Investigation 1.0: Introduction to Arctic Alive!

Objectives:

Upon completion of this activity, students will:
- Identify and communicate their current knowledge of the Arctic, climate and geoscience.
- Gain understanding of scientific procedures and explanations – scientific method.
- Understand that science requires different abilities and skills of scientific inquiry.
- Apply skills necessary to use maps to locate places and peoples and to help interpret various meanings/perspectives meant by the term "Arctic."

Method(s):
- Student, written self-reflection in their science journal, as a pre-assessment of their knowledge.
- Teacher-led discussion and assessment of what the class already knows, as well as, an introduction to the coming Arctic alive! mission.

Background:
Note: Have available as a transparency, a handout, in student journal or online.
- What is the Arctic?
- What are the characteristics of the Arctic environment?
- Why Study the Arctic?
- What is the scientific method?
- What are the skills and processes of scientific inquiry?
- Why and how to keep a scientific journal?

Materials:
- If desired, bind all student journal pages, background and appendix into one booklet per student to be used for the duration of the study.
- Arctic alive! Student Journal Pages (If not in journal mentioned above.)
- Optional, create a kit of items related to the Arctic – ideally tangible items.
- Maps provided in the atlas section, ecosystem/biome, cultural and political circumpolar perspectives of the Arctic. Have prepared as transparencies or print enough for students to have available to them. (Optional, blank map of the Arctic. See extension activity.)
- Grading Rubric: Student Journal

Pre-Assessment:
- During this introductory activity students will be given an open-ended writing prompt in which they will write/diagram a response (Constructed Response Assessment).
- Following individual response time. The class should discuss their knowledge as a whole group, things they already know and things they would like to know. (Personal Communication Assessment) This class discussion should provide a good chance to evaluate which parts of the background materials you will want to spend more time reviewing and which parts the class has a good grasp of already.

Procedures:

1. Before class – Gather/Prepare Background and Materials.
2. If available, pull out the kit of items related to the Arctic. Do NOT tell students what you are doing. Pull items out one at a time until students are able to guess what these items all have in common? The Arctic.
3. Using the Arctic alive! student journal pages provided, have the students work individually to write/diagram their knowledge about the Arctic, climate, climate change, geoscience and the scientific method.
4. After sufficient writing time, facilitate a class discussion about the topics and what the students already know. Consider modeling how to make a KWL Chart (What do you know? What would you like to know? What did you learn?) or a Mindweb (A center concept in the middle i.e. the "Arctic" and different concepts categorized and branch off from the center.) Consider using a large piece of butcher paper or designating a bulletin board to continue adding items, stories, "things we learned", etc. as the unit continues.
5. Have student define the Arctic in terms of an ecosystem/climate, indigenous cultures inhabiting the area, Arctic countries, etc. Refer to maps provided or others, to help students interpret various perspectives on the meaning of the term "Arctic" (See background section for more information).
6. Give a brief overview of the Arctic alive! mission. Highlight some of what will be happening during the virtual field trip to Barrow (working with scientists, researching "local knowledge", etc.) Explain that the next classes will be spent gaining background knowledge and skills in preparation to participate in a scientific research project.
7. They will be working in the field with researchers, from the universities, to study the role of the Arctic in climate change. The researchers are expecting to interact with them as fellow scientists. For this reason, emphasize the importance of students understanding and using the scientific method, vocabulary and skills of inquiry.
8. So what are these things? Facilitate a class discussion where students reviewing the steps the scientific method (see background section) and the skills of scientific inquiry. Science relies on basic human qualities, such as reasoning, insight, energy, skill, and creativity – as well as on scientific habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism and openness to new ideas, amongst other things. Also, it is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Scientists agree that questioning, response to criticism, and open communication are integral to the process of science. These will all be ways they will be expected to participate.
9. As the week goes by, they should be thinking about (and writing in their journal) questions they have for the researchers. These might included things regarding: the Arctic, its systems, processes, climate, climate change in the Arctic, the research in specific, the scientific method and techniques being used, the researcher – their schooling, preparation, qualifications, etc.
10. As it is desirable, that students use the skills of scientific inquiry, it may be helpful to not only discuss expectations for the activities, but also the expectations for their journal/scientific report writing. Refer to and discuss the grading rubric for the Student Journal.

Extensions:

- Using the blank circumpolar map, have students label the cultural, political and/or ecosystem boundaries of the Arctic.
- For an activity that can be completed upon completion of this lesson or at any time during this course of study see, "History: It Happens" in the "Extension Activities" portion of the teacher guide.
- Have students begin collecting items, newspaper clippings, maps, stories, etc. for an Arctic display.

Resources:

Arctic Climatology and Meteorology http://nsidc.org/arcticmet/

National Oceanic and Atmospheric Administration (NOAA) Arctic Theme Page http://www.arctic.noaa.gov