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ACTIVITY SELECTION AND WRITING

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A good day of POGIL (or even an okay day of POGIL) accomplishes so much more in your classroom and program than even a great day of lecture!

—A POGIL practitioner of 15 years

The guided-inquiry activities used in POGIL classrooms are carefully designed to allow self-managed student teams to construct important concepts while the instructor is continuously monitoring student progress. In this chapter, we recommend when to use POGIL activities in your curricula, describe the elements of POGIL activities (learning objectives, models, learning cycles, types of questions, other common elements, and facilitation notes), suggest how to select activities for your students, and offer tips for writing your own activities. We weave several extended examples throughout the chapter, selecting details from them to illustrate each section's main points.

In POGIL, our goal as instructors is not to cover as much material as possible, but to ensure that students master the most important concepts and principles and practice relevant skills. A POGIL activity is not just a worksheet with a list of questions; it is a scripted experience, carefully designed to help students construct their own understanding.

POGIL activities can form a solid foundation for a

> natural critical learning environment: "natural" because students encounter the skills, habits, attitudes, and information they are trying to learn embedded in questions and tasks they find fascinating—authentic tasks that arouse curiosity and become intrinsically interesting; "critical" because students learn to think critically, to reason from evidence, to examine the

> quality of their reasoning using a variety of intellectual standards, to make improvements while thinking, and to ask probing and insightful questions about the thinking of other people. (Bain, 2004, p. 99)

POGIL activities also align well with many of Medina's (2008) evidence-based brain rules, such as "every brain is wired differently"; "we don't pay attention to boring things"; "repeat to remember (short term memory)" and "remember to repeat (long term memory)"; "vision trumps all other senses"; and "we are powerful and natural explorers" (pp. 49, 71, 95, 121, 221, 226). POGIL activities can often replace the "interactive direct teaching" Windschitl, Thompson, and Braaten (2018) identify as a core practice in the *Ambitious Science Teaching* pedagogy. Moving from dependence on teacher-centered direct instruction enables the teacher to monitor student learning and allows groups of students to work at their own pace (p. 156).

To use POGIL activities effectively in our classes, we must understand their structure, how to choose activities that match our educational goals, and how to write new activities. This process is iterative—students, classrooms, and institutions vary widely, and every time we use an activity we learn more about how it works and how to make it more effective.

> Knowing how the questions are structured from simple observation of the model to interpreting the model to applying the model allows me to use the POGIL models more effectively and assess my students' progress. I know when to ask observation-based questions and when to ask my students to apply their knowledge. Asking students to apply knowledge that they do not understand leads to frustration and a failed POGIL experience. Using the structure of POGIL activities to our advantage makes the experience more useful for all of us.
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> *—Sharon Cates; AP and Honors Chemistry Teacher; Capital High School; Boise, Idaho*

This chapter includes numerous examples from POGIL activities. Three activities, described next, are used as extended examples.

Classification of Matter (Trout, 2012) is an activity designed for middle school or high school students who are just beginning to explore the fundamental particles that comprise all of matter. It is a challenge for young adolescents to develop the concepts of *atoms*, *molecules*, *elements*, and *compounds* and to relate them to the umbrella term of *particles*. In this activity, students explore one complex model from several different perspectives, each time adding a layer to their growing mastery of the concepts.