In the Classroom

Progress in Practice: Exploring the Cooperative and Collaborative Dimensions of Group Learning *

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If we want our students to achieve in a particular way and not in another, then the structure of the task plays a significant role.

We all participate in a variety of groups as part of our daily lives, from families to social and work communities. As chemists, we are part of our college departments, our professional societies, our research groups, and so on. In graduate and undergraduate school, some of us formed peer study groups in response to the demands of those other groups that we were a part of: our

* Individuals involved in curriculum design often introduce new, modified or applied ideas about instruction that range from classroom methods to philosophies of education. In this series, Progress in Practice, we will examine progress in chemical education that is related to practices, where many recommendations have originated from areas in higher education that exist alongside of and overlap with chemistry. Rather than an exhaustive review, we will select examples, background and vocabulary that may either invite interested newcomers to explore a different area in their teaching, or provide language and precedent for individuals who wish to contextualize ideas they have developed independently.

—Brian P. Coppola, Series Editor
formal courses. We know we are not unique in this. The popular culture, at least, is filled with portrayals of medical, law, and business students who must divide responsibility for learning a daunting amount of course material and who then teach one another as a part of their learning. Graduate research groups in chemistry are generally highly structured by their research directors where community issues are involved (group meetings and assignments, shared equipment, and representatives who obtain specialized skills such as crystallography or mass spectrometry), and move towards a less authoritative structure when developing individual initiative is the goal. Individuals depend on (and learn with) one another in all kinds of educational situations. In order to emphasize this idea, Bruffee [1] advocates the use of a phrase attributed to John Dewey: “living an associated life.” As Bruffee describes it, formal education in America has been based on a philosophy of associated learning since at least the time of Benjamin Franklin. We all live and learn in an associated way. Differences in interactions vary according to the nature of a group’s structure (and sometimes, although not as often, to an individual’s degree of dissociation from the group).

The current renaissance in promoting structured group learning as a part of formal post-secondary coursework in science is approximately 15 years old. It is an outgrowth of recommendations for engaging students in more “active” (as opposed to “passive”) learning environments [2], [3], [4], [5] as well as of a great deal of pioneering work done in undergraduate engineering education [6], [7], [8], [9] and in the precollege “Cooperative Learning” movement [10], [11]. Structured peer group work has been a constant feature in disciplines that involve a great deal of writing, where there is an expectation for students to learn from one another. Not surprisingly, chemists have a long tradition of designing group laboratory experiments for undergraduates [12], [13], [14], [15], [16], [17], [18], even if they are used infrequently and do not dominate laboratory textbooks in the same way that lists of individual exercises do. Before 1980, published examples of group work in chemistry lecture courses are rare, although noted educator Frank C. Whitmore described an example as early as 1925 [19]. The current cycle of designing and using group work is defined by the introduction of the terms collaborative learning and cooperative learning [1], [20], which have been embraced by individuals in and beyond the chemical education community [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36].

Neither “collaborative learning” nor “cooperative learning” are intended to be interchangeable euphemisms for “having students work in groups.” Individuals are still wrest-