

## The Teacher/Volunteer Relationship

“ReSET has given me a better attitude toward science. And I find that I incorporate it in other areas of the curriculum now, such as reading, where we are covering climate, environmental changes and nature theories. I’ve discovered that many of my children are far more science-inclined than I’d thought. It’s as if this interest lies dormant and untapped in them, and the ReSET volunteers pull it out.”

—Margrete Hatchett, Teacher



Volunteer Jim Cline, William Tyler Page teacher Amy Green (far right), and a classroom aide.

The ReSET program places an emphasis on the bond between you and the teacher. The teacher brings to the partnership his or her experience in teaching . . . specifically in teaching children of a particular age and stage of development. You bring expertise in a field of science, math or technology in which the teacher may have only a smattering of knowledge or none at all. The combination of these talents forms a dynamic and collaborative team that is integral to ReSET’s success.

## How to Make the Partnership Work

- **Communicate.** You will want to exchange phone and email addresses with your partnering teacher. The teacher is responsible for letting you know of any unexpected scheduling changes, such as a field trip or assembly. And you will need to let him or her know if you are unable to make a scheduled meeting.



Volunteer David Challinor confers with classroom teacher Kathryn Ross about an upcoming lesson.

- **Don’t try to go it alone.** There’s no need to! Teachers are there to give you input on your experiments and to ensure that the children will be challenged appropriately for their learning level. You have important knowledge to share, but you will probably be unaware of classroom dynamics or the unique personalities you will be dealing with. Utilize your teacher’s insight and experience as much as possible.
- **Get feedback.** After each meeting, ask the teacher for a short five-minute conference to chat with you about what worked and what didn’t.
- **Allow the teacher to maintain classroom control.** Discipline is not your responsibility. It is up to the teacher to maintain a well-mannered, attentive class.

## Key Responsibilities

*The teacher will—*

- Be responsible for classroom discipline during your meetings with your class.
- Be present in the classroom the entire time you are there.
- Participate in your in-class activity along with your students. (As students will follow the lead of their teacher, it is important that teachers be engaged and interested in your presentation.)
- Provide guidance on your experiments and their appropriateness for the students.
- Help in the coordination of field trips (obtaining releases, permission slips, etc.)

*As a volunteer, you will—*

- Prepare experiments that relate to your knowledge and experience.
- Be responsible for presenting the teacher with an outline of the science or math activities you plan to conduct during your six meetings.
- Provide the teacher with a vocabulary list prior to your class presentations.
- Endeavor to be interesting and capture the students' attention and curiosity.
- Encourage children to consider careers in science, technology, and engineering by talking about what real professionals do and what kinds of jobs are available.
- Have fun!



Volunteer Rich Repplier chats with teacher Elizabeth Weeks before a ReSET volunteer session.

## Planning Your Curriculum

As a team you and your teacher will plan the six one-hour classroom periods. You will want to establish a regular schedule by agreeing on a consistent day and time for your classroom visits.

You are free to develop your own series of experiments, and some volunteers have even created their own equipment for various demonstrations. Keep in mind that you want the children to experience doing “real science,” and you want to involve the entire class. Generally, it is better to plan activities that involve groups of 4 or 5 students.

How do you decide on a set of six classroom activities or on a science or math project? We suggest you consult our web site—[www.resetonline.org](http://www.resetonline.org). There you will find a section of “Sample Experiments” that can help with your planning. You might want to do a little of your own research beforehand. Local science centers, museums, the Internet, and libraries can provide useful hands-on teaching materials and activity kits. You could also consult with other volunteers to see what has worked well (and what hasn't!) for them in the past. ReSET has also developed a set of experiments tailored to the standards of learning for earth and natural sciences, and provides training in them for interested new volunteers.

## Sample 6-Week Curriculum Plans

Below are several sample six-week curriculum plans currently used by volunteers:

### 1. Mechanical Engineering

Session 1	Introduction to Science, Engineering, and the Volunteer
Session 2	Buoyancy and Archimedes Principle
Session 3	Mechanical Advantage
Session 4	Flowing Gases and Air and Bernoulli's Principle
Session 5	Three Sources of Electricity
Session 6	Structural Engineering

*(Courtesy of Bob Blumberg)*

### 2. Electrical Engineering

Session 1	Introduction to Science, Engineering, and the Volunteer
Session 2	Magnets and Electro-Magnetics
Session 3	Series Circuits
Session 4	Parallel Circuits
Session 5	Building Useful Circuits (Lighting, Alarms, etc.)
Session 6	Motors and Generators

*(Courtesy of Bill Mitchell)*

### 3. Statistics

Session 1	What Does a Statistician Do? Application to Other Disciplines
Session 2	Guessing, Estimation and Counting
Session 3	Normal Curve; Measure Heights
Session 4	Surveys: Sampling, Design
Session 5	Probability
Session 6	Discuss Survey Results. More on Probability.

Throughout the 6-week period, students are requested to bring charts from publications and talk about what the charts show.

*(Courtesy of Eva Jacobs)*

### 4. Environmental Science—5th Grade

Session 1	Cloud Formation
Session 2	Properties of Water
Session 3	Adaptive Selection
Session 4	Schoolyard Habitat
Session 5	Insects
Session 6	Erosion

*(Courtesy of John Meagher)*

“ReSET participants have done a marvelous job of presenting complex topics in a practical and theoretical framework that these younger minds can understand and relate to. They have brought hands-on materials to support the ideas being shared so that students can ‘experience’ science. These older people have also demonstrated important character traits that have impacted the students and teachers. The students have seen the merits of hard work, curiosity, diligence, responsibility and persistence. Additionally, the volunteers have opened the students’ eyes to opportunities for study and careers in the fields of science and mathematics.”

—June E. Confer, Volunteer Coordinator, Shepherd Elementary School

## The Experiments

"The ReSET volunteers offer an ingredient to scientific instruction in our school that the teachers here are unable to provide—that is, the ability to relate science as a classroom subject to actual employment in the field. ReSET volunteers have made science instruction 'real' to our students."

—John C. Panell, Principal, Malcolm X Elementary, Washington, DC

Present a list to your teacher of the experiments you want to do. Together, the two of you will create an outline of the six sessions. At this point, you will decide whether the activities will be hands-on, in which case, you will need to decide how to divide the class into groups. You may also decide to utilize one or more of the sessions as demonstrations, so you will need to think about how to involve the students.

Prior to each of the six sessions you ought to present your teacher with a vocabulary list of terms that you plan to use. Remember, simple words such as *resistance*, *pulley* and *averages*, as well as more complicated words, such as *density*, *induction*, and *polymer*, will be foreign to the average fourth grader. The teacher can pave the way by reviewing vocabulary and by telling the students a little something about you and your area of expertise. You might also ask the teacher to have students make a ReSET folder or journal ahead of time in which to keep an account of their experiments.

Ask the teacher to prepare an evaluation sheet for each session. The teacher should jot down the things that worked well on one side of the paper. On the other side, she should indicate those things that were less successful and might have given the children some difficulties. At the conclusion of each class session talk through these areas openly. You are not expected to be perfect, just receptive to improvement!

*Note: ReSET will order and cover the cost of school laboratory equipment and classroom kits (within reason). ReSET also will reimburse volunteers for any equipment and supplies they purchase.*

## The Field Trip

Every six-week session concludes with a field trip. You should decide early on where you would like to take the class. Discuss the possibilities with your teacher and take a look at the "Sample Field Trips" section of the ReSET web site. You are responsible for making arrangements with the laboratory, museum, or natural area the class will visit. It is important that you do this as soon as possible, as you may need to make reservations weeks in advance.

The teacher is responsible for making arrangements for permission slips and chaperones. Please call or email the Volunteer Coordinator regarding the date of the trip, what time you need the bus at the school, where you are going, and when you expect to return to the school. Will there be any stopovers, for example, for lunch? Who is the teacher in charge? Provide the phone number of the school in case the bus driver needs to inform you of a delay in his arrival. The Volunteer Coordinator will send you a confirmation of the bus reservation.

*Note: See page 18 for a list of field trip venues.*



During a field trip to Goddard Space Center, ReSET volunteer Dr. Charles Falk discusses why the moon takes different shapes.

## Creating a Positive Learning Experience

"Initially I didn't know what I was going to do or say over the course of six hours. This was a little daunting. But I'm a ham in terms of standing up in front of people. I learned early on that I had to be able to do that in my career. So I got over my fears quickly. The children are a very pleasant, non-threatening audience."

—Bob Blumberg, ReSET Volunteer

### The Personal Touch

Children don't have the inhibitions that adults have. They speak their minds and have a sincere "need to know." Share with them a little about yourself and what led you down your particular career path. Perhaps when you were vacationing with your family as a child, you had the opportunity to ride a steam engine, and the experience was so thrilling you decided that some day you were going to find out how it worked. Children love stories and to be entertained. You'll be surprised and delighted by their questions and unusual perspectives on life.

You are bound to have some stage fright before your first session. Just remember, ReSET has never lost a volunteer. Relax. Be yourself. You start with a distinct advantage. School children are pleased that an adult has come to visit their class. It makes them feel important, and they are prepared to like you before you ever open your mouth. Don't lecture. Introduce some humor. Hold their attention with provocative questions and personal anecdotes.

The attention span at this age is between 30 and 40 seconds. Ask questions. Endeavor to involve as many students as you can. Make a conscious effort to involve *all* students in classroom discussions, and try to avoid calling on only the students who are enthusiastic about participating. Seek ways to get reluctant students involved without the pressure of "putting them on the spot."

### First Steps

Introduce yourself. Ask the children what they want to be when they grow up. Explain why you decided to become an engineer/scientist and what sort of education or training you had. This is a good time to inform the children that the math and science they are learning now is important for all jobs in today's world. Tell them where you worked and some of the more interesting activities that were a part of your job.

### Show Them What a Scientist Is and Does

Understandably, children have a narrow knowledge of the world and the kinds of jobs that are available to them. Share with them anecdotes about your work—funny experiences as well as dramatic ones. You will be providing them with first-hand vocational guidance. For example, one volunteer always begins "Lesson One" by talking a little about himself and his career. He likes to mention how technology has made life better now than when he was in the fourth grade. Most children can't imagine a world where there are no computers or phones or televisions. It can be eye opening for them to see how the world has changed.

### Use the Scientific Method

The scientific method provides a universally recognized way to approach and execute scientific inquiry. Whenever possible, use the scientific method in your lessons. As different school systems may use different variations on the scientific method, ask your teacher about their convention.



Volunteer Bob Blumberg writes difficult vocabulary words on the blackboard at the beginning of each session.

"I believe the most valuable part of the program is that the children get to see a wide variety of older people and what they do. They get exposed to different professions at an earlier age. Most students have a very limited notion of the kinds of jobs people have. ReSET shows them the possibilities."

—Eva Jacobs, ReSET Volunteer

## Make it Meaningful

It's also a good idea to show how the achievements of the past relate to the challenges of the future. Try to relate the specifics of your experiment to the broader picture. For instance, when one volunteer demonstrates how a siphon works, he also talks about how the ancient Romans built siphons over many miles to bring water from a mountain lake to a town on the other side of the mountain. Children should see how science and technology have changed the way we do or understand things . . . how it can better the world and impact the future.

## Keep them Informed

Before you begin, tell the students what the experiment is about and what kinds of activities they will be participating in. Children feel more secure when they have a clear sense of direction and what the parameters are. Also, if your experiment involves unexpected noises, flashes of light, or unusual smells, let the children know beforehand. Some children can be very disturbed or frightened by such experiences. Without "giving away the punch line," try to keep the learning environment relaxed and trusting.

Use diagrams on the board or handouts that are prepared in advance. You and the teacher will work out the logistics depending on whether you will do hands-on work that day or a demonstration. Sometimes classroom aides or parent volunteers are available to help set up the experiment "props" and distribute materials.



Volunteer Eva Jacobs brings infectious enthusiasm and a sense of humor to her ReSET volunteer work.



During a ReSET session on muscles and bones, Volunteer Beverly Yett demonstrates how the elbow has a hinge like a door.

## Have Fun!

ReSET volunteers are an enthusiastic bunch. They enjoy learning and sharing what they know... and this comes across to the students with whom they work. Although we certainly want children to learn something new and improve their academic performance, mostly we want them to have fun while they learn. Your session with the children may be the first time these students have had an enjoyable experience with science or math. You have the opportunity to change their negative attitudes toward these subjects forever.

## Ways to Get Students Involved

- Start each class with a five-minute icebreaker activity.
- Break the class into small groups or assign tasks to pairs of students.
- Open up the class with a few minutes of informal conversation about current events, a student's personal interest, or a question related to last week's exercise.
- Assign students specific roles during an experiment. (This gets them accustomed to behaving and thinking like scientists.) For example: one volunteer who conducts an experiment on drawing polymer fibers assigns one student to mix the solution, another student to draw the fiber, and a third to observe and record the results.
- Limit your own remarks and avoid the temptation to turn a discussion into a lecture.
- Use non-verbal cues of encouragement. Smile expectantly, make eye contact, nod while a student is talking, look relaxed and interested.
- Pose questions that are designed to elicit a variety of brainstorming responses, rather than close-ended answers. For example, you might ask "What is light and where does it come from?" Or "What are some of the ways a bird adapts to its environment?" Or "How do we use statistics in daily life?" Or "How many stars are there in the sky?"
- Casually stand next to students who don't typically contribute, as it will often draw them out. Make sure you reward an infrequent contributor with a warm smile. The most intelligent students are often the most quiet. They may need a little more time to feel comfortable with you.
- Write students' answers on the blackboard, or refer back to a student's correct answer later in the class.
- Encourage questions and be positive in your answers. You might suggest that the children keep a running list of questions that you can discuss together at your next meeting.
- Comment positively about a student's contribution, even if it's the wrong answer. Many answers show good critical thinking and imagination, although they may be "technically" incorrect. Reinforce the positive aspects of these answers.
- Correct wrong answers tactfully. Never poke fun or show disapproval of a student's answer. Instead, provide hints, suggestions, or follow-up questions that will enable students to correct their own answers and continue to learn.
- End the class session with a thought-provoking question or assignment that they must complete before you meet with them again. You might make that question your next week's icebreaker. Make sure this is a fun and easy-to-implement task.



ReSET volunteers make an effort to include all students, even the more shy and quiet.

# The ReSET Report

## ReSET Supports Teachers In Reaching DCPS Science Standards

While ReSET volunteers endeavor to create exercises and experiments that enhance classroom curriculum, they also hear from teachers that their work is helping to fulfill the science and math standards for D.C. Public Schools.

“Earth and Life History” is one of the broad science standards required of 6th graders. This includes a section on fossils as evidence of how life and environmental conditions have changed. Physical Anthropologist Beverly Yett makes a conscious effort to customize her lessons to these concepts.

“Using bones as a starting point,” says Yett, “I discuss what you can learn from bones, even single isolated bones, and then tie that to Neanderthal man (e.g., how did they paint those murals of Neanderthal man at the Museum of Natural History?)” By examining the muscle markings on the bones themselves, Yett helps the children to make deductions related to the height and posture of earlier human forms. She also conducts a “archaeological dig” with the children, using trays with sand and buried bones (human and chicken), and then graphing the results to see what might be deduced about the specimens they found at their “dig.”

Another science standard for sixth graders is “Weather and Climate.” Ken Brown, a former Systems Engineer with NASA who volunteers at Malcolm X Elementary School, used a demonstration on the Bernoulli Principle to illustrate how strong air pressure is, and how differences in altitude will lead to specific meteorological conditions, the generation of winds, and the force of hurricanes.

Engineer Frank D. Winfield was excited to be able to introduce his class at Orr Elementary School to advanced engineering principles, but was initially a little concerned that such concepts might be too



Children measure a femur bone during one of Beverly Yett's volunteer sessions, fulfilling one of the DCPS Science Standards related to “Earth and Life History.”

complex for them. He was pleasantly surprised to discover that dependent and independent variables were listed as a science standard for fifth graders.

One of the more overarching goals of the DCPS science standards is to understand that scientific progress is made “by asking relevant questions and conducting careful investigations.” Winfield makes a point of engaging students in interactive dialogue by asking them simple questions pertaining to how and where objects are weighed, and then showing them how to build a simple scale of their own. “Getting the students actively involved is very important,” says Winfield. “I like to ask open-ended questions that require them to think about a response, rather than give a yes or no answer.”

Ken Brown poses the question “How big is a cricket?” and then shows his class how to collect evidence related to the food, size, and jump of crickets. “They learn how to acquire data through laboratory effort, to check and verify their findings, and to illustrate their results through the use of graphs,” says Brown. “In short, they learn how to behave like scientists.”



## Tips for Optimizing the Classroom Experience

Here are a few suggestions for ways to maximize the positive and minimize the negative:

- Before your classroom visit, try a dress rehearsal or “dry run” of your experiment (especially if it is your first time) with a family member, friend or a child who is the same age as your students.
- Check your equipment before your class visit, especially if it has been in boxes all summer. Replace light bulbs, check your circuits, replenish your goody bags. The goal is for children to have positive experiences with science and math, which won't happen with an equipment malfunction.
- Don't lecture! Try to dialogue with the students as much as possible.
- The best lessons are those that are inquiry-based, hands on, and get everyone involved!
- Illustrate with stories and amusing anecdotes—children love them!
- Use ordinary, easy-to-find materials. Volunteers are encouraged to use everyday household items such as string, jelly jars, and paperclips, so that children can go back home and easily demonstrate what they've learned to their families.
- Provide clear directions and help children to reconsider their answers if they give an incorrect response. Let them know it's ok to be wrong. It's your job to guide, rather than dictate.
- Be sincere. Children are quick to notice if you are genuinely interested in them or not.
- You are a role model, so always demonstrate good safety practices, fairness, patience, and attentiveness. When children see this behavior in you, they will be encouraged to exhibit it themselves.
- Talk to students in the same way you would talk to your grandchildren. If you don't have grandchildren, ask the teacher to give you some pointers. The teacher can help you adjust your vocabulary so that it is appropriate to the age group you are working with.



Statistician Eva Jacobs shows a student how to create a line chart of M&Ms during a session on probability.

## In Conclusion: An Evaluation

ReSET written evaluations include pre-program and post-program student assessments, and post-program teacher and volunteer assessments. Volunteers are also encouraged to meet with their teacher at the end of a program to discuss how well the experience went for the children, the teacher and you. Feedback helps to make the volunteer experience an evolving, learning process that leads to improvements.



**PART II**

**Sample Field Trips**

**"I enjoy the feeling of gratitude that I get back from the children, teachers, and administrators. They really appreciate what I do, and I have the sense that I am really working on the front lines, doing some good."**

**—Bob Blumberg, ReSET Volunteer**

ReSET volunteers have the advantage of being close to a varied selection of cultural and educational opportunities in the D.C. metro area. In this section we've listed a number of field trip possibilities you might choose for your class. They come recommended by our volunteers as venues that have proved successful and logistically easy. Please don't feel limited to this list. There are countless possibilities. Be creative. Oftentimes our volunteers know of special places that aren't the typical tourist hot spots, but which offer children rich and rare educational opportunities.

**College Park Aviation Museum**

College Park, MD 20740  
Phone: (301) 864-6029  
Web: <http://www.pgparcs.com/places/historic/cpam/>

**Cryptographic Museum**

Washington, DC 20007  
Phone: (202) 337-5111  
Web: <http://discoverycreek.org/>

**Discovery Creek Children's Museum of Washington**

Washington, DC 20007  
Phone: (202) 337-5111  
Web: <http://discoverycreek.org/>

**Greenbelt Park in National Capital Parks—East**

Greenbelt, MD 20770  
Phone (Visitor Information): (301) 344-3944  
Web: <http://www.nps.gov/gree/>

**Historical Electronics Museum**

Linthicum, MD 21090  
Phone: 410-765-0230  
Web: <http://www.hem-usa.org/>

**Marian Koshland Science Museum of the  
National Academy of Sciences**

Washington, DC 20001  
Phone (General Inquiries): 202-334-1201 or  
toll-free 888-KOSHLAND (888-567-4526)  
Web: <http://www.koshland-science-museum.org/index.jsp>

**Maryland Science Center, Baltimore**

Baltimore, MD 21230  
Phone: (24-Hour Information): 410-685-5225  
Web: <http://www.mdsci.org/>

**Montgomery College Planetarium**

Takoma Park, MD 20912  
Phone (Director Harold Williams) at 301-650-1463  
Web: <http://montgomerycollege.edu/Departments/planet>

**NASA's Goddard Space Flight Center**

Greenbelt, MD 20771  
Phone (General Information): 1-301-286-9041  
Web: <http://www.nasa.gov/centers/goddard/home/>

**National Aquarium at Baltimore**

Baltimore, MD 21202  
Phone (General Inquiries): 410-576-3800  
Web: <http://www.aqua.org>

**National Cryptologic Museum**

Fort Meade, MD 20755  
Phone: 301-688-5849  
Web: <http://www.nsa.gov/museum/>

**National Museum of Health and Medicine**

Washington D.C.  
Phone (General): (202) 782-2200  
Web: <http://nmhm.washingtondc.museum/>

**National Zoo**

Washington, DC 20008  
24-hour Recorded Zoo Information Line (202) 633-4800  
FONZ Recorded Information Line (202) 633-4240  
Web: <http://natzoo.si.edu/>

**Naval Historical Center—The Navy Museum**

Washington, DC 20374-5060  
Phone: (202) 433-4882  
Web: <http://www.history.navy.mil/branches/nhcorg8.htm>

**Rock Creek Park**

Washington, DC

Phone: 202-895-6070

Web: <http://www.nps.gov/rocr/>

**Shenandoah Valley Discovery Museum**

Winchester, VA 22604

Phone: (540) 722-2020

Web: <http://www.discoverymuseum.net>

**Smithsonian Institution's National Air and Space Museum**

Washington, DC 20560

Phone: (202) 357-2700

Group Reservations (202) 633-2563

Web: <http://www.nasm.si.edu>

**Smithsonian Institution's National Museum of American History (Hands On Science Center)**

Washington, D.C.

The Center is located on the first floor, west wing, of the National Museum of American History.

Phone: 202-633-3706

Web: <http://americanhistory.si.edu>

**Smithsonian Institution's National Museum of Natural History**

Washington, D.C. 20560

Phone: 202-633-1000 or TTY 202-357-1729

To schedule a tour for groups, call 202-633-1077

Web: <http://www.mnh.si.edu/>

**United States National Arboretum**

Washington, DC 20002-1958

Phone: (202) 245-2726

Web: <http://www.usna.usda.gov>

**U.S. Botanic Garden**

Washington, DC, 20024

Phone: (General Information): 202-225-8333

(Program and Tour Reservations): 202-226-4082

Web: <http://www.usbg.gov/>

**U.S. Geological Survey**

Reston, VA 20192

Phone: (Tour Reservations): 703-648-4748

Web: <http://www.usgs.gov/visitors/building.html>

“The best high you can ever have is when you finish that last field trip, and you’re on your way home, and you imagine what child you may have touched, what child’s life you may have changed.”

—**Stan Marshall, ReSET volunteer**



Volunteer Bill Gill poses with his class at Shepherd Elementary School.

*Interested in becoming a volunteer? Have a friend or associate who might be interested in the ReSET program? Go to [www.resetonline.org](http://www.resetonline.org) to find out more.*



P.O. Box 9400  
Washington, DC 20016-9400  
[www.resetonline.org](http://www.resetonline.org)