



Scientist Mentor Idea #2

ADAPTING AND DELIVERING YOUR BEST SCIENTIFIC LECTURE MATERIAL TO A K-12 CLASS

You've been invited to be a guest speaker in a K-12 classroom and settled on the date. You and the teacher have decided on a general topic within your area of interest. You've already got great audiovisuals from your graduate course. Seems like a piece of cake!...but suddenly you realize: Egads! Talking to kids isn't like talking to graduate students! How can I be sure they'll understand and pay attention? **Here are some tips to help you convey toxicology to kids who may be just beginning to appreciate the difference between a molecule and a mitochondrion!**

● **UNDERSTANDING THE DEVELOPMENTAL LEVEL OF YOUR AUDIENCE** will help you prepare an effective presentation. Here are some general student characteristics to consider as you plan¹:

ELEMENTARY SCHOOL: highly impressionable * highly curious * reasoning tied to concrete experiences * rapid shift of interest * strong sense of humor * boundless energy. **MIDDLE SCHOOL:** inquisitive but may not question an adult * can be physically restless/need activity-oriented materials * capable of abstract reasoning * self-conscious * want peer group approval * beginning consideration of careers. **HIGH SCHOOL:** on the verge of becoming adults and some are adults * will challenge or question the adult * represent a variety of ages (16-21) and maturity levels* represent a variety of skills, abilities, desires and ambitions * ready to explore careers.

Many young students are fully capable of appreciating the value and ethical considerations of using animals in research and testing. The teacher (or the school) may be less open minded about this subject or may simply request that you approach it delicately. Inquire in advance if this is a possible concern.

● **RECOGNIZING THEIR LEVEL OF SCIENTIFIC UNDERSTANDING** will help you determine where to start and what to emphasize. Science in **ELEMENTARY SCHOOL** is not always a separate subject. K-3/4 teachers throughout the country who are knowledgeable about National Science Education Standards report covering subjects like characteristics of organisms that co-exist with us in the world; personal health and hygiene and how this is affected by our environment; poison awareness, including drugs, alcohol, and tobacco; and environmental awareness and responsibility, including recycling and other ways to help keep our planet healthy. Teachers of science in **MIDDLE SCHOOL** more often report offering individual courses with a specific focus on life science, health science, earth science, physical science, or environmental science. Ask the teacher in advance about the students' understanding of basic science subjects, keeping in mind that chemistry, biology, and physics are not usually taught in much detail as separate subjects until high school. Be aware of words that may not be in the vocabulary of students at this age (e.g., pharmacology)! **HIGH SCHOOL** students take biology before chemistry. National Science Education Standards expect all students in grades 9-12 to be mastering an understanding of molecular processes in living organisms; biological evolution; and matter, energy, and organization in living systems. You may be asked to speak to high school students who have successfully completed AP (advanced placement) science classes, so it is especially important to ask teachers about scientific preparation of the students before you finalize your presentations to high school classes.

● **APPLYING THE FOLLOWING GENERAL TIPS ON PREPARATION AND DELIVERY**

will further increase chances of success, regardless of the audience²:

1. Almost any toxicology topic fits into a school's K-12 curriculum (see SOT's Scientist Mentor Idea Sheet #1). For more detail, check out the National Science Education Standards or your State Goals and Objectives for relevant areas. These items are contained in books that are readily available. Ask a teacher to help you.
2. Make your discussion and/or activity age appropriate. Give the students a brief verbal or written quiz before you begin. It's a good gauge on where to start.
3. Remember your audience. Use the appropriate vocabulary for the age group that you are addressing. The teacher can give you some advice or examples of work done by the students.
4. Bring an attention grabber or a hook to focus the students' attention at the beginning of your talk. Keep in mind that your goal is to arouse curiosity, excitement, and an eagerness to learn.
5. Use Props. Bring something to pass around that you use in your research. These objects may seem ordinary to you, however students love to touch, hold, and explore unfamiliar objects. If possible also bring a small item that the students can take home. They will keep on thinking about what you've said every time they look at it.
6. Let the students know that you are a real person. Tell them about your family and what got you interested in toxicology and science in general. Students need to see real life role models. Use humor as often as possible with your personal stories; it's a great ice breaker.
7. Don't lecture. Involve the students in a question-and-answer period or a hands on experiment. Let students explore, discover, investigate, experiment, solve.

**Tell me - I will forget
Show me - I may remember
Involve me - I will understand**

8. If you ask a question, allow time for the students to answer. Five seconds of "wait time" will give the students enough time to formulate an answer.
9. Discuss with the older students what educational requirements are necessary for your job. Older students also always want to know "how much money do you make". Make sure to include a description of the typical "day" on the job, and the number of years it took to get where you are.
10. Ask for an evaluation of your presentation or bring along a questionnaire. It will help to polish your presentation for the future.
11. Above all get involved with young people. The students of today are the scientists of tomorrow.

Credits: ¹Adapted from a presentation by Sharon P. Zimmers, Ph.D, AALAS. ² Contributed by SOT member Mary O. Dereski, Ph.D. Many of these ideas came from teachers and toxicologists who participated in the annual "Paracelsus Goes to School" K-12 teacher workshops sponsored by the SOT with support from the National Institute of Environmental Health Sciences. Scientist Mentor Ideas are a creation of the K-12 Education Subcommittee of the Society of Toxicology's Education Committee.