PEER-LED TEAM LEARNING
LEADER TRAINING

LEARNING CYCLES AND PEER-LED TEAM LEARNING

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Peer-Led Team Learning (PLTL) encourages active participation and group interaction among students. In many cases, this interaction leads to greater conceptual understanding and helps students apply those concepts to new settings. Historically, instructors using PLTL would give students some general knowledge background, terminology, possibly some conceptual understanding, etc., and then allow students to develop a more thorough understanding of the concept(s) during PLTL workshops. However, an alternative use of PLTL would be as part of a *learning cycle*.

A learning cycle is a three-phase model of instruction (Lawson, *et al.,* 1989) that includes exploration, concept development/ term introduction, and knowledge application to new settings. This is drastically different from traditional methods that follow a model of inform, verify, and practice (Lawson, *et al.,* 1999/2000). For example, a traditional student laboratory experiment generally begins by telling students the concepts they will encounter. Often students are even told the probable outcome. Once the students have been told what to expect, they are given the opportunity to confirm the concepts presented earlier. This method of instruction requires little student cognitive effort because they already know what the outcome should be. The three phases of the learning cycle rectify this by challenging students to develop the concepts on their own. Although more rigorous for students, this method allows students to actively construct their own knowledge.

The first phase of the learning cycle is *exploration*. During this time students are usually given a question to answer. With the help of laboratory materials, students begin to generate data that will help them answer the question. Initially, these laboratory experiments are instructor-led (guided inquiry). As students become more experienced, student-led (open- inquiry) experiments in which students generate their own question and experiments can be used. After generating the data, the students attempt to make sense of the data by looking for trends or patterns.

As patterns are found, *concept development and term introduction*— the second phase of the learning cycle— can begin. PLTL workshops fit perfectly into the learning cycle in this phase. Data generated in the laboratory can be scrutinized and discussed with the group. Students can discuss patterns they found and generate possible reasons for these patterns. In some cases students may want to go back into the laboratory to test their hypotheses or to alter the experimental conditions. They will also be able to pool their group's data in order to develop a more complete picture of the experiment. By working together, students should be able to develop concepts that explain their experimental results. During this time, appropriate terminology is introduced. Notice that all students have had the opportunity to work through some experiments and discussion before terms are introduced. This is important because students now have an appropriate context for each new term. By the end of the

PLTL workshop, students should have moved from data generated in the laboratory to a level of conceptual understanding.

The educational experience does not end there, however. The student now moves into the third phase of the learning cycle, *knowledge application to new settings*. Instructors help students apply this knowledge by assigning homework, other labs, giving exams, etc. Students encounter slightly different problems and must use their new knowledge to work through them. At this time, the instructor can help to refine the student-generated concepts (if needed). This last phase is extremely important in science education. Many times students feel they learned or memorized a great deal of facts, but never understood how these facts all fit together. Knowledge application allows students to test their understanding of concepts in new or novel situations. As these new or revised concepts are linked to other mental structures, students will gain a richer understanding of the concepts presented, as well as an enhanced understanding of how these concepts fit together. As concepts fit together, the knowledge gained becomes more meaningful. By using learning cycles in this way,the laboratory is now directly linked to PLTLworkshops and lecture. Most importantly, students are active participants in the entire learning process. PLTL provides the perfect opportunity for students to move from data to conceptual understanding with the help of peer leaders. It is a win-win situation: Learning cycles can be enhanced by using PLTL workshops as a forum in which students can discuss data and develop conceptual understanding. PLTL can be enhanced through learning cycles by revising the traditional inform-verify-practice sequence to one which allows an inquiry approach to constructing meaningful understanding of scientific concepts.

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