Opening Activities

These Activities are designed to introduce your students to the Project and to help you determine their pre-existing knowledge—conceptions and misconceptions alike—thus enabling you to document progress in content and concept mastery. After implementing 2-3 of these simple Opening Activities you'll have solid evidence of baseline knowledge and a record of student work against which to assess improvement. After completing the unit, you will also have revealing material to share with parents and your administration to demonstrate the benefits of your students' participation. Please note that Activities A.1, A.2 and A.3 approach the same kind of issue—pre-existing student conceptions—in slightly different ways. In these Opening Activities, as elsewhere, P2K expects you to choose what seems likely to work best for your own particular circumstances.

Activity A.1 Weather and Climate Facts and Fictions

"What causes the wind?" That sounds like another of those child-like questions we spoke of in our Letter of Welcome. By "child-like" we certainly don't mean "childish": remember Einstein coming up with his theory of relativity by asking what the world would look like if you could ride upon a beam of light? Here are some answers concerning the origin of the winds from a typical middle school class:

"Fans… Drafts from the cold air at the South Pole… Gravitational pull… The Earth moving… The jet stream… Heat from the Sun… Air coming down from the atmosphere."

No pressure gradients, nor temperature differentials, nor all the other explanations a weather scientist would offer, but at least a few half truths: the Sun does ultimately drive all Earth's weather. Warm air from the tropics and cold air from the poles, together with the Earth's rotation (is that what the student meant by our planet "moving"?) are indeed the shapers of jet streams and, in turn, ocean currents. We suggest that whether or not you implement the formal Pre- and Post-Test (A.3) you begin this unit with a somewhat freeform exploration of what students bring to class, tight packed in their minds and imaginations: both facts *and* fictions about the weather. Start with 10 fun (and fundamental questions) about weather and climate selected from the 25 to be found on Teacher Reference sheet A.1.1 (The "answers" as a meteorologist would state them may be found on Teacher Reference sheet A.1.2 but we don't suggest you share them with students at this time.) Select the questions which you think would work best for your level of students, from elementary through high school. (See Activity 1.1. Teacher Background: even Harvard students have trouble coming up with the reasons for the seasons.) Have students working individually answer as best they can in their WEATHERlogs. (See Activity A.4) Spend some time in class with students sharing

opinions. Accept all answers, recording them on a blackboard, paper, computer, overhead display, etc. Students will hear a range of opinions, from quite incorrect to some version of completely correct. Encourage them to note useful additions to their own initial response. Indicate that you think they'll likely discover many of the remaining answers for themselves during the course of this unit. Encourage them to add these as they encounter them.

(NOTE: THIS IS ALSO A GOOD TIME—PERHAPS THE FIRST OF MANY—TO REVIEW SAFETY ISSUES ASSOCIATED WITH STUDYING WEATHER. SEE THE SAFETY WARNING LINKED ONLINE TO SEVERAL NOAA, FEMA AND RED CROSS PUBLICATIONS EASILY ACCESSIBLE FROM THE "LIVE FROM THE STORM" WEBSITE.)

Activity A.2 The KWL (Know-Want to know-Learned) Chart
Have students make 3 columns on a blank sheet of paper. Label the left-hand column KNOW, the center WANT TO KNOW and the right LEARNED. In the first column students should list all the facts they *know* about weather and climate. Again, apparent misconceptions at this point are okay. Spend 5 minutes on this task. Begin to create a class KWL chart, accepting and discussing all suggestions. This version should be large enough for all to refer to. Move on to brainstorm what they WANT TO KNOW. (This might include family and caregiver input if you choose to spread the Activity over 2 days.) Have them record their individual *want to knows* on their own charts and compile the whole class *want to know* list. Students should place their individual KWL charts in their WEATHERlogs, and add LEARNED items (perhaps dating them) as the Module progresses.

Activity A.3 Pre-test/Post-test
For those who prefer an explicit inventory of student knowledge at the outset, we have provided a more traditional PRE-TEST/POST-TEST (Copy Master A.3.1. An Answer Key is provided as Copy Master A.3.2). Test items relate directly to the National Science Education Standards concerning earth, physical and space science topics, and to specific learning opportunities afforded by PASSPORT TO WEATHER AND CLIMATE. Be sure to let us know how students do.

Activity A.4 WEATHERlogs (or Weather Journals)
Portfolios are examples of student work that indicate progress, accomplishments, or special challenges. In trying to understand weather and climate, such journals have a honored and significant role. Thomas Jefferson, in addition to writing the Declaration of Independence, faithfully recorded the weather each day. He thought that by looking back over his notes he'd be able to understand and predict the weather. Ben Franklin and many more of the leading scientific figures of the past did much the same. So in keeping what we're calling their "WEATHERlogs" your students will be part of a great tradition.

Review with students why you and their caregivers are interested in assessing what they learn. Have them suggest methods that would be fair and meaningful. Record the discussion—and later share it with the DISCUSS-STORM online forum. Suggest to students that one way to document what you expect will be a positive learning experience is to keep a logbook or journal of what they do, see and learn from weather observations, class discussion, hands-on labs and other research. WEATHERlogs may be binders, notebooks, folders or even boxes to contain loose sheets. Brainstorm with students and decide on a list of mandatory items that WEATHERlogs must contain. These might include:

- a copy of their "Weather and Climate Facts and Fictions" answers
- their KWL charts
- lab reports
- a daily journal of weather observations (see Activities 2.2, 3.2 and others that suggest such daily observations) and what they learned
- photographs
- other drawings
- student-selected writing projects
- news articles about weather and climate (from newspapers or magazines or downloaded from the Internet)
- new vocabulary words and meanings (see the STUDENTS' CORNER wordsearch and interactive online Glossary)
- weekly student summaries regarding new learning that week
- copies of returned tests and quizzes

plus any other work they do during the unit.

Have students design covers for their WEATHERlogs and periodically review them. Share your grading criteria with students using the suggested Rubric (Copy master A.4) or your own. Provide students with a written copy of the grading criteria and items that must be included in the WEATHERlogs. Encourage students to include additional items they feel best illustrate their individual achievements or document their growing awareness of weather and climate.

Activity A.5 Concept Maps

An additional or alternate way to have students become aware of what they know and subsequently learn is concept mapping. Concept maps show the relationship between facts and concepts in a graphic form that may be more meaningful to some students. Students can start this activity at the beginning of the unit and add to their map throughout the project, or create their maps at the end of the unit to show what they think they have learned. (Sample concept maps from LFSTORM teacher developer Tim McCollum's 8th graders are appended as Copy Master A.5 as reference.)

Students can use either a large sheet of construction paper on which to draw their concept maps or pieces of small self-sticking Post-it type paper. Index cards cut into 4 equal pieces and tape also work. They'll use one Post-it for each of the concept words that make up the map. Give each student a folder or large envelope for their pieces, so they don't lose them. Begin by stating the topic: weather. This will become the main idea and the center circle. They will write all the major terms or concepts that relate to the main idea: e.g., temperature, pressure, wind, and then on another level, hurricanes, tornadoes, snowstorms, etc. After this is completed, have them begin to look for connections between ideas and start linking them. Add supplemental phrases to clarify ideas. Finally, they should rearrange the ideas so the relationships are clear. General concepts are placed closer to the main concept and specific concepts placed on the outside.

What is PASSPORT TO WEATHER AND CLIMATE?
Whichever of the suggested Opening Activities you use, review with students what you expect to happen during the project. Indicate that you and they will be exploring together, and taking advantage of some unusual resources. They will see weather and climate researchers and the instruments they use up close and on camera. Online they'll meet some of the world's leading scientists and be able to interact with them. Via the Web, they'll see live images of storms from satellites high up in space and collaborate with other students in America and around the planet. In class they'll undertake several hands-on Activities that will help them better understand what makes Earth's weather, and what NOAA and NASA researchers do. If you've participated in previous PASSPORT TO KNOWLEDGE projects, mention some particularly exciting moments. Go online and visit the LIVE FROM THE STORM website. Use the poster (notes on the images may be found on Copy Master P.1), and note that studying weather and climate involves physics, geography and social studies, math, writing, teamwork… and much more. Review your timetable for the project… and get going on this latest P2K learning adventure!

The Guide is available online in **PDF format**, activity by activity. However as those of you who've used recent PTK projects such as LIVE FROM THE RAINFOREST and LIVE FROM THE SUN know, we try to make the printed Guides superior in design as well as content. "Teachers and students deserve the best." Yes, you can get all the above "free" on the Net, but we think you'll be even happier with your $30.00 order of the Guide, worksheets and an oversize full-color poster! Sometimes people equate "free" with valueless, and we sure hope no-one thinks that about this Guide!

If you have any questions about the Guide, please direct them to
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