

## CCI Recommends . . . Five articles on cooperative learning

Lord, T.R., *Cooperative learning that really works in biology teaching*. American Biology Teacher, 1998. **60** (8): p. 580-588.

A paper from a veteran instructor that clearly describes an excellent model for cooperative learning. Lord uses a five-step version of the learning cycle model in a large introductory biology course. The author discusses the characteristics of good vs. bad cooperative learning. Several examples of in-class exercises are described.

Lord, T.R., *101 Reasons for using cooperative learning in biology teaching*. American Biology Teacher, 2001. **63** (1): p. 30-38.

This paper summarizes results from numerous articles that collectively reveal that work in cooperative groups increases skills in science thinking and learning, improves attitudes about science, enhances the learning environment, aids grading, improves practical skills as well as reading and writing, promotes better social skills, enhances instruction, improves student values, models real world situations, and is equally successful for both men and women.

Macdonald, R.H. and L. Korinek, *Cooperative-learning activities in large entry-level geology courses*. Journal of Geological Education, 1995. **43**: p. 341-345.

Small-group cooperative learning activities were used to promote learning in introductory geology courses with 50-100 students. Think-pair-share activities, free-writing exercises, and minute papers are discussed. Base building strategies had students learn about each other early in the course. Student groups that mixed academic level, gender, and experience, worked better than groups based on alphabetical order.

Paulson, D.R., *Active learning and cooperative learning in the organic chemistry lecture class*. Journal of Chemical Education, 1999. **76** (8): p. 1136-1140.

Active learning classes were divided into groups that were randomized by ethnicity, gender, and previous chemistry GPA. Students worked together in classes in 5-10 minute segments with followed by discussion. Un-graded minute paper assignments are used to determine student understanding of material.

Williamson, V.M. and M.W. Rowe, *Group problem-solving versus lecture in college-level quantitative analysis: The good, the bad, and the ugly*. Journal of Chemical Education, 2002. **79** (9): p. 1131-1134.

A traditional lecture was replaced with a cooperative group problem solving. Student groups based on thinking skills (TOLT, Test of Logical Thinking) and gender. Group discussions involved solving problems. Groups had to continue discussion until all group members could understand the correct answer. Group work produced higher grades and less student attrition. Students in the group class had better rapport with instructor, were more willing to ask questions, and visited prof's office hours more frequently. Weaker students stated that they might have dropped the class without the groups.