Fabulous Weather Day

By Candice Marshall and H. Michael Mogil

A do-it-yourself, in-school field trip for first graders brings weather education to life.

Each year, first graders at Kensington Parkwood Elementary School in Kensington, Maryland, look forward to Fabulous Weather Day. After studying weather for three months, we celebrate what we have learned and stretch our thinking further into the weather world around us! Students learn how meteorologists collect data about the weather, how they study wind, temperature, precipitation, basic types/characteristics of clouds, and how they forecast. The project helps the students grow in their understanding of how the weather works and how it can affect their lives.

To make the unit even more meaningful and to answer the endless questions that it triggers, the first-grade team collaborated with a meteorologist (a.k.a. "Mr. Weather") who was well versed in science education. Together, we created an in-school field trip that serves as a culmination to the weather unit. We started small in the spring of 1999 and have now successfully held seven "Fabulous Weather Day" experiences. Mr. Weather and all the first-grade teachers are involved in the day's activities.

To allow students to explore and extend their thinking on weather topics, we present four different activity sessions: Sun and Clouds, Water Cycle, Wind, and Storms. This article offers an overview of the day, descriptions of the four sessions, and tips to make your own Fabulous Weather Day a success.

Preparing for Weather Day

Each first-grade teacher presents one of the day's sessions and gets one "free" session to walk around and observe the other sessions, especially Mr. Weather's

session on Storms. We provide the teachers with an instruction packet for their session several weeks before the event. Each packet contains an overview of the session with a timeline, a materials list (including who is responsible for creating/bringing each item; Mr. Weather brings many of the materials), step-by-step directions for the session activities, and a list of helpful resources.

We also send home a request to parents for help. Having two or more extra adults per class aids in student management, allows the teacher and Mr. Weather to focus on leading the activity, and speeds session cleanup. Because they experience the program with their children, parent participation also builds support for future parental involvement. We ask some parents to make a special weather-related snack, which has ranged from hand-painted sun lollipops to cupcakes iced with rainbows. Make sure you check for student allergies when planning snacks.

About two weeks before Fabulous Weather Day, we distribute a more general packet to all teachers and parent volunteers, which offers last-minute preparation reminders, an up-to-the-minute schedule for the day, classroom location information, and other useful tips (e.g., make nametags). Teachers also photocopy the "Meteorologist Notebook" we prepared for each student. This notebook gets students writing during this experience, gives them a record to keep and share with their families, and provides the teacher with an assessment tool. Moreover, it makes students accountable and keeps them on-task during the activities. We created two versions of the notebook; one has lines for those who can write, and the other has picture spaces for new writers and students with special needs.

The Big Event

Students (and parent volunteers) rotate by homeroom class through the 45-minute sessions in the morning in a pattern (clockwise or counterclockwise). This rotation also reinforces what they learn in the Storms session about hurricanes!

Students start out each session by completing the prediction question ("What will you learn?") in their Meteorologist Notebook. This exercise helps them to focus and apply their background knowledge. Students make varied predictions based on the names of the session (e.g., "I predict we will learn what a water cycle does") to more specific ideas that show their background knowledge from the unit (e.g., "I predict we will learn how clouds are made," and "I predict we will learn how many miles an hour a strong wind blows").

Next, the students begin the investigations and activities described below. At the end of each session, before moving on to the next activities, students complete the Fact ("What is one thing that you learned?") and Opinion ("What was your favorite activity? Why?") sections in their Meteorologist Notebook.

Sun and Clouds

Sun and Clouds activities include making Sky Windows: going outside to observe the colors in the sky, and then graphing those colors. First, students craft their Sky Window weather tool (see Internet resources). They receive a poster board rectangle (approximately 5" × 7") with the center cut out (much like a mat for a photo) and a set of individual paint chips (cut apart from the strips that can be found at any home improvement store). Students then glue the paint chips around their frame in any order they wish.

A variety of colors (blues, grays, and whites), which we prenumbered from 1 to 12, allow for easy comparison among the students. This range of colors challenges their misconceptions that the sky is only

"Mr. Weather" in action on Fabulous Weather Day.

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A water cycle demonstration during Fabulous Weather Day.

blue. Next, students go outside (or view from a window) and look through their Sky Windows to determine which colors they see in the sky. Remind students not to look directly at the Sun.

After recording their sky observations, students graph the colors of the sky and write a sentence about what they observed on the graph. By the end of the session, students are looking at the sky in a completely new way asking, "What will the sky look like tomorrow?" and sharing, "I learned that the clouds are different colors."

The Water Cycle

The Water Cycle session consists of introducing or reviewing the parts of the water cycle by viewing a poster, simulating water cycle processes, and exploring the properties of water using "raindrops," pipettes, and waxed paper.

First, students review the water cycle with the help of a raindrop-shaped hand puppet called Dropsy. Dropsy travels around the poster indicating the four parts—evaporation, condensation, precipitation, and accumulation—of the water cycle. This poster with its photographs showing the water cycle at work remains in the background for student and teacher reference throughout the session. Then, the teacher simulates the water cycle using common household tools. While the teacher explains, the students predict and draw each part of the cycle. To demonstrate evaporation, the teacher heats water in a rectangular, electric skillet simulating puddles in the Sun. Students can see the steam and connect this to evaporation even though puddles don't usually steam. The electric frying pan is very hot. Be sure that students watch this demonstration from a safe distance away and that the teacher uses an oven mitt to handle the hot pan.

Next, the teacher takes out a traditional frying pan. Student volunteers check the pan for holes (there are none, of course) before the teacher adds some ice cubes to the pan to simulate the coldness of the clouds) and holds the pan a few inches above the hot water surface. As students watch, water droplets begin to appear at the bottom of the cool frying pan (condensation, in a chilled pan instead of in clouds). After a moment or two the droplets begin to fall (precipitation) back into the electric skillet (accumulation in the puddle).

To make viewing easier, the teacher sometimes lifts the pan so students can see how wet the pan's bottom has become. "If water goes up [to the clouds/frying pan], it gets sweaty and it has to come down like rain," observed one student. Finally, students discuss how the water cycle model is the same and different from the actual cycle.

In the second half of this session, students are ready to discover more about the properties of water itself. Each student receives a piece of waxed paper about 4" × 6" that is misted with water from a plant sprayer. About five or six sprays are sufficient (less is best in the beginning). Students observe the droplets and then use pipettes to manipulate them as we ask, "What do you notice?" Be sure the teacher demonstrates proper use of pipettes before distributing them for student use. Students begin to see how the droplets "bump" into one another and become one large drop (cohesion), just as drops meet in the clouds and eventually get large enough to precipitate. If time allows, students also put a small piece of newspaper under their waxed paper and are able to discover the magnification property of water. This activity has prompted revelations such as, "I made a huge magnifying glass out of water! Because when you take the water over the waxed paper and the waxed paper over the newspaper the words are bigger."

Wind

During the Wind session, students see a demonstration of weather vanes and an anemometer. They also measure their own wind using a Kestrel wind meter and then graph their data. First, students chorally read and discuss a wind poem. We use "Whistling Wind, " but any wind poem will work. Then, students hold a variety of wind vanes [see *Anytime Weather Everywhere* (1994) for instructions on making your own] in the "wind" of a hairdryer and observe that the smaller head points toward the wind and the larger tail moves away from the wind no matter what the shapes.

Then, using a map of the United States, we talk about why this characteristic is important and why weather vanes are designed to tell us where the wind comes from (i.e., because that helps us forecast our upcoming weather).

Next, students see how an *anemometer,* a tool used to measure wind speed, works. We use a simple model (see *Anytime Weather Everywhere* (1994) for instructions to make your own) and have students count the number of times the Ping-Pong balls on the anemometer rotate in one minute at low and high hair-dryer speeds to determine the measure of their "wind."

In the final activity in this session, students blow into a Kestrel wind meter (being careful to make a dry wind; no spit) to discover how fast their "wind" is (typically from 0–35 mph) using the maximum wind setting. We give each class a specific color dot sticker and each student gets his/her own dot. We compare wind speed by class on a large graph. We emphasize that the speed is not good/bad; it just indicates how fast a student blows at a particular time, just like wind in nature.

Storms

In Storms, students literally "cook up a storm" using common kitchen tools. But before they do, students share what they know about hurricanes with Mr. Weather. Students typically mention hurricane attributes (e.g., they have high winds, they destroy homes, they form over water), but at least one student recognizes that Mr. Weather's T-shirt has a satellite or radar image of a hurricane on it, and will say, "Hurricanes have eyes. Just like your shirt."

This leads Mr. Weather to explain how weather satellites look at the Earth and also to discuss the sense of rotation of hurricanes. Mr. Weather points out a wall clock (analog) to explain the terms *clockwise* and *counterclockwise*.

Next, students (in small groups) use a spoon and a water-filled glass bowl to spin up a Northern Hemisphere, counterclockwise hurricane. Mr. Weather keys on the clock to ensure that students spin their hurricanes from the 12-9-6-3-12 clock positions. For the first spin, there is only water. Students quickly recognize that they need something to trace the storm's motion: food coloring. After spinning the water briskly (yes, some gets on the table), students put their spoons down and Mr. Weather and the parent volunteers add only two drops of food coloring to each "hurricane." The drops are added about halfway between the spin center and the edge of the bowl. (HINT: Don't use the yellow color). Students observe the swirls and quickly see the relationship of these spins to what appears on Mr. Weather's shirt.

Next, students make *jet stream* winds and create swirls in a pie plate filled with one inch of cold milk. Two drops of each food coloring color are randomly placed in the milk and students use a pipette or coffee stirrer to try to make swirls. This doesn't work. Mr. Weather comes to the rescue with a small drop of dishwashing detergent, which breaks the surface tension. Immediately students can now create swirls with just a whisk of the coffee stirrer. Mr. Weather then brings out a special weather satellite image (known as "water vapor") that shows the class real-life swirls in the atmosphere (see Internet Resources).

The session ends with Mr. Weather demonstrating tornadoes using a homemade tornado machine (made using a drop of dishwashing detergent added to a water-filled cylindrical plastic container; the container is then capped or sealed). Mr. Weather also shows how tornadoes can pick up things using a tennis ball container (filled two-thirds full of water), a golf ball, and a butter knife.

Weather Day Follow-Up

Lunch and recess follow the morning session rotation at their usual time. In the afternoon, we gather all of the students in one of our classrooms, and Mr. Weather shares the story *Cloudy with a Chance of Meatballs* by Judi Barrett (1978). To ensure students can see the story unfold, Mr. Weather uses overhead transparencies. Finally, students are encouraged to pose any "burning" weather questions they may have. These have included inquiries about weather careers, lightning, weather safety, and cloud photography. Mr. Weather tries to keep answers to these at the grade-appropriate level using his personal experiences and real-life situations.

At the very end of the day the students complete the final section of their Meteorologist Notebook, which asks students to describe their favorite and least favorite parts of Fabulous Weather Day. This exercise allows them to reflect on their day as a whole, and adds to what they can communicate with their families when they take their Meteorologist's Notebooks home. As a team, we can also use all the information in their notebooks to emphasize or change aspects of the day for future years, making the students' experience the very best possible. The notebooks also provide an authentic writing sample for teachers to use in evaluating student performance and understanding.

Future Changes

You can implement this type of program for almost any type of science-based unit. The keys are to obtain the services of a scientist that can work with young children, collaborate on a meaningful agenda, and then repeat the program each year so teachers become trained in the process.

Eventually, we'd like to have parent volunteers teach each of the sessions so teachers can rotate with our students. This change would more fully engage the parents as partners in our learning process, as well as allow smoother transitions and more focused behavior since each teacher would be managing her own class.

We are also looking at ways to integrate the arts into the program, perhaps through having students create a weather stamp, a song, or a dance to describe what they have learned. Because we are an arts-integrated model school (students learn the arts of music, drama, dance, visual art when there is a natural curriculum connection), incorporating the arts into this curriculum extension would mesh naturally with our day-to-day instructional process. Research shows that learning through the arts is more meaningful to students and they retain information longer (Burnford 2001).

Volunteers like Mr. Weather can only visit so many schools. So, if you can capture the scientific understanding after a few years of having a scientist visit and blend it with meaningful activities, demonstrations, and inquiries, there's no reason that you can't have a Fabulous Weather Day for many years thereafter on your own.

Seven years ago, we never dreamed we could make this event so exciting and that we would be sharing it with teachers across the nation. Hopefully, you will be able to replicate such a program at your school for the benefit of your own students, parents, and teachers. ■

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Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Content Standards

Grades K–4

Standard D: Earth and Space Science

- Objects in the sky
- Changes in Earth and sky

Resources

Barrett, J. 1978. *Cloudy with a chance of meatballs.* New York: MacMillan.

Burnford, G.E., C. Weiss, and A. Aprill. (eds.). 2001. *Renaissance in the classroom: Arts integration and meaningful learning.* Mahwah, NJ: LEA.

Mogil, H., and B. Levine. 1994. *Anytime weather everywhere.* Rockville, MD: HTWW Press.

National Research Council (NRC). 1996. *National science education standards.* Washington DC: National Academy Press.

Internet

Sky Windows
www.weatherworks.com/monthly/activities/sky_window.html

Satellite imagery source (there are many others)
www.weatherworks.com/satellite_imagery.html