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# Inquiry-Based Science Communication Using Plant and Animal Systems

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# Inquiry-Based Science Communication Using Plant and Animal Systems

Tiffany Heng-Moss  
University of Nebraska






# Programs

- Our Zoo to YOU
- Soybeans in the Classroom  
Research Experience for  
Teachers





# Science as Inquiry



National Research Council (2000)

- Powerful way to understand science content
- Enhances student performance
- Improves attitudes toward science
- Fosters scientific literacy
- Increases understanding of scientific processes



# Our Zoo to YOU

Unique partnership: Nebraska Schools, science educators, scientists, and the Lincoln Children's Zoo

To provide elementary and middle school educators with a unique opportunity to teach inquiry-based science with live animals

Focus on both teachers and students

# Our Zoo to YOU

- Over 300 species of animals
  - Critter Encounter Area
- Zoo loans animals to classrooms
- Four animals, each for six weeks
  - Mammals
  - Reptiles
  - Arthropods
  - Birds






# Teacher Professional Development Workshops

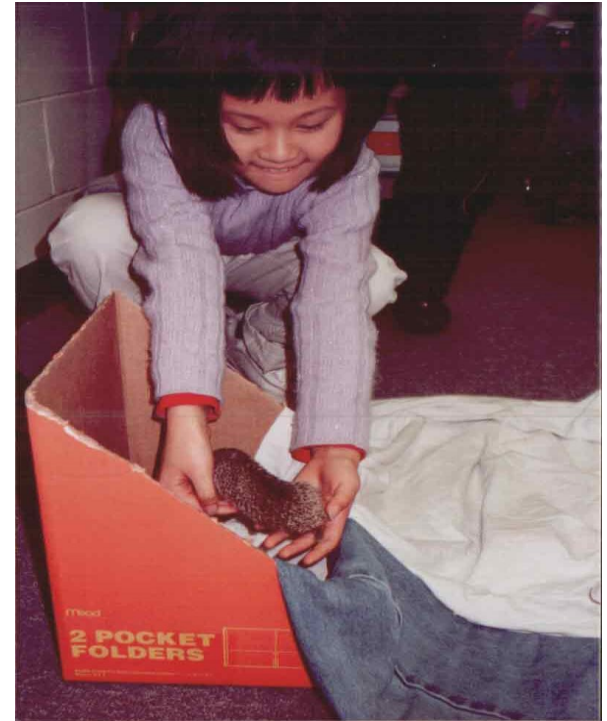
- Overview of program
- Animal Biology 101
- Animal handling and care
- Science as inquiry





# Key to Success: Connecting to Standards

- Science as inquiry
- Life Science Standards





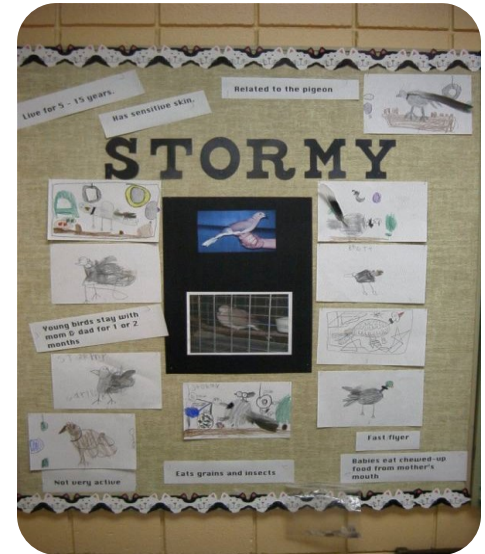
# Across Curricula . . . English Language Arts

## Character Education

- Trustworthiness
- Respect
- Responsibility
- Caring
- Citizenship



- Developing Vocabulary
- Reading
- Writing



# Animal Introduction



Touching Yoda, a Ball Python



Meeting Emily, a ferret



Holding Norman, a legless lizard



**Animal Care**



**Zoo Support Visits**

# Engage Students as Scientists

- Which food does Picasso prefer?
  - Carrot
  - Orange
  - Pellets
  - Hay
- Will Milli prefer fruits or vegetables?
- How many legs does Milli have?

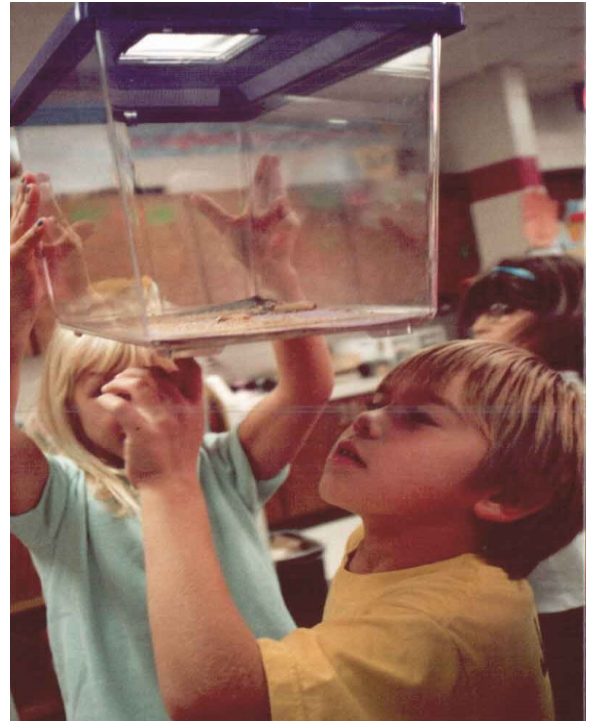




# Engage Students as Scientists

## Mealworms

- How often do mealworms molt?
- How long does it take a mealworm to become a beetle?



# Engage Students as Scientists

Lewis



- Will Lewis complete a maze?
- Will Lewis complete a maze with mealworms scattered in it?



# Engage Students as Scientists

## Madagascar Hissing Cockroach



- How does a cockroach hiss?
- Why does it make that sound?
- Why do they stick to your hands?





# Program Impact

- Over 150 classrooms in NE
  - First grade
  - Fourth grade
  - Seventh grade
- Over 100 in-service teachers
- Over 5,000 children
  - Thousands of other students impacted
  - Parents and other family members



Observing beetles



Weighing the Geckos



# Program Impact

- Our Zoo to YOU was an effective way of incorporating animals in the classroom to:
  - do inquiry
  - motivate students
  - teach life sciences
  - incorporate science across curricula



# Another outcome.....



- Exhibit features a variety of arthropods, from your backyard and around the world
- Visitors are the scientists
- Exhibit staffed with Bug Buddies so visitors can interact with live arthropods
- Institute of Museum and Library Studies - \$150,000





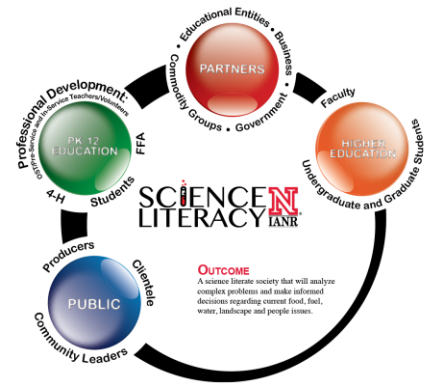
# Programs

- Our Zoo to YOU
- Soybeans in the Classroom  
Research for Teachers  
Program



# The Need for Science Literacy

- By 2050 there will 2.4 billion more people
- Confusion among the public about food, where it comes from and how it is produced
- Less than 1.5% of people in the US live on farms
- Few connect agriculture with STEM





# Soybeans in the Classroom

## Research Experience for Teachers



Transformative model of education and professional development focused on:

- Systems-approach
- Science as inquiry
- Integration of agricultural systems as vehicles for science education



# Soybeans in the Classroom

## Research Experience for Teachers



Teachers gain the tools and knowledge to educate their students on:

- the role of soybeans in their lives
- the impact of soybeans - both locally and globally

Engage their students in discovery and hands-on learning





# Summer Soybean Institute (SSI)

- Soybean system
- Research and discovery
- Explore classroom connection - How to replicate this experience in the classroom?
  - Systems level inquiry approaches
  - National, state and local science standards
  - Overstuffed" curriculum, limitations on how much science is taught

# Classroom Implementation

- Program support
  - Scientists
  - Science educators
  - Master teacher
- Lesson plans & other online resources
- Other educational resources
  - Ag in the Classroom
  - State Soybean Boards
  - Nebraska Extension





# Impact of the Program

- More than 150 teachers have participated
- Unique model:
  - Using agricultural systems to teach science
  - Connecting soybeans to curricula
  - Infusing an inquiry-based approach
- Lincoln Public Schools K-2 classrooms use soybean as the model plant system

# Inquiry Investigations

photosynthesis life aphids water stem  
cycle light pod root is soybean soil  
seed leaf light pod root is soybean soil  
nutrients soybean soil  
dark

# Impact of the Program





# Ag in the City



## City kids learn about agriculture

by Mary Rezac, Nebraska News Service - 11/20/2013

Dirt flew in Kevin Atterberg's eighth grade class as the kids prepared basil, chives and other plants to grow in water, known as a hydroponic system of agriculture.

The Nebraska Farm Bureau named the Lincoln teacher as one of two Ag Teachers of the Year last year for innovative new curriculum called Ag in the City, an advanced eighth-grade science class exploring various aspects of the field of agriculture.

The Culler Middle School teacher attended the Summer Soybean Institute in 2012, where he was supposed to come away with more knowledge about soybeans and one lesson plan. He left with a vision for an entire classroom year.

"I started thinking about my students and how especially in the state of Nebraska, agriculture is huge," said Atterberg, who is in his third year teaching.

"About 30-40 percent of my kids will get a job in agriculture," Atterberg said. He said his class discusses all kinds of agriculture-related fields in their careers unit, such as food science or horticulture, to ensure their view of agriculture is "not just farming."

Besides careers, the major pillars of Nebraska agriculture—corn, beef and soybeans—are studied as well as nutrition and soil. The second semester of the class focuses on lab experiments with soybeans in a partnership with University of Nebraska Agricultural Youth Council Members.

A student favorite so far has been feeling inside a cow's stomach, courtesy of the UNL Beef Mobile which brings the animal to the kids. The students are able to see and feel into the stomach, or rumen, through a rubber opening called a fistula that is used for scientific observations.



Photo by Mary Rezac

**Eighth grader Valentina Fowler pokes holes in a styrofoam cup while classmate Rana Aribi studies a basil plant.**



Courtesy PhotoImage

**In their hydroponics unit, eighth graders at Lincoln's Culler Middle School float plants in styrofoam cups in water as an alternative way of growing herbs.**





# LIGHTNING ROUND

The goal of the Lightning Round is to increase the number of creative ideas that get shared

- Share the most interesting and/or successful outreach program/initiative that you have been involved with
- Share a new idea
- Share to the broader communicating by tweeting using our #SciComm2016





"ALONE WE CAN DO SO LITTLE  
TOGETHER WE CAN DO SO MUCH."

HELEN KELLER