Get Ready!

Contact the teacher well in advance

You can make contact with teachers in a number of ways. You might have a child or grandchild in the school, have been a science fair judge, know the principal or science supervisor, or have a relationship already established with the school system by your company, survey or university. If you have none of these, you might find it easiest to make contact through your school system's supervisor of science (usually based at the district office or board of education). Once you have made contact, be sure to set up a meeting with the teacher at least a month in advance of your visit.

Meet with the teacher to plan your visit

It's always a good idea to meet with the teacher in his or her classroom, either after school or during a planning period (usually about a 45-minute time slot). That gives you a chance to find out the following essential information:

- How much time will you have?
- How early should you arrive to set up?
- How many and what type of students will you be addressing?
- Do students usually work in groups, pairs or as individuals?
- Will they have name badges or name tents?
- What is the classroom setting like (tables and chairs, desks, lab tables)?
- What should the science topic(s) be and what curriculum, if any, are the students using?
- What immediate and long-term curriculum goals does the teacher have for this section (and what framework goals)?
- What science equipment, water and electricity are available?
- What are the science safety rules?
- What are the school safety rules?
- What AV you can use, or bring with you?
- What are the school dress code requirements?
- Where should you park? (Avoid bus loading zones!)

- Where should you go when you enter the school to sign in? (Many schools now require visitors to show ID and to wear badges during their visits.)
- What is the teacher's contact information in case of emergencies, especially his or her cell phone number (leave your contact information as well, including your cell phone).

You can also plan your respective roles during your visit. One way to divide this up is that the teacher is responsible for classroom management and you are responsible for the lesson delivery. You may also want to co-teach. The teacher could introduce your concept and you take over from there. No matter which way you plan the visit, the teacher should always be in charge of managing the students and should not leave the room with you in charge. He or she has a legal responsibility for the students. You might also find the opportunity to help a curious teacher learn more background material, and start a long-term relationship about Earth science.

Start slowly!

If you have never made a presentation that includes a hands-on investigation to a school audience before, you might want to start with just one class – preferably a class of very highly motivated students. Once you get your "sea legs," you can plan for lengthier visits with a wider range of students.

Plan your presentation.

From your visit with the teacher, you should be able to tailor an experience for the students that fits with their curriculum, is exciting, draws upon your expertise and leaves them wanting you to return. Students will really like hearing stories about your work, as long as you keep these pretty short. If you use a PowerPoint presentation, make sure that you keep the vocabulary on the students' level and keep to very few slides. Use LOTS of photographs, include helpful diagrams, and even cartoons if they can best illustrate ideas you are presenting.

The **Curriculua** section of this handbook has lesson plans and investigations that fit a variety of geoscience topics. Additional investigations are on the **AGI web site**. Be sure to allot time for introductions, any AV pieces you have, distribution and collection of materials, investigations and questions and answers. Most class periods are 45 minutes and the time really does fly. If possible, try to visit during a double period in grades 6 – 12, if these exist in the school. Also, self-contained elementary teachers often have more

flexibility in scheduling their days than middle or high school teachers do. Here's a skeleton of what your visit could include (just one example):

- **Step 1:** Introduce yourself and explain what you do – be enthusiastic!
- **Step 2:** Show any tools of your trade, if you brought these along.
- **Step 3:** If you're doing an investigation, let students know that up front. They'll be more attentive if they know they are going to be handling "real stuff."
- **Step 4:** Show a short video (AGI's *Why Earth Science?* DVD, which is included in this Handbook) or a PowerPoint presentation about what geologists do in general, or what you do in particular.
- **Step 5:** If you're using a handout with an investigation, give it out and walk through it with the students. (Make sure you have enough for everyone.)
- **Step 6:** With the help of the teacher and/or a colleague, hand out materials.
- **Step 7:** Give students enough guidance to get them started, and then walk around to observe and help. Watch the time, so you can budget for clean up and questions.
- **Step 8:** Answer students' questions.
- **Step 9:** Leave giveaways with the teacher.
- **Step 10:** Thank the students for the opportunity to share your experiences (this always gets a round of applause).

When you finish planning your presentation, run it by the teacher for his or her input. This gives the teacher the opportunity to set the scene for you by having students draft questions or do some research prior to your visit. It also helps the teacher to fine-tune your presentation to fit the needs of the students. For example, you might find that your vocabulary is too sophisticated or too simple for your audience.

Practice your presentation.

If you have the time, do a trial run of your presentation in front of the teacher you are visiting, or your colleagues, family or friends. Time what you do and adjust your plan if necessary. It's easy to underestimate time passing when you are talking to students. This is especially important if you are planning on using audiovisual support or including a hands-on investigation. Although your investigation may seem very simple, it always pays to try it out ahead of time yourself. You may find that the directions, as written, can be confusing or that it takes much longer than you thought to collect and record data.

Think about bringing a colleague to help

Although you will have the classroom teacher available to help, when handing out materials and papers, you will be grateful for extra hands. If you can, bring a younger colleague to assist you. It's important that students meet as many role models as possible, and they will enjoy interacting with scientists in many stages of their careers.

During your visit

Although it is the teacher's responsibility to manage the students, it still helps to know some classroom management techniques yourself.

- Getting the class' attention. Ask the teacher what technique he or she uses to get the whole class' attention. For example, some teachers in elementary school start counting out loud and the students are expected to be quiet by the count of three. Other teachers start clapping their hands and the students join in and then stop after three claps. Middle school teachers sometimes use what are called "signals" – they hold up a hand sign something like the Boy Scout salute. The students follow suit until everyone is focused on the teacher. High school teachers have been known to flick the light switch for the room. The whole idea is to capture the students' attention for long enough to bring their eyes back to you.
- Managing materials and handout distribution. Enlist the help of the teacher or a colleague to hand out materials to students when you are ready for start using them. It's hard for students, especially in the earlier grades, to keep from handling materials as soon as they arrive, so plan accordingly. In the **activities section**, there are a number of suggestions for how to organize materials for each investigation, such as using baggies, shoe boxes, etc. Be sure to allot enough time at the end of your visit to re-organize materials and pick them up from the students. Most students from middle elementary on up will clean up for you if you ask them.
- Managing questions and answers. Before you arrive, ask the teacher if the students can have name tents (for younger students) or name badges (for older students). Just knowing a students' first name makes question and answer sessions a lot more personal to the students and easier for you to manage. When you ask a question during your visit, make it a point to call on a different student each time. This rule also works when students are asking you questions at the end of your visit. Try to be as accepting of students' ideas as you can. Use phrases like "That's a very interesting idea. Does anyone have another idea to share?" Saying things like "No, that's not right." stops interaction and makes the students nervous about volunteering information.

- Managing safety. It is imperative that you clear in advance with the teacher what you are planning to do and bring. For example, if you are planning on bringing a rock hammer to hand around to students, the teacher might see this as inadvisable. There might be no problem, however, with demonstrating how to use the hammer yourself.
- Behavior problems. Be sure that you arrange with the teacher that he or she will be responsible for any problems with student behavior. You don't want to be in a situation where a couple of students start punching one another and the teacher leaves you in charge of the class to take the students to the principal. In cases like this, teachers should call for a member of the administration to come to them, or have a colleague cover their class briefly.

Follow up with the teacher after your visit.

Either in person, or via telephone or e-mail, contact the teacher to find out what worked and what didn't in your visit. Adjust your presentation accordingly for your next visit.

Evaluate your own experience.

Reflect on your school and classroom visit. Think about how you felt at different times during your visit such as, interacting with the teacher, facing your audience of students, making a presentation to them, getting them started on your chosen activity, monitoring how they were working, talking to individual students, answering questions and how the event came to a close. If this was your first time, what experience have you now had that has allayed your former apprehensions? What surprised you that you will need to address before your next visit? What did you feel really good about? What did you learn not to do next time? Make a few notes about these things to keep in mind for future visits.

Additional things you could do to help students in the school.

Your visit to a school is a chance to gauge other ways in which you may be able to help teachers and students and the school. For example, you may notice that they lack resources or equipment that you could help provide. Maybe there are resources from your own workplace that you no longer need, but could still be useful to a school. You may also be able to offer teachers and students the chance to visit your workplace or other venue that links with their studies. You can suggest other professionals who could visit the class. Many schools struggle for resources and opportunities to provide students with real-world experiences. You can certainly offer advice. Be alert for opportunities to help them where you can.

Plan for your next visit soon.

Don't let too much time go by until you do it again! The more often you contribute in this way, the better you will become at delivering exciting and important experiences to teachers and students. Think of it this way. There's a real chance that something you say or do may be the beginning of a whole new world of possibilities for a student. Most of us were inspired by someone in our past: teacher, family member; friend; social leader; hero; or a chance encounter with a stranger. You'll probably never know, but you could be that person

Instructional Approaches

A number of instructional approaches have built upon the work of Piaget and other researchers. One of the most widely used of these approaches is called the Learning Cycle. There are variations to the steps of the Learning Cycle, but one version consists of these steps:

- **Engaging with a concept:** This is the "grabber" step of the Learning Cycle where you can capture children's interest about a topic. This can happen with a demonstration, video, interesting samples, cartoon, story, going outdoors, or many other methods. It is important in this step to link the concept to the children's experiences and knowledge base.
- **Exploring a concept:** One of the best ways of having children explore ideas is by hands-on experiences. If you are teaching about Earth history during your visit, for example, get samples of fossils into the children's hands as soon as you can. Get them started on asking questions about the fossil samples and looking for patterns and relationships between them.
- **Explaining a concept:** After the children have time to explore, your explanation can help them to focus on the key concepts you want them to understand. This is a good time to let the children ask questions of you and each other, and seek for explanations together.
- **Applying a concept to a new situation:** So that you feel confident that the children you are working with "get it", give them an opportunity to apply their knowledge to a new situation. For example, if you are having them learn to identify a set of minerals, give them a couple of new samples to try identifying later in the lesson.
- **Expanding a concept:** This is a "what next" stage. Children think about other questions on the concept they could investigate. This helps them to expand their understanding of the concept. Classroom teachers often use free-standing

Learning Centers to enable interested children to explore these “what next” questions.

During a relatively brief classroom visit (45 minutes or so), you may only get to the Explanation Stage of the Learning Cycle. The classroom teacher can then follow up with the later stages. If possible, provide him or her with activities that help children make those “next steps” after your visit. It is important to remember that the steps of the Learning Cycle put into clear and simple language what are really a series of complex intellectual processes for both children and their teachers.

The Learning Cycle is just one research-based approach used in science teaching. The lessons in the **activities section**use a modified Learning Cycle approach to help students learn science through inquiry. The inquiry aspect of the lessons is based upon the body of research which supports the definition of inquiry in the *National Science Education Standards* and in the *Benchmarks for Science Literacy*. Students who learn science through inquiry may begin with their own question to investigate, or someone else's question, but, eventually they need to find answers that:

- Fit with their existing understanding and developmental level
- Make sense
- Are scientifically correct (even if only at a very simple level)
- Help them to understand their world
- Lead to new questions

Note that inquiry is more than just hands-on; good inquiry is “hands-on, minds-on”. As a visiting instructional leader, you can both promote and guide the discovery and inquiry process. Rather than answer student questions directly, you can help them find their own answers, which again helps them experience the scientific process.

While hands-on, minds-on experiences are a vital part of the inquiry method, children also need to draw upon the information they can find in books, videos, the Internet, CD-ROMs, magazines, field trips, experts (including you and their teacher), and each other. You can work with the classroom teacher to craft or select experiences for children that allow them to investigate science questions in a rich and supportive atmosphere. This includes giving children time to explore science; as well as giving them access to

information technology; interesting items to investigate; opportunities to discuss and share; and the chance to investigate their own questions.

FOLLOW UP

- Most of us find the enrichment experience inspirational. As many have said before, you do not truly understand something until you have to explain it (and even more so when the target audience is a class of 4th grade students). You almost certainly will have learned some new ways of viewing the material you covered, and encountered some questions that you could not answer.
- Try to solicit feedback from the teacher, and from students in higher grade levels. Don't be surprised if you get invited back for other topics, or to return next year. Some teachers may nominate you for science club contacts, school or district-wide science committees, or other opportunities. On the other hand, don't be too surprised if you don't hear from the teacher, at least right away, since teachers are some of the busiest professionals. You might initiate the follow-up discussion, especially if you promised any more materials or information during your visit.
- Don't give out your e-mail address to the students but give your e-mail address to the teacher.
- If you are coming back to the school for more presentations, give the students activities that they can do at home to prepare for your next visit.
- If students ask you questions in thank you letters, send responses and follow ups to the teacher.

More than anything else, know that you have made a positive difference. The students and teachers you met gained new knowledge available only from you. They met a role model that might influence future studies and career choices. They saw how science can applied with their own hands and minds. And at least for a brief time, you were part of the inspiration and development of young minds. We hope you enjoyed it!