1. Essential Element

Activity/Lesson Title: Heredity and Inherited Trait

EE.MS.LS3-2: Make a claim supported by evidence that offspring inherit traits from their parents

Teacher: Nate

Student: Nico

Grade Level: Middle School (6-8)

Level: Precursor

2. Science and Engineering Practice

SEP 2: Developing and Using Models

SEP description: Supports students as they use a model to describe phenomena. Students learning this EE use genetic models to make their scientific claims.

3. Disciplinary Core Idea

Inheritance of Traits

Core Idea description: Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited.

4. Crosscutting Concept

Cause and Effect

Concept Description: Cause and effect relationships may be used to predict phenomena in natural systems.

5. Linkage Level Descriptors

Initial: Recognize that organisms differ within the same species.

Precursor: Identify similarities and differences between animal parents and their offspring (e.g., eye color, hair/fur color, height, leaf shape, and/or markings, etc.).

Target: Make a claim supported by evidence that offspring inherit traits from their parents.

6. Student's Typical Accessibility Supports

- Visuals
- Materials that can be manipulated by hand

7. Student Prior Experiences, Prior Knowledge

- The student loves animals, especially dogs.
- The student notices that he has brown eyes, and his mother has blue eyes.
- The student understands there is a difference between two species, like dog and bird or bird and human.
- The student loves being able to touch and manipulate objects as he is learning.

8. Phenomenon to Explore

Question: Why do some animals have different fur colors?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that

- Genetic variation in offspring cannot be predicted.
- Dominant traits are also the most common traits in a population.
- Only beneficial traits are passed on from the parents.
- Every genetic mutation is an error.

10. UDL Options and Solutions to Potential Barriers

- Use media and technology to engage students.
- Expand the topics for generalization based on student interests, strengths, and needs.
- Use a first/then structure to establish goals for the lesson.
- Give all students in the class time to respond to each other.
- Use various accessible materials (e.g., different real-life examples, images, models, videos of inheritance) to demonstrate the concept.
- Provide real-life examples and interactive opportunities (e.g., fur, feathers, skin, or live animals) to explore and understand differences within the same species.
- Use photographs and picture-supported text throughout the lesson.
- Use the appropriate academic language and model less complex vocabulary using the communication system the students are most familiar with (e.g., voice output devices, pointing to pictures, verbalizations, eye gaze, etc.).
- Provide assistive technology and use personal communication devices to share ideas and opinions and answer questions.
- Provide graphic organizers and templates to organize and display data.
- Provide materials so students can describe or portray animal or family traits by drawing or painting.

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R324A180202 to University of Kansas. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

11. Engage

Think

- *How can I make sure to access students' prior learning?*
- *How can I use the CCC to connect everyday language with scientific language of the phenomenon?*
- *How can I support student participation by scaffolding the SEP?*

Teacher Will

- Assist students in observing what is the same and different within the various animal groups using books and videos.
- Do a shared reading of a book about animals and their parents.
- Use photo cards to ask questions about parents and offspring, like, "Do they look exactly like their parents? What is the same? What is different?"

Students Will

- Review pictures and videos of different types of animal families.
- Observe similarities and differences across animal groups and compare parents and offspring in animal families.
- Participate in shared reading.

12. Explore

Think

- *What is difficult or inaccessible about the phenomenon, and how can I make it more accessible in the Explore phase?*
- *How can students collect data in a way that helps answer a scientific question?*
- *How can I encourage students' careful observation and asking good questions vs. looking for only the "right answer"?*

Teacher Will

- Assist students in sorting animals using photos of adult and baby animals with fur (sorting first by adult/offspring, then noting fur color of each).
- Assist students in discussing how animals get their fur color.

Students Will

- Analyze and sort pictures of animal families.
- Use a data table to record the fur color of each adult and baby animal.

13. Explain

Think

- *How can I help students connect science topics, phenomena, data, and everyday experiences? How can I help my students differentiate everyday language from scientific language? What reasoning helps students see or explain the invisible?*

Teacher Will

- Assist students in discussing how they knew what traits were the same and different from their parents in the animal families (using fur color as an example).
- Assist students in observing that animals' fur color is passed down from their parents (using animals whose fur color does not change for purposes of camouflage).

Students Will

- Complete a CER statement

Claim: Animals have some characteristics that are like their parents.

Evidence:

» I saw in the animal pictures that sometimes fur color is the same as one parent (like in certain dogs).

» I saw in the data chart that sometimes fur color is the same as both parents.

Reasoning: Parent animals pass on their traits (fur color) to their offspring.

14. Elaborate

Think

- *How can I help enrich or extend student ideas? Are there related science concepts that would support and extend student learning?*

Teacher Will

- Assist students in thinking about similarities and differences in the fur color of another animal.
- Assist students in thinking about why baby animals are sometimes different colors from their parents (for protection/camouflage).
- Assist students in thinking about how the traits passed on from parents sometimes help different types of animals survive (e.g., arctic foxes whose fur turns white in winter but is brown in summer).

Students Will

- Use photos and videos to discuss a different animal and how its fur color is passed on from its parents.
- Identify baby animals with the same fur color as their parent and those that are different from their parent (for camouflage/survival).

15. Evaluate

Think

- *What do I need to see or hear from my students that assures that they have learned the science content? What information do I need to gather to inform my teaching as I move through the lesson?*

Teacher Will

- Monitor students' responses to questions during the lesson; adapt the lesson as needed to address student ideas.
- Administer an assessment (e.g., identify an animal with similar fur color and different fur color than their parent).

Students Will

- Respond to questions posed by teacher, organize data they gather, complete a CER statement using data as evidence.
- Complete the teacher-created assessment (e.g. identify animals with similar and different fur color as their parents).