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# COLLABORATIVE LEARNING IN GENERAL ENGINEERING COURSES

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## **Collaborative Learning in General Engineering Courses**

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### **ABSTRACT**

There has been a paradigm shift in the process of hiring engineers for positions in both manufacturing and service sectors. A decade ago, engineers were hired on the basis of their attitude, aptitude and their acquired skills in engineering design and analysis. However, in today's global marketplace, engineers have to face behavior- based interviews in which they must be able to present their past tasks, achievements and results. What graduates can do and did in the past is often used to predict their future performance and behavior.

On the basis of feedback from human resource personnel and managers in industry, engineering and technology programs are emphasizing not only cooperative education experience and internships, but also are increasing active learning opportunities for students in classrooms. Active learning activities in a classroom engage students in the learning process. In active learning, students learn basic engineering design and analysis concepts through individual or team activities. These activities must be designed by faculty, so that they can bring their industrial experience into the classroom and create opportunities for students to think, apply concepts and to solve real-world problems. This definition may include traditional activities such as homework, but in practice active learning refers individual or group classroom activities that enhance student engagement in the learning process. Active learning is usually used with the traditional lecture where students passively receive information from the instructor, but a part of each class period is devoted to active learning activities. Such active learning approaches are also known as blended learning methods.

Most students in a class benefit from active learning via problem-solving, cooperative learning, or service-learning activities as demonstrated through an increase in student engagement and retention of lecture concepts or improve students' time on tasks, motivation to learn, interpersonal relationships, and self-expectations for future growth. Some very high achieving students may not benefit directly from such active learning activities, but they will benefit from teaching and helping others in the active learning activities in the classroom.

Collaborative learning can refer to individual or team learning activities in a classroom with the instructor or student-peer assisting in the learning process. At UW – Platteville, funding was provided in spring 2013 for peer assisted learning (PAL) student help in engineering courses. This paper and presentation focus on the author's experience in using collaborative learning activities in a two-credit dynamics course at the sophomore level. The instructor uses cooperative learning and problem-based learning activities in senior level courses and that will be the focus of future presentations. In cooperative learning, students pursue common goals while being assessed individually.

The collaborative learning in an introductory level engineering course are listed and discussed. The author lists his motivation for using collaborative learning in the introductory level engineering course: reduce the number of students dropping the course, increase participation by students in learning the basic concepts, improve performance of students in tests, and develop an appreciation for mathematical models before the models are applied to solve complex problems.

Collaborative learning activities determined 20% to 30% of the students' grade in the courses taught by the author in spring 2013. The last part of the presentation will deal with how collaborative learning activities were included in a general engineering course. Student feedback about the collaborative learning activities will be presented.

#### **REFERENCES**

1. PRINCE, M., 2004, Does Active Learning Work? A Review of the Research, *Journal of Engineering Education*, 93, (3), 223-231.