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Science Methods

Small Group Science Lesson – Evidence of Animals
Core Decisions (What, How and Why)

I designed this lesson as an introduction to the scientific practices of observation and looking for evidence to build a claim. These are foundational skills in science that my first grade students have little familiarity with. I chose to focus on observations and evidence related to animals because they took a class trip to the Philadelphia Zoo a couple weeks ago and are very engaged in learning about the animals they saw there. While I am thrilled that they are engaged in their learning, I believe learning about Zoo animals is not enough. I'd like for my students to realize that there are animals and living things around them, sharing the many spaces in their own neighborhoods right here in Philadelphia. These are animals that they often take for granted or possibly don't even notice because they aren't paying attention to what's in their surroundings. It is my belief that these animals that share the city with us can provide us with opportunities for very meaningful observations and investigations that can sometimes connect to our own day to day lives. This is why I'd like to push them to think about not just the more exotic animals they saw at the Zoo but to take notice of the local animals around them as well that they don't need a special field trip to be able to observe up close in real life. My hope is that this lesson about how we can find evidence of living things and animals in own familiar surroundings will hopefully encourage students to be more observant and appreciative of the local animals and natural world that exists even within the city limits.

Specific types of evidence will be emphasized so that they are motivated to look for specific things when they are outside of the classroom. The activities in the lesson emphasize making observations, looking for evidence, making claims and sharing information. These are all practices that real scientists are involved in. I hope that through this lesson students will see themselves as capable of acting as scientists themselves by modeling these practices and then encouraging them to continue those practices outside of school. It is my belief that students should understand that a scientist is not

something you *become* but something that you already *are* when you participate in certain behaviors and practices. I am particularly interesting in building in and focusing on scientific practices while also having a content focus due to the new emphasis on a multidimensional approach to science education as laid out in the National Research Academies' Framework for K-12 Science Education.

In this lesson I attempt to use multiple teaching methods and strategies to allow all students an entry point for the activities we are doing. This includes initial shared writing/organizing of ideas, teacher modeling, then eventually shared and independent practice. As first graders these students will benefit also from practicing appropriate classroom discourse. The discussion and discourse also allows me to set up the expectation of students starting to try out meta-cognitive strategies to become more aware of their own thinking and learning. The ability of young students such as these first graders to be self aware and meta-cognitive is of particular interest to me as a teacher-researcher. In a more practical sense, allowing students to form a collective understanding through the sharing of ideas builds a sense of community among the group of students before moving into independent work later in the lesson. Through these various activities students have multiple exposures to the main ideas and objectives so that by the end of the lesson they can have multiple points of reference from the lesson to support the construction of their own learning. The independent practice at the end of the lesson is not only a way for them to apply what they have learned but also to express their identities within the content that is being taught. ~~They hopefully~~I hope that the children will see this as a chance to see themselves in what they have learned and make the content more personal and meaningful to them in this final activity.

Small Group Science Lesson - Evidence of Animals

Goals/Objectives:

Students will be able to identify at least 3 different types of evidence of the presence of living things

Students will understand that they can find living things to observe where they live

Students will use the term evidence to refer to clues or observations of animals previously being present in an area.

Standards and Assessment Anchors:

From the NRC Next Generation Science Standards Framework

Scientific Practices:

- Analyze and Interpret Data
- Engaging in Argument from Evidence

Crosscutting Concepts:

- Patterns
- Stability and Change

Core Disciplinary Ideas

- *LIFE SCIENCE: By the end of grade 2*. There are many different kinds of living things in any area, and they exist in different places on land and in water.
- **LIFE SCIENCE:** ***By the end of grade 2.*** People use their senses to learn about the world around them.

From the Benchmarks for Science Literacy

12E/P1 - Ask "How do you know?" in appropriate situations and attempt reasonable answers when others ask the same question.

12D/P2 - Draw pictures that portray some features of the thing being described.

12D/P3 - Interpret pictures, drawings, and videos of real-world objects and events.

1B/P3 - Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.

1B/P1 - People can often learn about things around them by just observing those things carefully

5A/P1 - Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another.

5D/P2 - Living things are found almost everywhere in the world. There are somewhat different kinds in different places.

1C/P1 - Everybody can do science and invent things and ideas.

Materials and Preparation:

- Pictures of common urban animals/living things (birds, squirrels, bugs, rats/mice, rabbits, etc.)
- Large pictures of animals tracks in snow, sand, mud, cement
- Pictures of evidence of animals (scat, broken nuts, feathers, nest, shed skin, tunnels/holes, etc.)
- Chart paper and markers
- Large class scene w/ evidence of animals
- Copies of scene for students to mark up
- Lined paper and blank paper for note taking, observations and drawings
- Pencils and crayons for drawings

Classroom Arrangement and Management Issues:

Students will start seated on the rug because it provides more feeling of community. There they will be able to share ideas and expand their thinking collectively with shared ideas (group lists) and teacher modeling. There is much discussion and discourse during this part of the activity so we may need to review appropriate responses to ideas and respectful ways to contribute. I will use the "pounce pass bounce" strategy to get students to respond to ideas and check to make sure they are listening to each other as much as the teacher.

Then they will move to desks to work in focused pairs. The reason for being in pairs is so that they can collaborate to complete the task efficiently in less time but also practice working together. This task could be seen as slightly competitive but in an engaging and motivational way, to keep students on task during this part of the activity.

We come back together to review also at the desks but discussing as a whole group before moving into independent work at the desks.

Plan

The Hook - *5 minutes*

1. Ask students to think about their trip to the zoo. Ask what kinds of animal they saw, what did they observe the animals doing? On chart paper or board, list animals under the heading "Zoo".
2. Ask students if the animals in the zoo could be found in Philadelphia, outside of the zoo? Take some examples. (most are probably not the type of animal that normally lives here) List animals that live locally under the heading "Philadelphia"
3. Ask students if they think we do have any animals that live here in Philly? Where have you seen them? Get examples and add to the "Philadelphia" list. (It might be helpful to have pictures of the local animals to be a visual reminder for students)
4. Exclaim explicitly that everyday we are all scientists who observe and look at the world around us and learn from it. Let students know that our task as scientists today is to think about studying the animals in our surroundings.

***The Body** – 30 minutes*

5. Ask students if we always see animals every time we go outside. Explain to students that sometimes even if we don't see an animal there are ways we can find out if an animal was there at one time. It might help to say "It's like we are detectives looking for animal clues". Create a class list of the different clues that you might find that an animal has been there. As students suggest things, share the pictures of examples of those things (poop/scat, feathers/fur, holes/mounds/tunnels, nests, scratches, eaten plants, tracks, etc.) Introduce the term evidence to students. Explain that the clues we found are evidence that animals were present or there. Throughout the activity remind students to use the term evidence when referring to any clues of animals.
6. Show large chart paper scene. Ask if anyone sees any animals in the picture? (there won't be any). Explain that there is evidence in the picture that animals were there before. Have students pair up and head to desks to look in their own copy of the picture for the evidence. When they think they have found something, they should mark it (circle it) and think about what kind of animal that is evidence of. How do you know it's that kind of animal? Students can take observation notes on the lined paper to help them remember their thinking.
7. After 10 minutes, have students come up to the large chart version of the scene and point out one piece of evidence they found and share their observations with the group. Explain to students that they need to be listening because the other students may have found evidence that not everyone noticed and if they don't have it marked they can find it and make note of it as it is shared.
8. After all evidence has been found and discussed, ask students what they can learn/know by looking at the evidence (type of animal, where the animal was/went, how long ago they were there, what they ate, etc.) Make a list/web of the classes ideas about what we can learn from the evidence as ideas are shared. Explain that these ideas are *claims* we can make from the evidence in the picture. Tell students that scientists who make observations always make sure to take detailed notes and take lots of pictures or draw sketches. Make sure to ask students if the evidence is permanent. Take time to define the word permanent. Have a brief discussion about what could happen to the evidence (wash away, get stepped on, blown away by wind, etc.). So since many things we observe are not permanent what should we do with the evidence? (take pictures, sketch them, take notes on our observations). Emphasize that scientists are always taking detailed notes and records about their observations. Ask students why that might be important? (To share information with others, to have proof, to reference/look back at it later, to compare it with other observations from another time, to have a record of it before it changes etc.)
9. At this time have them think about their own home/neighborhood. What kinds of evidence might they find of animals there. Have students *independently* draw a picture/scene and include evidence of animals being there (making sure to emphasize they aren't drawing the animals themselves but evidence that they were there). Ask that students use at least 3 different kinds of evidence. More advanced students can label the evidence or take notes on what evidence they included and why.

***Closure** – 10 minutes*

10. After 10/15 minutes have students each share their picture and one type of evidence they included in their scene and one thing they learned, found interesting or a question they have now.
11. Urge students to continue being scientists at home and look for evidence of animals. They

should make a note about what they saw/observed. They can bring that observation in to share with the group/class so that we all can be on the look out for similar evidence in our own neighborhood!

Assessment of Goals/Objectives:

Formative assessment is done by posing questions to the students about what they have seen or think of in terms of evidence of animals.

Collection of their observation notes and drawings allows me to assess if they are able to identify and include different types of evidence and look for which type of animals they might be including in their picture.

I will assess their use of the term evidence by looking for it in their notes and listening for the word being used in their verbal sharing of ideas.

Anticipating Student Responses:

Students were very excited about the zoo and may be over zealous to talk at length about what they saw. I may need to limit them to saying one animal and one thing they noticed about that animal.

Students may not think they have any living things around simply because they don't notice or count the birds, mice, squirrels, insects etc. They may have a lack of awareness currently about what is around them. Having pictures will help them to remember “oh yeah I've seen one of those”.

Students will likely get a little wound up about the inclusion of scat/poop as evidence of animals. Laugh with them about it but try to emphasize the idea that living things/animals don't have toilets where they relieve themselves, so their waste is left where ever they are. This may be a good time to also remind students never to touch the evidence they observe. Not only is it unsanitary but it also disturbs it for others who may enjoy finding the same clue they did.

Some students may not work well in the paired work time. They might need to be encouraged to take turns pointing out evidence and marking it on the page. I may have to explicitly model how to share their discoveries, “I found some evidence! Can I show you?!” and then ask them to let their partner share something they found with them before pointing out another discovery.

Accommodations:

Some students will be far quicker at this task than others. This is why I like having the note taking sheets and guiding questions so that students can make observations but then think about them and take time to note what they are thinking while they wait for other students to have time to finish. They could also be directed to draw a second scene that's different from their home that might have different types of evidence or even different kinds of animals.

Also I will be reminding students that three is the minimum amount of evidence to include in their pictures and challenge them to think of more if they already have their three. Three is suggested only because some students may need more think time before starting to draw and include evidence and I don't want them to run out of time or feel like they aren't done. I will put up the pictures of animals that live in the city so students who are having trouble thinking about what to include can look at the

pictures and think about what evidence those animals would leave us.

Feedback from Lana (Penn Mentor):

Your plan is very well thought out & written. I have just a few things in response.

1. You have kids working in pairs. Have they had any training or practice in how to work in pairs? If not, will you be giving them any instruction or expectations for this?
2. When you have kids present be sure to give the "audience" a focus, task , something to hold them accountable or they tend not to pay attention. It can be something as simple as feedback on what they saw/heard. What did they like about it, learn from it, what questions do they have?