**Value of Co-Teaching, Project-Based Learning, and Common Communication for**

**Teaching Sustainability to an Interdisciplinary Class**

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Teaching sustainability to students from different disciplines requires new approaches to course planning, lesson planning, pedagogy, student expectations, and assessment. In the past five years I have had a small amount of experience in each of these areas through the delivery of three different courses. In addition, I have co-authored papers assessing the approaches and presented them at the American Society for Engineering Education (ASEE) annual conferences since 2008. The purpose of this essay is to pull from these past experiences to highlight techniques that succeeded, identify techniques that failed, and reflect with my current insight. Given my engineering disciplinary focus (although all interactions described below are interdisciplinary), the essay is written from the perspective of engineering educator.

Interdisciplinary teaching and learning of sustainability topics is enhanced through co-teaching. And a key element is the involvement al instructors in the planning of the course and lesson activities. I have co-taught three courses and in each case the interaction with my partners was essential in creating a course plan that could appeal to a broad audience, represented our collective teaching styles, and provided a coherent sequence of topics and lesson activities for the students. In all courses classroom activity has included significant discussion time and this is where the co-teaching is essential to an interdisciplinary set of students – to provide them role models of disciplinary people going beyond their discipline to take a fresh perspective and appreciating the perspective of others in different disciplines. This is especially essential if the disciplines of the students are disparate (engineering, science, humanities, and social sciences) where pre-conceived notions of the other majors inhibits respect/value of opinions initially.

Teaching sustainability to an interdisciplinary course is enhanced with project-based learning. My experiences of interdisciplinary teaching have included both project-based learning experiences and traditional classroom activities. Using projects enables the instructor (or instructor team) to set the scope of the projects to require a range of disciplines to illustrate not only real-world projects, but also the value of other disciplines. I have found students will learn well from each other (even from disparate disciplines) if there is a project integrating their efforts. Sustainability projects come in many shapes and sizes but the need for a range of disciplines can nearly always be found. Finding ways to integrate engineers with natural scientists with social scientists is a challenge, but accomplishing it with a project-based experience has worked well for me.

Establishing a common language and expectation level is essential for teaching sustainability to an interdisciplinary group. I have students from different disciplines and from different backgrounds will entre and have different thoughts on what is the expected workload, what is the expected quality of work, and how they communicate their thoughts. It is important to bring the entire class to a common ground and the key is communication from the instructors to set the course expectations. The instructors must role model working through communication and perspective differences. The instructors must make explicit the expectations and continuously reinforce them. And the instructors must work with students to prepare homework and project submittals to match a common structure that meshes the different disciplines and forces students to incorporate approaches and ideas from different disciplines.

Overall, I have found a key element to effective teaching of sustainability to an interdisciplinary group is to be extremely adaptive and adjust course content, teaching techniques, and expectations as the course progresses. I have rarely had to do this for a Civil Engineering course, even when offered for the first time. But I have had to do it for my interdisciplinary sustainability courses, even those that I have taught multiple times.