ReSET Volunteer Handbook

A GUIDE TO CLASSROOM VISITS AND FIELD TRIPS
ReSET’s Mission

The goal of ReSET is to introduce children in the classroom to science, engineering, and technology. We strive to make the classroom experience enjoyable and exciting (fun), using hands-on learning to reduce apprehension about science. ReSET provides students with a better understanding of the work done by scientists, engineers and technicians with the long-term goal of increasing the number of students who choose to enter these professions. We strive to inspire more students to select science and math as secondary school elective courses and to become citizens who can effectively participate in public decisions on issues of science in society.

The ReSET Volunteer Handbook is dedicated to Harold Sharlin, the organization’s Founder and Chief Executive Officer for more than 20 years. Harold’s vision and decades of leadership have inspired volunteers in the Greater DC area to touch the lives and futures of thousands of young students.
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Foreword

Many first-time volunteers feel naturally hesitant before they begin their classroom experience. Their first and most urgent question is: “What do I do?” The objective of the ReSET Volunteer Handbook is to answer that question (and perhaps ease a few apprehensions along the way). In combination with ReSET orientation, which consists of demonstration sessions, a training video, and visits to schools to watch experienced volunteers in action, the Handbook provides all the guidance and encouragement you’ll need to jump-start your volunteer experience. Remember, none of our volunteers has ever taught at the grade school level. Your knowledge and experience in science and technology are what count. The rest will follow.
Acknowledgements

We are very grateful to all of the individuals who have helped to move this project from dream to reality. In addition to the financial backing of The Armed Forces Communication and Electronics Association (AFCEA), The Bella S. and Benjamin Garb Foundation, The Max and Victoria Dreyfus Foundation and The Clark Winchcole Foundation, numerous volunteers have provided helpful information related to the field trips and experiments they conducted with their classes. A number of volunteers provided firsthand accounts of their classroom exercises, as well as letters of gratitude they received from administrators, teachers, and students. We would also like to recognize those individuals who helped with the Volunteer Handbook’s organization, writing, and design.

We are grateful to the following organizations that have supported ReSET over the years:

- Armed Forces Communication and Electronics Association (AFCEA)
- Boeing Company
- The Morris and Gwendolyn Cafritz Foundation
- Chevron Corporation
- Children’s Fund of Metropolitan DC
- Clark Winchcole Foundation
- Commonweal Foundation
- Max and Victoria Dreyfus Foundation
- Department of Energy (DOE)
- Bella S. and Benjamin Garb Foundation
- GE Corporation
- Philip Graham Foundation
- Lockheed Martin Corporation
- William C. McGowan Charitable Fund
- National Science Foundation (NSF)
- The Optical Society of America
- Hattie M. Strong Foundation
- The Toyota USA Foundation
- TRW Corporation
- Washington Post
- Webber Family Foundation
A Message from the Director

ReSET’s success as an enduring Washington institution is a tribute to our visionary founder, Harold Sharlin, and to the cadre of talented volunteers who have contributed their time and expertise. As we prepare to carry this legacy into the future, we must adapt to emerging trends in education, society, and technology.

Today, ReSET works within an education environment that emphasizes standards of learning and testing, and demands quantitative assessment of the impact of ReSET programs. We also face great disparities in the learning proficiencies of students among the schools in which we work.

As more baby boomers retire, and as greater numbers of women and minorities enter a science profession, the face of the organization is beginning to change. The historically sharp line between working and retirement has blurred. At the traditional age of retirement many of today’s workers remain in the workforce, often changing careers and reducing their number of hours. Today, we find recruiting opportunities among the active workforce as well as in the retirement community.

ReSET will continue to rise to these challenges, adapting to changes both in schools and our volunteer recruiting pool, while remaining true to our core mission to improve science motivation, literacy, and professional interest in children.

—John Meagher, ReSET Executive Director
PART I

The ReSET Experience

“The reason I am in ReSET is to share my time with kindred souls. These aren’t people playing shuffleboard in Sun City, but are people who are really interested in what’s going on around us.”

—David Challinor, ReSET Volunteer
History and Purpose

ReSET is the brainchild of Dr. Harold Sharlin, a former electrical engineer and history of science professor who believed the knowledge and experience of scientists, engineers and technicians might benefit and enhance the lives of young students. Through classroom discussions, hands-on experiments, and field trips, ReSET volunteers are actively engaged in opening young minds to new ideas and discoveries.

Since 1988, ReSET has partnered with local schools and teachers. Nearly 200 volunteers have worked with the program over the years, serving thousands of students. Endorsed by D.C. Public Schools, ReSET has been enthusiastically embraced by local educators. Many schools would like to offer more ReSET units to their classes. With your help, we can reach even greater numbers of students.

Each ReSET volunteer delivers an in-kind contribution valued at approximately $3,000 per volunteer per year. In addition, the program is backed by corporate and foundation funding, and has begun to expand to other areas of the country.

ReSET’s Teaching Philosophy

The ReSET program encourages children to see science and math as useful, relevant, and exciting—subjects with a strong connection to their lives and their futures. Volunteers are challenged to find ways to motivate children to appreciate their world and to think creatively.

Your work with the children will be far more meaningful if your experiments are designed to complement and enhance the teacher’s classroom science curriculum. For example, the teacher might be planning to teach her class the different types and sizes of organisms. As a microbiologist, you can augment this discussion by showing children the invisible world of microbes through a microscope. The science standards of learning also provide helpful guidance on the topics the students will be expected to master for their standardized tests.

“The District of Columbia Public Schools enthusiastically endorses this intergenerational volunteer program, designed to allow student exploration of the science, math, and technology worlds. ReSET’s involvement with the school district has positively impacted the instructional infrastructure, broadening the teacher curriculum by involving real scientists at the classroom level.”

—Clifford B. Janey, Former Superintendent of D.C. Public Schools

ReSET founder Harold Sharlin receives an Appreciation Award from Volunteer and Board Member Eva Jacobs.

ReSET shows children how science and math are a part of their everyday world.
Children are full of “Why?” questions. Why do ships float? Why do speakers vibrate? Why do airplanes stay in the air? Answering these questions with hands-on demonstrations and everyday illustrations is fundamental to ReSET’s instructional philosophy.

One of the primary goals of the ReSET program is to create a synergy between the classroom and home. ReSET seeks to promote parental involvement in the learning process. Volunteers are encouraged to teach children about scientific concepts in such a way that they can easily repeat the experiments on their own, such as creating an electrical battery from a lemon, a zinc nail, and some copper tubing.

What You Give

“We are certain that ReSET enhances our science program and leads to specific academic achievement, along with development of interest in further science pursuits.”

—Katherine A. James, Principal, Shepherd Elementary School, Washington, DC

Your involvement in the ReSET program helps to shape the attitudes of future generations, not only towards science, math, and technology, but also to the joys of learning in general. It’s easy to complain about lowered academic standards and achievement levels. It’s a much greater challenge—and far more fulfilling—to get involved and make a difference! You’ll be working directly to improve the teaching of science and math in public schools. ReSET volunteers use their experience and their faith in the future to make it better.
What You Get Back

“It’s great to put yourself back to that time when the world was fresh and new, and there were wondrous things to learn about.”
—Stan Marshall, ReSET Volunteer

ReSET volunteers are universally delighted to be in the company of children. Many will tell you they get far more out of the experience than they give. Volunteers can also take pride in knowing that they are not detached critics of our country’s educational system, but are positive contributors to making the system better. You can be instrumental in changing young lives—in helping children to develop an appreciation for science, in encouraging them to consider a career in the science, math or technology professions, and even in nurturing self-respect and confidence.

A Volunteer Profile

“The experience that the volunteers bring to the table is just phenomenal. If you read the resumes of some of the volunteers, it’s just amazing.”
—John Carwell, Commonweal Foundation

ReSET volunteers are active and retired scientists, engineers, and technicians with successful careers in the private or public sector.

Some of the professional fields represented among our volunteers:

- Aerospace Engineering
- Biochemistry
- Biology
- Electrical Engineering
- Environmental Science
- Health Sciences
- Mechanical Engineering
- Microbiology
- Physics
- Statistics

Volunteer Coordinator Roberta Goren (left) chats with volunteer Beverly Yett. The Volunteer Coordinator is your primary point of contact before you get started—she will set up a classroom visit, introduce you to your partnering teacher, make field trip arrangements, and handle any problems that might arise.
A string of paperclips, a cluster of clothespins, a coke bottle and a straw, a handful of rubber bands, a paper airplane wing…

The ReSET principle of using modest objects to convey big ideas was brilliantly displayed at Orr Elementary School one recent Wednesday in December. Coincidentally, two ReSET volunteers were scheduled to visit their assigned 5th-grade classes at the same time that day. Bob Blumberg, a retired mechanical engineer who lives in Gaithersburg, was teaching Bernoulli’s Principle, while right next door, D.C. resident Clarence Wade, a former chemist with Walter Reed Medical Center, was getting his class passionate about polymers.

How do ReSET volunteers convey complex scientific concepts such as force, velocity, molecular chains, air pressure, and synthetic fibers to energetic but easily distracted 10-year-olds? Very simply! (And with a good sense of humor.)

Mr. Blumberg began his class with a brief discussion of moving gases and liquids, then talked about how force gives objects the ability to move. Using a simple homemade device comprised of wood and a piece of paper cut like an air foil, Mr. Blumberg blew air from a portable vacuum cleaner on the “wing” to show how force can pull things in. Each child was given a chance to use the force from the vacuum to keep a plastic ball in the air. A definite crowd-pleaser, the children giggled with pleasure at this firsthand opportunity to experience the discoveries of Daniel Bernoulli, an 18th-century Swiss mathematician who demonstrated how pressure and velocity are related.

Meanwhile Dr. Wade was creating quite a sensation with his discussion of polymer chemistry. Starting with the basics, Dr. Wade talked to the class about what a molecule is and how a single molecule is called a mer. Linking a chain of safety pins together, he demonstrated in simple terms how to create a dimer, a trimer and then a polymer. Then he moved the class from the metaphorical to the chemical. Using...
polyvinyl alcohol, acetone, and a copper wire, Dr. Wade showed the children how to create a polymer by dipping the wire into the solution and drawing it up in a continuous straight line. The string of goopy fiber clearly appealed to the children’s appreciation for “gross-out,” and was met with wrinkled noses and a chorus of delighted “ews.”

Dr. Wade gave the children specific tasks—one child prepared the solution, another measured the varying lengths of fiber with a yardstick, and a third recorded the results in a notebook. In a very subtle way, Dr. Wade got the children to think and behave like scientists. Each child got the chance to “draw” a fiber in a competition to determine who could draw the longest strand.

While Dr. Wade was educating (and entertaining) his enthralled group of children, Mr. Blumberg had moved on to eductors, an application of Bernoulli’s Principle where moving air is used to move liquids in a pipe or tube. Employing his vacuum cleaner again, Mr. Blumberg showed how pressure could draw the liquid in a coke bottle up and out of a straw (much like a perfume atomizer).

As Mr. Blumberg worked with the class, he didn’t pass up any opportunity to make science and math relevant to everyday life. When one child asked him how old he was, this became a digression into simple math, as Blumberg showed the class how to calculate his age based on the year he was born.

Mr. Blumberg concluded by asking the children what they wanted to be when they grew up. Answers ranged from a “judge” to a “basketball player” to a “podiatrist.” Mr. Blumberg made a point of showing how many of these professional choices required education and study, and he encouraged the children to stay in school and apply themselves academically in order to reach their goals.

Next door, Dr. Wade was also wrapping things up. This was the last of Dr. Wade’s six sessions with the children. Over the term, he had covered the periodic table of elements, electrons and ions, gases, and states of matter. Mr. Blumberg would be back again for two more sessions with his class to talk about electricity and mechanical advantage. Both ReSET volunteers would return to Orr again in the spring.

A recent article in The Washington Post cited the learning gap between students in the U.S. and those in Europe and Asia in the areas of math and science. Deputy Education Secretary Eugene Hickok remarked: “The U.S. needs to do better. We need to get young people interested in math and science at a younger age.” Had Mr. Hickok visited Orr Elementary School earlier this month, he would have stumbled on two impressive examples of science and math in action—vital hands-on learning experiences that made difficult, but important ideas come alive.
Getting Started

“ReSET adds to the young and to the old. The volunteers respect the children and are passionate about what they do. They bring such great energy. In turn, the program teaches children courtesy, and to treat older people with respect.”

—Valena Valentine-Nelson, Teacher

Acclimation

Many volunteers are anxious about being in an elementary school classroom. To help them get over their “jitters,” ReSET has developed a number of best practices and products geared to getting acclimated. First, ReSET has regularly scheduled volunteer orientation sessions where prospective volunteers have the opportunity to meet veteran volunteers and to share ideas. Volunteers also have the chance to visit a school and sit in on a class. As a new volunteer, observing another volunteer inside the classroom can do much to allay any concerns you may have. Classroom visits are easily arranged through ReSET’s Volunteer Coordinator.

ReSET has also produced a training video that will help you to visualize the classroom experience, a web site that provides a good overview of the program, and a bi-monthly newsletter, offering a variety of helpful feature articles, from volunteer and teacher profiles to the latest developments in science and math education. Finally, The Volunteer Handbook was developed to give you a firm foundation for beginning your ReSET experience.
Choosing a School

The choice of a school with which you wish to partner is up to you. Your selection may be based on geographical proximity, e.g. the school closest to where you live. Or it may be based on the type of school or student you feel would most benefit from your work. For instance, you might choose a school whose students have special needs or challenges, or you might opt for one that exhibits a higher level of academic achievement. You may also have worked with a particular teacher in the past, and wish to continue that relationship. Many factors can come into play in this decision, but the choice is ultimately yours.

The Right Match

A lot of groundwork will have already been completed before you ever step inside a classroom. The ReSET Director will have spoken with the principal at the school you’ve selected to explain the program and to set the ground rules for your participation. It is the school principal who determines which teachers will participate. The principal might decide to conduct the program at a particular grade level, say all 5th graders, or ask that teachers volunteer to participate. The principal might also select teachers who can best manage classroom time and easily adapt your visits to their schedules.

At the beginning of each semester, an introductory meeting is held, rather like a small roundtable, where you will introduce yourself, explain your area of expertise, and possibly share some of the topics you’d like to undertake with students. Teachers choose with whom they wish to work, typically based on immediate curriculum needs—whether your particular science or math topic comes close to meeting a classroom objective. In some cases, a teacher may know very little about your specialty and will want to educate his or her class in a completely new area.

The following semester, the partnering process begins again.

Volunteer Orientation Sessions

Orientation meetings are offered several times each school year and can really help to reduce first time jitters.
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

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.

• **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!

**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. 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.
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

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.
“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.

**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.
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 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.”

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

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.pgpaarks.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

Cryptographic Museum
Washington, DC 20007
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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/
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 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

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
“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

Interested in becoming a volunteer? Have a friend or associate who might be interested in the ReSET program? Go to www.resetonline.org to find out more.