See, Think, Wonder

This protocol sets the tone for inquiry and is a good way to introduce a new topic. It is also an active learning strategy–rather than passively receiving information, participants are asked to actively gather information using multiple senses. It encourages participants to generate questions which can guide them as they investigate a topic in more depth during later activities.

Procedure:
Place students in small groups (3-4 students per group, ideally) and present each group with an object. This can include a tangible object, a photo of an object or a video.

1. SEE–Participants start by using their senses of touch, sight, hearing and smell to explore an object at their table. They will record their observations through writing and by drawing using color pencils, drawing pencils or pens. What colors do they notice? How would they describe the texture and the weight of their object? Are there any patterns they can observe? Circulate while students work and encourage them to elaborate upon their observations.

2. THINK– Students build off of their observations and prior knowledge to develop inferences about their object. What is the object made of? What use could it have? How old is it? Where is it from? *What evidence can students observe to support their inferences?* Students record their inferences in the space around their drawing and may use arrows to connect an inference to a specific detail on their drawing.

3. WONDER–In this step, students start to formulate questions that will propel them further into the investigation. Based on their observations, what are they curious about? Ask students to write down these questions so that they can be referred to throughout the larger investigation of a topic.

4. Give each object group a chance to share out with the rest of the group. You can also have students place their drawings and written observations, inferences and questions on the table around their object and then ask for students to silently circulate through the tables to look at each group's work.

The role of the facilitator in this is not to validate or discount the participants' hypotheses and questions, but rather to encourage students to engage with the objects in a rigorous fashion. Mirroring back, summarizing their observations and asking clarifying questions (what made you think that? what evidence from your object leads you to believe . . . ?) will encourage the students to dig deeper.

Points to Consider:

- While it may be tempting to create a worksheet for this activity with separate boxes for students to complete for the See, Think and Wonder phases, we would encourage you instead to simply give each student a blank piece of drawing or watercolor paper, and a choice of drawing tools. This will free up students in their inquiry process, allowing them to move from their drawing to questions, to inferences, to observations in whatever order suits them. Working on drawing or watercolor paper also honors students as artists and communicates that their ideas matter. Whereas students completing a worksheet are less likely to feel a sense of ownership and engagement in their artistic work.

- It takes guidance and practice for students to learn how to make careful observations, to develop inferences based on evidence and background knowledge and to start to ask questions that delve beneath the surface. The first few times you use this protocol, it can help if you begin with a whole group inquiry, using an object or projected photo that is large and accessible for the whole class to visually explore. Start by modeling how you use your senses to make observations. What observations can you make through drawing that would be hard to capture in writing? What observations can you make in your written notes that would be hard to capture in drawing? How can the drawing and writing work together to uncover important information about the object? Model how you can develop inferences based on your observations and on your prior knowledge, and model asking questions. Which of these questions might you be able to answer yourself? For example, the question "Would this float?" is something that you could answer by placing the object in water (assuming it is something that can get wet without causing damage). Which of these questions might you be able to answer through further research and appeal to outside expertise? As you progress through this group inquiry, encourage the students to participate in the process and record their observations, inferences and questions alongside yours. With multiple eyes and brains unpacking meaning from the same object, students will learn just how many observations, inferences and questions are possible and in so doing will get better at stretching their thinking and digging deeper in their own inquiries.

- Here are some criteria to consider in selecting objects for the See, Think, Wonder protocol:
    - When possible give students the opportunity to explore authentic objects and primary sources–this can include photographs, as opposed to reproductions.
    - Some aspect of the object should be mysterious (use, material, or history)

    - Ideally the object is connected to some significant aspect of the culture/history/scientific phenomena that you are going to be exploring
    - Ideally, students will have a chance to learn more about the object over the course of the broader unit.

As the mystery object protocol involves drawing, you may want to do some talking about the act of drawing as part of the introduction to the activity.

Here are a few points to consider emphasizing with students:

- drawing is a very challenging activity because we are trying to take the world which is three-dimensional, colorful and full of infinite details and gradations in tone and capture it in black and white, using just some flaky carbon (graphite) on a flat piece of paper.
- Because it is challenging, it is important that we be patient and supportive of ourselves and others as we grow as artists.
- People are often too quick to judge their efforts. It is just part of the artistic process that your early stages of drawing will be rough approximations of what you are trying to capture. Students are often too quick to reach for the eraser and they destroy their work before it ever has a chance to get off the ground. While the line you have on your paper may not be quite right, it can still help you to find a better line. "Hmmm. That line looks like it is curving too much to the right." Keep the line there and draw your better approximation next to it, using the first line as a guide. If you erase the first line before you get started on the second line, then you no longer have a guide, and your first attempt is just wasted effort.
- Many artists often start with light lines as they create a rough layout of their drawings and then circle back to add darker, more decisive lines.
- Using touch, in addition to your sense of sight, will help you to develop a feel for texture, volume and weight in your drawing. Encourage students to use other senses as well.
- Try to focus on what is working well in your drawing, rather than on its defects. Accentuate those parts that are working well by going back over them with darker lines.
- Think about the proportions of your object. How large is this part compared with this other part?
- What are the basic shapes that you see in your object? Sometimes it is helpful to start with lightly sketching out these basic shapes. Then you can start to fill in details.
- Your eyes should be constantly moving back and forth from object to drawing. If you are only looking at your drawing, you will end up drawing how you think the world looks, not how it actually looks.
- Use kind words when talking about others' drawings. There are many adults who think that they can't draw, because, as a child, someone laughed at their drawing or said something mean.