Natural History Museum of Utah

Igniting Inquiry

Alignment to Utah Core Curriculum	Enduring understanding:	Grade Level: 3-5
Intended Learning Outcomes (ILO's): 1. Use science process and thinking skills. 2. Manifest scientific attitudes and interests. 3. Understand science concepts and principles. 4. Communicate effectively using science language and reasoning.	Students will come to understand that when they make and record their own observations they are engaging in the scientific process.	Activity Length: 75-90 minutes Process Skills: • Inference • Observation • Recording

Materials Needed:

- 5 different objects (use items from a teaching toolbox, or things with obvious and not-so-obvious details; a matchbox car, stuffed animal, shoe, etc)
- Paper and pencil for each student

Background:

There is no one scientific method - only processes that allow people to question and discover. Questioning (wonders), observing, guessing (inferring), making and testing assumptions (hypotheses), and drawing conclusions are all parts of this process. By pointing out and encouraging student participation in scientific processes they can come to realize that they are scientists capable of making their own discoveries!

Inquiry means to ask a question. There are as many ways to ignite inquiry, as there are curious students and scientists. Inquiry is doing science. Any question can lead to discovery, more questions, and new understanding. Questions are often born of observation and resulting inferences.

Scientists have to make observations and record data (information they collect) as a part of their jobs. If you want to find out about something you can make observations and record your data, just like a scientist! The most important tools a scientist uses are his or her own senses.

Activity

Discuss

Scientists have to make observations and record data (information they collect) as a part of their jobs. If you want to find out about something you can make observations and record your data, just like a scientist! The most important tools a scientist uses are his or her own senses.

Ask: What senses can you use to make observations?
Record on the board: "The senses I can use to make observations are…."
Record student responses as then end of this sentence. Ask students for examples of how each sense might be used to make an observation (sugar and salt can be distinguished by taste, snakes look slimy but feel dry, etc).

Ask: What is the best way to remember an observation?
Record on the board: "The best way to remember an observation is…"
Record student responses on the board as the end of this sentence. Point out that you have been recording data from student responses all along and explain how recording data is an important part of your job as a teacher. Explain that complete sentences are important for scientists to use. A scientist making observations will not have a worksheet to fill in or a sheet that looks like everyone else's. Students are responsible for writing their thoughts and questions as complete sentences.

Ask: What details should you include when recording observations?
Record on the board: "Things I want to record about my observations are…"
Record student responses on the board as the end of this sentence. If students get stuck suggest the following but challenge students to come up with examples:

Common Misconception:
Many teachers new to inquiry think it is hard, takes too much time, and doesn't allow students to focus. In reality, giving students opportunities to question, observe, record and relate can empower them to have confidence in their abilities as learners, capable of high level thinking across all subjects.

- ***Drawing*** - No matter your artistic ability you will notice more when you try to draw something. Labeling a sketch is a very good way to remember observations
- ***Size*** - relative to something else (larger than an apple, under 2 inches long)
- ***Shape*** – overall and in parts, (the rock is egg shaped but is made up of smaller round and square pieces of rock)
- ***Texture*** – encourage students to relate texture to something else (rough like
- sandpaper, rough like bark, rough like burlap)
- ***Weight*** – relative to expectation (heavier than I expected, etc)
- ***Color, shine, luster, smell, taste, movement, sound*** (when appropriate)
- ***Questions*** - questions that come up as a result of observations. This is one of the most important parts of being a good thinker!

Practice

Divide students into 5 groups.
Give each group an object.
Remind students that they will be making observations using several of their senses and recording their observations using complete sentences, lots of details, drawings, and questions they have.
Suggest ways to start good complete sentences:

I noticed that….
The [shape] of the [car] reminds me of…

Allow 7-10 minutes for groups to observe and record.
Rotate so that groups can observe each object and practice recording skills.

Discuss

Ask students to share the observations they made. As they share ask: "What do you think that [feature] is for?" "Why is it like that? "
The answers to these prompts are **inferences**.

Explain that inferences are guesses based on observations. Learn to recognize when students are making inferences and ask them to justify. This is a great way to point out to students their innate scientific abilities and encourage critical thinking!

Common Misconception:
An inference does not need to be "correct to be valid! Often teachers dismiss a guess as just that if it does not match his or her expectations for what students should know. Learn to recognize when students are making inferences (guesses based on observations) and encourage them!

Inferences often lead to questions. "I think the wheels are that shape so it can drive fast, but then what does the engine have to do with it? Encourage students to write questions and inferences on their papers.

Learning Extensions:

You may choose to follow up questions or inferences that students are particularly excited about by discussing how to make and test an assumption and draw a conclusion and then do it as a class!

Formative Assessment Strategies:

1. Assessments are built into this activity. By recording student responses to your prompts you will get an idea about what students know.

2. Circulate through the groups and listen to their observations and inferences. Ask students to justify their inferences. This will give you unique insight into what previous experience students are drawing on to explain discrepant observations.

3. At the end of the activity ask students to write what they understand about making observations, recording observations and how doing so can be useful to them.