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In the Classroom

Workshop Chemistry: Overcoming the Barriers to Student Success

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The message of the late 20th century is that chemists will have to work with skill and efficiency to attract support to their discipline.

Prevailing modes of instruction, often passive in nature, do not address crucial issues for student success in science: the need for students to become part of an intellectual community, the differences in the ways students learn, and the powerful role that mentoring can play in involving students in science. Furthermore, students who spend most of their instructional time listening to lectures seldom learn to communicate scientific ideas and to become part of a problem-solving team, skills that industry tells us are crucial to success in the workplace.

Workshop Chemistry is a peer-led team-learning model of instruction that provides an active learning experience for students, creates new leadership roles for those who have done well, and

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involves faculty in the process of reform. A modest reduction in lecture or recitation time is replaced by a two-hour student-directed small group problem-solving and model-building workshop.

The Workshop Chemistry Project is a coalition of faculty, learning specialists, and students from a variety of institutions organized around the theme of developing the workshop model as an integral part of the course structure. Several brief descriptions of the workshop courses offered in the Fall of 1995 are provided, along with some sample workshop problems. Surveys, focus groups, student logs, faculty interviews, and actual course results provide insight into the enhanced learning in the workshop and the progress of the project towards its goals.

I. Introduction

Everyone who teaches introductory chemistry classes knows how difficult it is to engage students with the material. We frequently lose students during these introductory course sequences; even many of those who finish the beginning courses in good standing later abandon the sciences.

The decision to drop out of the sciences, of course, is felt on an intensely personal level by individual students, but this falling away is not just a personal or local phenomenon. On the contrary, it is a problem of national scope [1], [2], [3]. Some may view this as a form of academic Darwinism, a beneficial way of locating those students who are the fittest for a career in science. Others are concerned about this problem, but find it difficult to overcome the enormous obstacles to change. These attitudes of apparent indifference or helplessness waste both resources and reputation; they are too expensive to be maintained. The message of the late 20th century is that chemists will have to work with skill and efficiency to attract support to their discipline. Some of that work begins in the classroom.

Chemistry teachers cannot afford to dismiss large segments of the student population. We need their talents in the field, and we also need their goodwill as students and, ultimately, as citizens. Tobias [1] defined one part of the problem; there is a group of capable students who are alienated by many aspects of traditional introductory science courses. Another group of students, for one reason or another, find it hard to learn chemistry. Many of these students are ultimately capable of doing good work, even though they are not ready to do so from the first day. We cannot afford to discard these students.