

Especially for High School Teachers

by Diana S. Mason

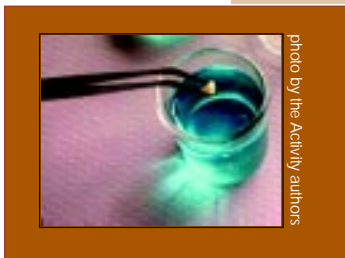


Preparing Students for Success

What role does the high school teacher play in preparing our students for success? “Most U.S. college students believe—mistakenly—that they are science literate. But they would like to have received more precollege math and science grounding, and they think that the next generation needs significantly better training.” (1, p 15). However, no single factor has been identified as a predictor for success of the undergraduate (2), and inspecting the non-success rates (grades of D, F, W) in university chemistry programs one might surmise that there is a disconnect between high school and college chemistry courses. In light of this observation, one must ask—what can secondary teachers do to bridge the articulation?

Nalley (3) reported that in the immediate post-WWII era, a teacher rarely had courses in educational psychology or multimedia, and formal training in science and mathematics was rare, but then came Sputnik and more emphasis on the study of science, mathematics, and engineering resulted. However, now these *then* well-trained teachers are retiring and as a result there is a “crisis in science and mathematics teaching” (3) making it even more important that current high school teachers play an important role in preparing the next generation for productive careers. Consequently, current teachers must take up the slack from the experienced teachers who are retiring. Ideas presented in this issue of the *Journal* may help you not only advance your students’ knowledge but also improve their retention.

Nameroff (p 993) reports that many high school graduates do not complete four years of college, but nearly 60% of them pursue some form of higher education. Chemical technician programs, like ChemTechLinks, provide students with the opportunity to pursue their interest in science and at the same time launch a career with potential for furthering their education and becoming a part of the workforce needed to solve many of the problems facing today’s world. The lack of success in freshmen courses is in part due to poor mathematics skills along with students’ failure to apply critical-thinking skills and appropriate problem-solving strategies. Lowered student performance between the first and second semesters of chemistry can be attributed to the requirement of more complex mathematics (p 987). The MAS intervention (pp 978, 1084) has a more noticeable effect on students at lower mathematics levels: these techniques can help to move students from an algorithmic-learning mode towards more conceptual understanding. The MAS technique and SATL methods (p 1078) both promote instructional approaches that stress a non-linear transfer method. Use of instructional analogies and active kinesthetic simulations may be ways to help students overcome vocabulary problems and lack of conceptual understanding that seem to prevent them from applying mathematical skills to chemical phenomena,



Secondary School Featured Article

- ▲ JCE Classroom Activity: #55. Diffusion of Water Through a Differentially-Permeable Membrane, by Maria Guadalupe Bertoluzzo, Fabio E. Quattrin, Stella Maris Bertoluzzo, Ruben Rigatuso, p 1032A.

such as stoichiometry (p 1021), and understanding important laboratory techniques, such as chromatography (p 1023).

Inquiry-based learning environments sometimes give students little time to experience following a predetermined procedure with an emphasis on precision and accuracy—the very skills that industry expects of their technicians

and scientists. Several developing partnerships (p 990) promote the association of high schools, two-year colleges, and universities for the purpose of providing an education that is career oriented and places great emphasis on laboratory instruction integrated with technology and technician programs (p 993). Reformed laboratories emphasize true discovery learning and also advance standards-based science investigations leading to marketable job skills. A checklist (p 987) is available that can be used by students to help them organize their thoughts in order to improve reporting of laboratory results, which is especially important to students who seek employment in industry. As science becomes more dependent on technology, students will be required to develop better writing skills and will need better guidelines for performing library research (p 1005).

Secondary students need to be introduced to the practical applications of modern technology (p 1015). Getting this knowledge into the classroom is going to require a major revision of the currently accepted pedagogy used to teach future chemistry teachers. However, the study of chemistry is the perfect vehicle for getting this change into the science education curriculum. One of the means to accomplish this will be to introduce preservice teachers to course content largely centered on using authentic, real-world, inquiry-based approaches to support higher-level learning.

ACS High School Day

Another excellent resource for experiencing innovative, proven classroom activities is the biannual ACS High School Day. This fall’s meeting is on September 7 at Cathedral High School in New York City. I hope to see you there!

Literature Cited

1. Wilkinson, S. *Chem. Eng. News* **2002**, *80* (21), 15.
2. Spencer, H. E. *Chem. Eng. News* **2002**, *80* (16), 2.
3. Nalley, E. A. *Chem. Eng. News* **2002**, *80* (20), 50.