

## Practice Makes Perfect

New science teachers face a daunting task. They must rapidly learn how to put together notes, find interesting demos, present challenging labs, provide appropriate homework, write tests and quizzes, stay organized, and find a balance between home and school.

My colleague and I have 35 years of teaching experience combined. When we were asked two years ago to share a classroom and chemistry lab, we sat down and outlined what has worked and what hasn't worked for us during our careers. Taking these notes into consideration, we developed a plan for the scholastic year that has proven successful in a very competitive, academic school. We hope our tips will help new teachers survive (and thrive) during their first year.

### First-day demonstrations

We begin the academic year with demonstrations on the first day. Presenting concepts gives students a captivating preview of what's to come. To demonstrate conductivity, we place electrodes attached to a light bulb into aqueous solutions of acids, bases, salts, and molecular compounds. The strength of conductivity depends on the degree of ionization (amount of charged particles) in a solution. The stronger the conductor, the brighter the bulb glows. To introduce gas laws, we put a small piece of dry ice in a bottle filled with water. The dry ice creates pressure, forcing a stream of water to shoot out of the bottle without squeezing the bottle.

After engaging students with demos, we outline safety rules and

the layout of the lab room. Each numbered lab station is equipped with individual lab drawers and a common equipment cabinet containing laminated equipment lists. Posted on each bench are lab duties: opening and locking lab drawers, cleaning sinks, wiping down reagent areas, straightening aprons, and turning on the UV light in the goggle cabinet. Each lab bench takes care of one responsibility to ensure the next class has all the materials neatly organized.

The first lab day begins with a song, "The Twelve Days of Chemistry," similar to the one found in *Idea Bank Collation: A Handbook for Science Teachers* (Talesnick, 1984). Sung to the tune of *The Twelve Days of Christmas*, the words are as follows: "On the first day of chemistry my teacher gave to me a test tube and an Erlenmeyer flask." For the second through twelfth days, we add the words "two forceps, three beakers, four glass plates, five ring stands, six Florence flasks, seven watch glasses, eight tongs a carrying, nine covered crucibles, ten graduated cylinders, eleven pipettes dripping, and twelve strikers striking," respectively. By the end of the song, most students are familiar with the name and sight of equipment. Students then proceed to their stocked lab drawers to check, clean, and replace items.

### Enforcing safety

Following the lab check, we administer a lab safety test. The safety test consists of 30 multiple-choice questions regarding: wafting, appropriate clothing in lab, the proper method for inserting glass tubing into a rubber stopper, careful han-

dling of reagents, how to heat alcohols and hydrocarbons, correct heating of test tubes with chemicals, specific types of glassware that can be heated, how to clean up chemical spills, first aid for cuts and chemical burns, how to neutralize substances, using hood for poisonous gases, how to light burners, and proper order for diluting acids. In addition, the students must identify 10 pieces of standard laboratory equipment and score a 90 percent on this test to continue. The test is retaken until passed.

### Consistency is key

Most students, especially those with learning difficulties, perform best with a consistent schedule. We provide students with notes for the entire course at the beginning of the school year, which are written and copied during the summer. Notes are color coded: white for teacher notes, peach for labs, and yellow for homework. Included in the notes is a schedule of when labs, assignments, or tests will occur. Although flexibility is sometimes needed, students typically stick to a schedule: *For example:*

- ◆ Tuesdays are lab days (appropriate dress and shoes for lab);
- ◆ Homework is due on Thursdays;
- ◆ Fridays are typically test or quiz days.

Our grading system is broken down to include homework (15 percent), lab work (20 percent), quizzes and review quizzes (15 percent), and tests (50 percent). Students receive full, partial, or no credit for their work and have a one-day extension

certificate that may be used for any late work.

### Mastering the material

Guided practice problems are worked out on the board by students to assess who understands the material. We divide quizzes into new and review material quizzes. Retests and requizzes are available to ensure that students master the material. Each retest and requiz consists of essays, short-answer questions, or problem sets (no multiple choice). The varied format makes students think more because there are no visual cues to aid their progress and they are forced to understand the material better the second time around. Students are given the better grade of the two; most score higher on the retake.

Labs are a crucial part of chemistry. Appropriate safety apparel is required. Students are asked to keep an old pair of tennis shoes in their locker and are constantly reminded to keep their goggles on. Lab partners are assigned and rotated each month. After the first rotation, students are then paired appropriately based on strengths and weaknesses.

By spring, the most challenging material has yet to materialize; however, students usually are restless by this point. To maintain their attention, mole bucks—small dollar bills with mole faces in the center—are used for extra credit on tests. To earn a mole buck, students must answer several questions correctly. The bucks may be used for one free test question and no more than one may be used per test. Students pay apt attention and often inquire about the number of bucks they've accumulated.

We do not give extra credit readily, but provide one project each semester that allows students up to 50 points on their lowest test (not to exceed 100 points). One way to gain extra credit points is to dress up like a mole on "Mole Day," October 23, to celebrate the standard unit of measurement and to correspond with  $6.02 \times 10^{23}$ .

The first semester we provide costume ideas and patterns for moles. This past year, one student came in dressed as the "Last of the Molehicans," wrapped in a blanket with a headband. One student dressed in all white as a "dental mo-

lar." For extra credit the second semester we ask students to create a chemistry magazine complete with articles, how-tos, jokes, recipes in metric units, and interviews. Students can work with a peer or individually and are limited only by their imagination and creativity.

We hope these classroom suggestions, garnered by us through the years, will help new teachers. Most importantly, however, we want new teachers to enjoy the ride! Teaching is incredibly rewarding and exciting—we speak from experience!

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### Reference

Talesnick, I. 1984. *Idea Bank Collection: A Handbook for Science Teachers*. Ontario, Canada: Science Supplies and Services Company, Ltd.