

Cooperative Learning: An Integral Part of Mechanical Engineering Technology Curriculum

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Abstract

Students are confronted with an enormous amount of engineering content during their course of study. Due to the tremendous amount of pressure placed upon performance in the way of grades, students often look for ways to “cut corners” or do “just enough” to get a decent grade. Students will only learn to master engineering concepts and become better problem solvers through the development of higher order thinking skills. This current work employs cooperative learning methods, which encourage the use of small student work groups that collaborate in order to improve their own learning skills as well as the skills of other students in the group.

Student study sessions, which met for 1 hour per week, were developed. During the sessions, students learn to build effective problem solving strategies. A major goal of these sessions is to shift the focus from problem specific calculations that only help students solve textbook problems to methods and procedures that help students develop the ability to apply appropriate engineering concepts and principles to a wide range of problems. Attendance was taken at each session so that a comparison of homework assignments and exams could be made throughout the semester and used as a quantitative assessment of the student’s problem solving skills in order to evaluate the effectiveness of the problem solving sessions.

Quantitative differences in performance on exams and homework problems as well as significant improvements in class participation were among the major outcomes of the study sessions. Multivariate analysis was used to analyze the data related to the dependent variables of student achievement and retention of information.

The research and anecdotal evidence of this study support the effectiveness of cooperative learning which appears to be a promising method for the development of higher order thinking skills in undergraduate engineering students.