Scientists can make major contributions to science education by working with teachers and assisting with classroom science instruction. In only a few hours, you can make a difference in how a student views science as a subject for study in school and perhaps as a future career. By sharing your enthusiasm, you can bring excitement into the classroom and add to the wonder of science. At the same time, a scientist can help students see science as an approachable and dynamic subject. There are also internal rewards for the scientist. He/she shares in the excitement of the students and begins to understand the value of these personal interactions in working toward improvements in science education.

Neuroscientists are encouraged to get involved in pre-college science education in a variety of ways. To begin that process, the Society for Neuroscience encourages members to visit classrooms and open their laboratories to the public during Brain Awareness Week. Outlined below are suggestions to assist neuroscientists with an initial visit to a K-12 classroom.

**BEFORE YOU GO**

**Make contact with a teacher.**
- Contact your child’s teacher.
- Call a principal or the science coordinator in the local school district.

**Know your audience.**

**Ask the teacher:**
- What grade level is the class?
- How many students are in the class?
- What have the students studied this year?
- What general activities do students at this age enjoy?
- What is the layout of the classroom?
- What is the best day and time of day to visit?
- What activities would the teacher like you to do?

**Plan for one classroom at a time.**
- Activities with 30 students can be challenging; activities with 60 students at a time will be unwieldy.

**Get directions to the classroom and learn the school procedures for visitors.**
- Exchange home and work phone numbers with the teacher in case something comes up and the activity must be postponed.

**Discuss the planned activity with the teacher.**
- The teacher will have a good idea about what will work in the class.

**Active learning and hands-on demonstrations work best.**
- Lecturing to young students is not likely to make you very popular. Attention begins to wane 20 minutes into a lecture even with college students.
- Plan a short (5-10 minute) introduction.
- Prepare an activity that will take 40 minutes (less time for young children).
- Prepare enough materials for small groups of students to work together on a project or problem.
- Consider setting up stations and have students rotate through a series of demonstrations or activities.

**Keep scientific terminology to a minimum.**
- Don't assume any prior knowledge.
- Make your explanations simple and use words appropriate to the level of the student.
- Young students love learning new words, so don't leave out scientific terms altogether.

**Safety comes first.**
- The teacher can help determine if there are safety issues you need to consider.
- If you are bringing fixed brains to the classroom, soak the brain in water (or alcohol) overnight to get rid of some of the formaldehyde. Remember to bring gloves and paper towels.

**Determine what you need to bring.**
- Prepare supplies, equipment, or materials (including water) that are needed for the activity.
- Ask the teacher if he/she can supply any needed items, but be prepared to bring everything.

**Practice makes perfect.**
- Get feedback on your planned activity from colleagues, the teacher, and, if possible, children of an age similar to the class you will visit.
- Be sure to have a trial run with the materials you plan to use.

**Look into getting additional resources.**

**Available from the Society for Neuroscience:**
- Brain Facts: A 74-page primer on the brain and nervous system.
- Brain Briefings: A series of two-page newsletters explaining how basic neuroscience discoveries lead to clinical applications.

**Available from other sources:**
- Materials on the brain for younger children can be purchased through BrainLink (1-800-798-8244).
- See Web site links and resources on the Society's Brain Awareness Week Web page.

---

**THE CLASSROOM VISIT**

The following ideas are taken, in part, from a small brochure called Sharing Science with Children: A Survival Guide for Scientists and Engineers that was printed by the North Carolina Museum of Life and Science (contact: Georgiana M. Searles, Director of Education, North Carolina Museum of Life and Science, P.O. Box 15190, Durham, NC 27704).

**Share yourself.**
- Tell the students how you became interested in being a scientist.
- Explain one interesting topic of your research.

**Involve the students in the activity.**
- Prepare a demonstration or activity that will immediately capture the interest of the students.
- As much as possible, let the students participate in the activity.

**Include the scientific process in your activity.**
- If possible, design an experiment or have the students design the experiment.
- Incorporate student observations, measurements, identifications, and interpretations into the experiment so that students practice the skills of science.

**Relate your activity to real-life situations.**
- Share an everyday experience with the students that uses the scientific process.
- Relate your area of research and the field of the demonstration or activity that the students are doing to the lives of the students.
- Indicate how your research has changed how we do things or what we understand about the world.
Stimulate thinking by asking questions.
- This will reinforce the principles that the students used during the activity or experiment.
- Be sure to allow all students a chance to speak.

Use language that the students can understand.
- Try to use simple words when possible.
- Define terms and write words on the board. This will help the students increase their vocabulary and allow them to look up the word in the library later.

Leave more than a memory behind.
- If possible, leave some materials behind for the class to work with after you leave.
- Plan an additional experiment that the students and teacher can do by themselves.
- Be available to the teacher for follow-up ideas and to the students who want more information.

Get feedback.
- Ask the students what they liked and did not like about your visit.
- Ask the teacher for feedback about the activity or presentation.

Schedule your next visit.
- One visit can leave a very good impression with the students, but to make a significant difference, educators tell us that at least three visits are necessary.

BEYOND THE CLASSROOM

Develop a partnership with a teacher.
- Become a resource person for teachers to provide more in-depth understanding of the field.
- Help teachers design activities and laboratory activities that demonstrate the scientific method.
- Provide supplies and materials for activities. (Elementary school teachers may receive only $50 per year for outside supplies. They often spend hundreds of dollars of their own money in order to bring exciting activities into the classroom).

Develop a course or volunteer organization for undergraduate students to do activities in K-12 classrooms.
- This will expand by 10-20 fold what any single scientist can do during classroom visits.
- Undergraduates as well as graduate students love sharing their enthusiasm for science with children.
- Courses of this type exist at the University of Arizona (Science Connection; Gail Burd, [gburd@u.arizona.edu] faculty member) and UCLA (SPARCS Program; Dave Rector, [dave@aunix.loni.ucla.edu] faculty member).

Develop short evening courses for teachers in science.
- Provide courses to assist teachers with professional development and to help them maintain their teaching certification.

Become active in local school district politics.
- Participate in science education reform. Several recent studies have been published that document the need for reform of science education and outline steps that can be taken to make these reforms (see Science for All Americans, AAAS, Oxford University Press, New York, 1990; National Science Education Standards, National Academy of Sciences, 1996). The involvement of scientists in this process will be critical if true reform is to succeed.
SUGGESTIONS FOR K-12 NEUROSCIENCE ACTIVITIES

Activities for Elementary School and Middle School
- Demonstrate a brain
- Discuss and do activities that relate to the five senses
- Simple visual memory tasks
- Insect behavior
- Create helmets for eggs using a variety of materials
- Simple motor tasks like mirror writing

Middle School and High School
- Two-point discrimination
- Temperature adaptation
- Patellar reflex
- Retinal blind spot
- Reaction time at catching a ruler
- Discrimination time - card matching by color versus suit
- Comparison of brains from different species
- Visual-motor plasticity with prism glasses