EARTH CONNECTIONS

Resources For Teaching Earth Science

BACK TO SCHOOL— TIPS FOR CLASSROOM SPEAKERS

At this time of year, teachers are preparing for the new school year, but they aren't the only ones. More and more, parents and professionals are being invited into classrooms to talk to students about their area of expertise. While these professionals know their subjects well, they haven't been trained as educators. Talking to a third-grade class is much different from making a corporate presentation or a report to colleagues. The following tips from the Mineral Information Institute can help speakers prepare for their visit to the classroom.

YOU'VE BEEN ASKED TO TALK TO A CLASS— NOW WHAT DO YOU DO?

- ✓ What is your topic? Is it relevant to what the students are studying? Find out what the students have been studying and how much they know about you and your topic. Sometimes you can't make the 'speech' you want because it doesn't fit. You can ask the teacher anything—they want you to be successful.
- ✓ Teachers are now specialists in a subject area. You'd better know the opinion of the teacher about your subject and your industry.
- ✓ Don't try to run a one-man show. You can't do that at work, so don't try it in the classroom. Contact your company's head office or your industry's trade association. Their job is to help you look good.
- ✓ Look at the size of the textbook the class is using. More often than not, the students feel as if they are being fed with a fire hose. And they're right. Remember, the class you are in is only one of 4 or 5 they take, every day.
- ✓ If you're not prepared, or think you can bluff, these kids will put you on the spot. Don't go to a government class to discuss your community's land-use laws or the revision of the 1872 Mining Law unless you've read and understand them. The kids will have read and analyzed the regulations and the law in preparing for your visit.
- ✓ Don't do more damage than good. Practice, practice, practice.
- ✓ Come bearing gifts—handouts, samples, etc. If you can, leave everything with the teacher.
- ✓ If you want to involve the students in an activity, always check with the teacher first to make sure they can handle it.
- ✓ Never start a lesson, activity, or program that takes more than your allotted time.
- ✓ Never talk down or up to students.

CAREERS AND JOBS ARE THE SECRET TO BEING A SUCCESSFUL CLASSROOM SPEAKER

The new national standards emphasize jobs after school. This is the area in which you are the supreme expert—the students know it and so does the teacher. If you want instant attention:

- ✓ Tell them how much money the different skilled jobs pay at your company. It might be best to compare wages rather than give out specific figures. Students are used to minimum wage jobs, because that's all they've had.
- ✓ Tell them about the special skills, training, and education it takes to get a job like yours, trying to spur them on to more education and training. Make the point that education never ends; it's an ongoing process to upgrade skills and learn new techniques.
- ✓ Relate your job, your company, your industry to the economy of your community, the state, the nation, and the world.

MINERAL INFORMATION INSTITUTE

Mineral Information Institute is a nonprofit educational organization providing minerals and energy information at no cost to teachers (cost involved to others). Materials include posters, lessons, activities, and referrals to other sources providing free or highly subsidized educational information. The purpose of all materials is to increase awareness that "everything we have and everything we use comes from our natural resources". MII also provides technical support to new and established earth science programs. MII sponsored and continues to support revisions of the high school science textbook *Global Science: Energy, Resources, Environment*.

IF THE CHILDREN ARE UNTAUGHT, THEIR IGNORANCE AND VICES WILL IN FUTURE LIFE COST US MUCH DEARER IN THEIR CONSEQUENCES THAN IT WOULD HAVE DONE IN THEIR CORRECTION BY A GOOD EDUCATION.

Thomas Jefferson

Lesson modified from information provided by:

Mineral Information Institute
501 Violet Street
Golden, CO 80401
phone: (303) 277-9190
fax: (303) 277-9198
website: http://www.mii.org/

Earth Connections No. 5

GRADES K–6—WHAT IS TAUGHT WHEN AND HOW MUCH CAN THEY UNDERSTAND?

	KINDERGARTEN AGE 5–6	1ST GRADE AGE 6–7	2ND GRADE AGE 7–8	3RD GRADE AGE 8–9	4TH GRADE AGE 9–10	5TH GRADE AGE 10–11	6TH GRADE AGE 11–12
HINTS	Students are learning to use scissors, crayons, pencil; learning to tie shoes and work buckles. Use big, colorful pictures.	Students like to do, not listen; can share and work in groups; can follow short verbal directions; 10–15 minutes maximum attention span.	Students can listen to and follow directions; like to listen, then do. Expect many questions. Use variety.	Students begin to learn abstract concepts; like group activity and can follow directions.	A fascinating age. Analytical thought process begins. Students have sense of humor; enjoy everything.	Students are independent learners; are socially conscious; enjoy outside experts; ask many questions; like to be read to.	Students are more abstract thinkers; are easily bored; question everything; enjoy a challenge.
	STUDENTS DON'T READ OR WRITE IN CURSIVE, SO DON'T USE IT. PRINT EVERYTHING.				REGIMENT-ORIENTED— DON'T GO OVER YOUR TIME.		
LANGUAGE ARTS	Students are pre-reading—use pictures, puppets. Students learn colors, alphabet; learn to identify color and sounds; can read own name.	Students can use upper- and lower-case letters; can read words like *cat*, *run*, *the*; can follow two-step directions.	Students are introduced to cursive; can recognize some abbreviations; learn simple report writing and research; are very imaginative.	Students use dictionary, encyclopedia; can recall details of who, what, when, why, where; read news and non-fiction.	Students begin short novels; read more detailed texts, references; are able to recall verbal information; use cursive writing.	Students know difference between fact and fiction; can summarize; can draw conclusions and predict the outcome.	Students do more sophisticated reading; can read 'between the lines'; have strong opinions; know and can identify propaganda.
MATH	Students learn to count from 1 to 20 and identify numbers 1 to 10; learn 'more' and 'less', 'right' and 'left', 'top' and 'bottom'.	*First of year:* Students read and write numbers to 50; count to 100. *End of year:* Students add and subtract numbers 1 to 10; learn to measure.	*First of year:* Students add and subtract double-digit numbers; count coins; know square, cube, cylinder. *End of year:* Students learn 3-digit addition and subtraction; begin to multiply.	*First of year:* Students know numbers to 1000; know rounding; add and subtract money. *End of year:* Students multiply and divide 1 thru 6; learn charts and tables.	*First of year:* Students begin addition and subtraction with decimals. *End of year:* Students learn double-digit multiplication and division; read bar and line graphs; know geometric shapes.	*First of year:* Students learn 4-digit math, 3-number addition and subtraction. *End of year:* Students learn 2- and 3-place multiplication; learn to add, subtract, multiply, and divide with decimals; know fractions.	*First of year:* Students use order of operation to solve equations. *End of year:* Students find variables; learn simple geometry, algebra.
	ALL MATH INCLUDES CONCEPTS OF ESTIMATING AND PROBLEM-SOLVING.						
SCIENCE	Students observe through touch and feel; compare and sort different sizes, shapes, colors, etc.	Students know day, night, sun, moon; know living from non-living; like touch-and-feel activities.	Students learn how things grow; learn about dinosaurs; work with magnets; like observing, manipulating.	Students learn uses and misuses of resources; learn about changes in the Earth; learn about the use of machines, force, energy.	Students learn about rocks and minerals, classification systems, properties and states of matter; do experiments.	Students like use of science equipment; learn about atoms and molecules, source of electricity and energy; see relationships.	Students learn about Moh's scale, chemical changes; learn relationships of plants, animals, and Earth; like hands-on.
	COVERS ALL OF THE GENERAL SCIENCES EACH YEAR: LIFE, PHYSICAL, EARTH, AND HEALTH (HUMAN BODY).						
SOCIAL STUDIES	Students focus on their world, things they know: home, school, library.	Focus is on home and school. Students believe what they see and hear.	Focus is on neighborhoods. Students recognize likeness and difference in people.	Focus is on community citizenship, interdependence among people.	Focus is on world regions. Students learn interdependence among nations.	Focus is on U.S. history, maps, people. Students learn states and capitals.	Focus is on the world and specific countries, comparison of cultures.
MAP-READING SKILLS	Students like maps and globe; know blue is water, brown is land; see parts, not whole.	Students use symbols and color to represent things; can compare map and globe.	Students can use a key or legend, abstract symbols; learn to measure distances.	Students use cardinal directions on grids and to locate places; learn scale and distance.	Students examine world maps by region; recognize northern and southern hemispheres.	Students begin learning latitude and longitude; begin interpreting relationships between countries.	Students can combine information from different maps to analyze or draw conclusions.

SURVIVAL TIPS FOR THE UPPER GRADES

Grades 7 to 9 include students age 12 to 15—life is changing for them. These students:

- ✓ Are emotional and eager to get moving
- ✓ Don't really think ahead
- ✓ Like to work in small groups
- ✓ Like 'doing' activities
- ✓ Haven't had extensive work in the sciences
- ✓ Have basic math skills, are beginning algebra and geometry
- ✓ Are easily bored and have vulnerable egos, tend to embarrass easily

Grades 10 to 12 include students age 15 and older, some of whom are able to drive, vote, and go to war—respect them. These students:

- ✓ Are mature learners
- ✓ Are beginning to plan for career choices and training beyond high school
- ✓ Are able to understand abstract concepts, but still like hands-on activities
- ✓ Are expanding their understanding of ethical principles but do not yet realize the full impact of their words and actions ■

REFERENCES AND RESOURCES, RELATING TO THE LESSON PLANS AND OTHER ARTICLES IN THIS ISSUE

DINOSAURS

Correlation and Strata—Findasaurus, by Craig A. Munsart and Karen Alonzi-Van Gundy. *Good basic explanation of sedimentation, strata and index fossils.*[http://www.ucmp.berkeley.edu/fosrec/MunGun3.html] [lesson plan]

See also: Dinosaur-hunting resources list elsewhere in this issue

FOSSIL FORESTS

Learning from the Fossil Record [lesson plan] http://www.ucmp.berkeley.edu/fosrec/Learning.htm

Simple Home Experiments for Bringing Geology to Life; Experiment 2—Condensing Geologic Time or the Art and Science of Making Fossils, by Wendy Gerstel and Kitty Reed: Washington Geology, v. 27, no. 2-4, p. 31, 1999. [lesson plan]

Significance of the Republic Eocene Fossil Plants, by Jack Wolfe and Wes Wehr: Stonerose Interpretive Center [Republic, Wash.], 16 p., 1991 repr. 1992.

Mammoth Is Now State Fossil: Washington Geology, v. 26, no. 1, p. 42, 1998. [article]

Discovering Fossils: How to Find and Identify Remains of the Prehistoric Past, by Frank Garcia, Don Miller, Jasper Burns (illustrator): Stackpole Books, 176 p., 1998.

The Audubon Society Field Guide to North American Fossils, by Ida Thompson: Alfred A. Knopf [New York], 846 p., 1982.

Collecting Fossils—Hold Prehistory in the Palm of Your Hand, by Steve Parker, Murray Weston, and Jane Parker: Sterling Publications, 80 p., 1998.

Ginkgo Petrified Forest, by Mark Orsen: Ginkgo Gem Shop [Vantage, Wash.], 24 p., 1998.

FOSSIL SITES

Stonerose Interpretive Center, Republic, Wash. *Interpretive center has excellent collection of fossils, and visitors are allowed to collect fossils on site.* http://www.stonerosefossil.org/

Ginkgo Petrified Forest State Park, Vantage, Washington. *Has an interpretive center with a fabulous collection of petrified wood and interpretive hiking trails* (no collecting). http://www.tcfn.org/tctour/parks/Ginkgo.html ■

New Monitoring Tools Help Reduce Earthquake Risks

Shake Maps Pinpoint Hardest Hit Areas

Pat Jorgenson
reprinted from People, Land & Water
April–May 2001, U.S. Department of the Interior

The most common information available immediately after an earthquake is the location and magnitude. However, what scientists really want to know is where the shaking was felt, and in the case of emergency response, where it shook the most. Two new, near-realtime systems—ShakeMap and Community Internet Intensity Maps—can now depict within minutes which areas in the vicinity of the quake were hardest hit. ShakeMap shows the distribution of earthquake shaking as measured by seismic instruments. Immediately after an earthquake, emergency managers must make response decisions using limited information. Automatically and rapidly generated computer maps of the intensity of ground shaking, known as ShakeMaps, are now available within about 5 to 10 minutes of an earthquake. This quick, accurate, and important information can aid in making the most effective use of emergency response resources.

While this system has only been in place for about three years in Southern California, and only a few months in northern California and the Seattle region, it has already proved useful for several recent quakes. Decision-makers used the system to rapidly assess the situation after the Oct. 16, 1999, magnitude 7.1 Hector Mine earthquake in Southern California. Rapid loss estimates also were made with information provided by ShakeMap after the magnitude 5.2 Yountville (Napa Valley) quake in September 2000 and the magnitude 6.8 Nisqually/Seattle) earthquake on Feb. 28, 2001. Based on the success of the ShakeMap project in California, the USGS, in cooperation with other scientific institutions and emergency agencies, is developing a ShakeMap system for the other seismically active regions of the United States.

The Community Internet Intensity Map, commonly referred to as Did You Feel It?, also shows the areas of greatest shaking and damage, but requires the contributions of Internet users to show where the earthquake was felt and how strongly it shook. After any quake, almost everyone wants to tell someone what it felt like, how long it lasted, and the damage it did to their home or business. Building on that universal human trait of wanting to describe such an experience, or at least confirm that you were affected by it, USGS scientists developed a system that instantly converts responses to web-based questionnaires about earthquake experiences and/or damage into colorful maps depicting which areas were hardest hit and which areas were spared.

Since this map system was launched in 1998, the USGS has recorded and compiled more than 100,000 individual reports to develop maps showing areas where the ground shook the hardest. In the wake of the 1999 Hector Mine earthquake, for example, more than 25,000 people contributed to Community Intensity Maps, which showed that the quake was felt over a 90,000-square-mile area.

Over 7,000 responses to the Sept. 3, 2000, earthquake that damaged parts of Napa County, California, show a strong correlation between human reactions to the earthquake, intensities of ground shaking recorded on instruments, and patterns of structural damage. That experience was repeated in the Puget Sound area, after the Feb. 28 quake, when over 12,000 citizen reports allowed mapping of the overall affected area. The maps coincided well with later official damage reports. The maps are at http://pasadena.wr.usgs.gov/latest/shakingmaps.html. ■