that might survive strong wind.

Gravity

Important words:

Axial force – A piece of the structure has force applied to it lengthwise (pushing or pulling)

- The **pushing** can lead to something called compression, or the force of an object being squished, squeezed, or made to be smaller than it is
- **Pulling** can lead to something called tension, or the force of an object being pulled apart, and the object straining to stay in one piece
  - o When tension occurs, the object tries its best to hold itself together

Slime, small twist balloons,

- **\*this** made me think of using a stress ball, squeezing it to make it smaller and pulling it apart

Shear – pieces of structure sliding apart from each other (the block on top is sliding apart from the block below it)

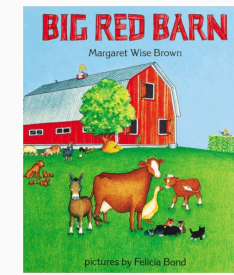
- This made me think of the game Jenga, and how when we slide a piece of the structure out, it causes instability with the rest of the structure

Earthquake

- **ice jams** (? relevant) – water cannot flow through the ice → flooding (bridge, community, houses); force onto bridge

# Resource Collection

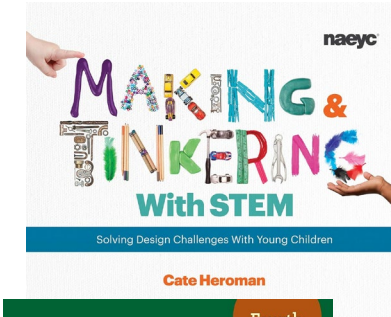
- Early childhood books and curricula
  - Young Investigators
  - Preschool Pathways to Science
  - Ramps and Pathways
  - Big Questions for Young Minds
  - Making and Tinkering with STEM, etc.
- Professional magazine articles
  - Young Children
  - Teaching Young Children
  - Science and Children
- Nebraska Extension resources
  - STEM Imagination Guides
  - Little Wings Pollinator Science Explorations, etc.



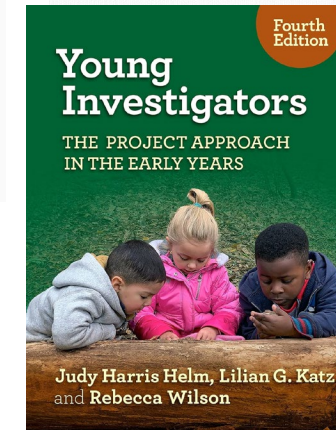
**Big Red Barn** [↗](#)  
FARM

STEM Challenge: What is the best barn design?

[Download this STEM Imagination Guide](#) [↗](#)



**Cate Heroman**

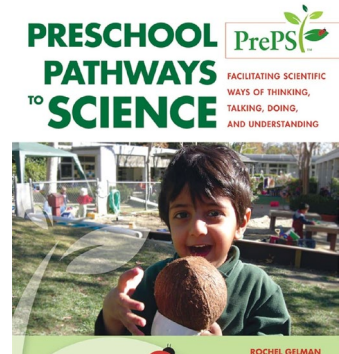


**Fourth Edition**

**Young Investigators**

THE PROJECT APPROACH  
IN THE EARLY YEARS

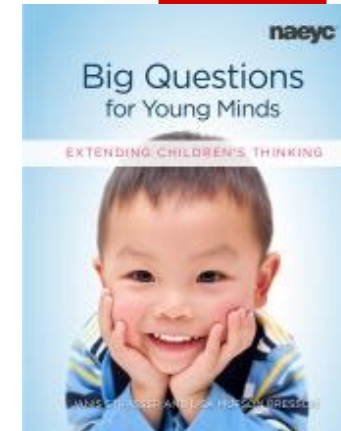
Judy Harris Helm, Lilian G. Katz  
and Rebecca Wilson



**PRESCHOOL PATHWAYS TO SCIENCE**

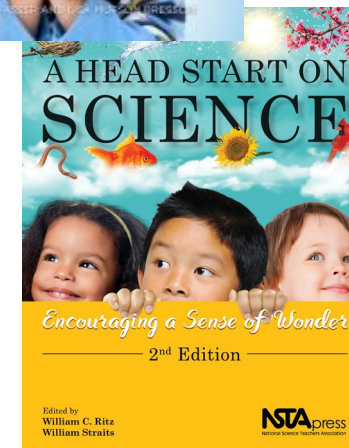
FACILITATING SCIENTIFIC WAYS OF THINKING, TALKING, DOING, AND UNDERSTANDING

RACHEL GELMAN  
KIMBERLY BRENNEMAN  
GAY MACDONALD  
MOISES ROMAN



**Big Questions for Young Minds**

EXTENDING CHILDREN'S THINKING



**A HEAD START ON SCIENCE**

*Encouraging a Sense of Wonder*

2<sup>nd</sup> Edition

Edited by  
William C. Ritz  
William Straits

**NSTA**press  
National Science Teaching Association



**Each Living Thing**

JOANNE RYDER

ASHLEY WOLFE

**Each Living Thing**

STEWARDSHIP

STEM Connection: Bug Hotel

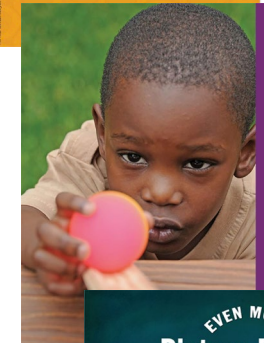
[Download this Guide](#) [↗](#)



**EXTENSION**

**Little Wings**

Pollinator Science Explorations



**Ramps & Pathways**

a constructivist approach to physics with young children

Rheta DeVries



**EVEN MORE**  
**Picture-Perfect**  
**SCIENCE**  
Lessons, K-5

Using Children's Books to Guide Inquiry

by Emily Morgan and Karen Ansberry

**NSTA**press  
National Science Teaching Association

# Content Brochures

- Living Organisms & Arthropods

## Arthropods Unveiled

SECTION 4

**Arthropods** are animals with an exoskeleton (hard outer layer). Among the types of arthropods are *insects*, *crustaceans*, and *arachnids*.

**Arthropod Features & Identification**

- Insects**
  - Six legs
  - Body with three segments
- Crustaceans**
  - Multiple legs
  - Body with many segments
  - Two pairs of antennae
- Arachnids**
  - Eight legs
  - Body with two segments

### Arthropod Benefits

Among the benefits of arthropods include their various **roles** that influence the ecosystems around us. These roles include:


- Waste Disposal
- Pollination
- Food Source
- Biodiversity

An additional benefit includes the population control of both insects and animals.

### Larvae & Molting

#### Life Stages

In arthropods, **larvae** represent an immature stage of life. Larvae, often resembling worms, must undergo **metamorphosis** in order to reach adulthood.



## Discover the world of living organisms & arthropods!

Explore the fascinating world of living organisms and ecosystems that surround us!

### Living Organisms & Ecosystems

SECTION 1

#### Ecosystems

are a dynamic interplay of **living** and **nonliving** elements. Different animals, insects, and plants thrive in various ecosystems.

**Ecosystems exist everywhere, even in small areas like parks.**

**Biotic Factors** are comprised of all the *living* elements, such as plants and animals.

**Abiotic Factors** consist of the *nonliving* components, such as water, soil and light.

#### Seeds & Plant Growth

The environment in which a plant

#### Case Study: Chirping

**Male vs. Female**  
Male crickets chirp while females do not. Purposes for chirping include mating, alerts for danger, and communication.

**Body Language** includes mimicry, vibrations, and other signals.

**Nonliving** components of an ecosystem include water, soil, and light.

**Dormant** is a stage until proper conditions are met.

**Climate Growth**

**Climate Control**

**Climate Detection**





# Content Brochures

- Force and Motion & Building Structures



## Relative Motion & Position Section 1

### Discovering the Ball

- Explore the ball's placement relative to other objects.
- Experiment with moving the ball using various body parts and external objects.
- Understand how properties like weight, size, and texture affect the ball's motion.



Questions to consider:

- Where is the ball?
- What is the ball doing?
- Is the ball to the right or left of (object)?
- How can you move the ball?



**Exploring Force, Motion, and Building Structures with Young Minds**

**Unlocking the Wonders of Force and Motion**

## Building Structures

Section 3

### Understanding Force

There are many types of forces that can affect structures, such as: pushing (**compression**), pulling (**tension**), sliding (**shear**) and

When we push the from us, or tow we pull?

### Gravity's Influence

- Visualize gravity as the force pulling objects toward the ground.
- Understand its impact on the movement of everyday items.

Questions to consider:

Think about gravity by toss ball in the air. What happens the ball is tossed? Does it back down on its own?



### External Forces

- Identify forces from nature such as wind, storms, and earthquakes.
- Engage in hands-on activities to simulate these forces.

Consider how weather might inflict stress on a structure by using a fan to mimic strong winds. How does the wind affect the structure?

### Center of Gravity

A structure's center of gravity is its foundation of stability.

A truss is a group of



### Making Structures

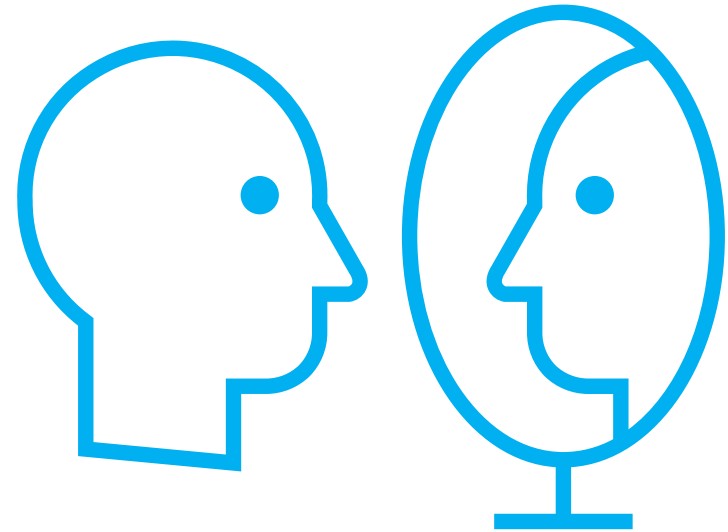
- Encourage structural function.
- Discuss structural effects.
- Notice materials.

### Space

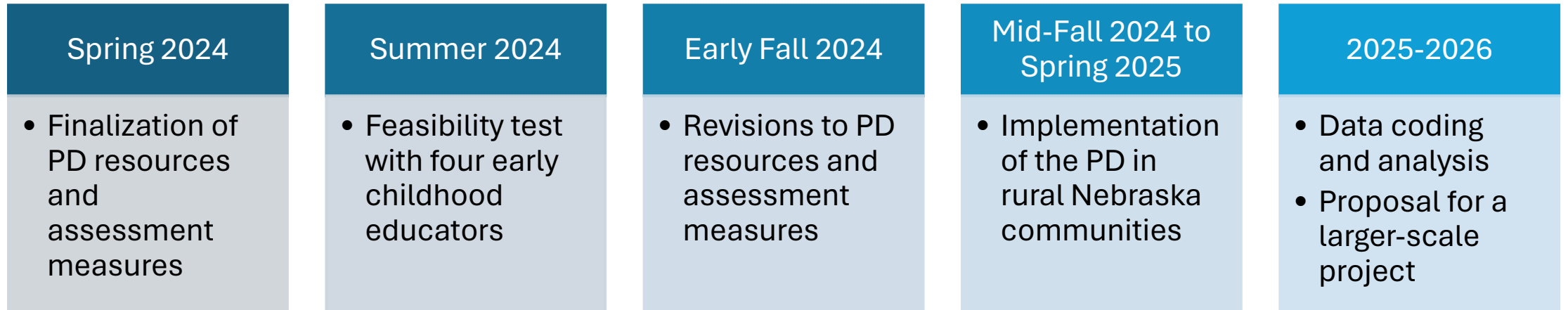
- What do you think about building in space?
- Tell me about building in space.
- How much building will you build?
- How could you build in space?
- How can you build in space?
- What other things can you build in space?
- Which part is the strongest?
- How can you build in space?

# Reflections from the Team

What we have learned so far...



# Next Steps



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Thank you!  
Questions?



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**Nebraska**  
Lincoln

FUNDAÇÃO  
**Maria Cecilia  
Souto Vidigal**