

In Summer 2003 I piloted two day-long workshops, under the rubric of “The Social Consequences of Design: Requirements and Trade-Offs in Large-Scale Engineering Projects,” within an REU co-curriculum demonstrating the applicability of the systems engineering (SE) paradigm in a societal context. The first centered on water remediation projects in South Florida, the second on the destruction of the World Trade Center.

The SE approach to problem-solving is to develop an analytic and strategic framework by synthesizing approaches from a range of fields and identifying the optimal means to arrive at a solution. The workshops allowed students to explore non-trivial, open-ended engineering problems; to work in small teams with REU colleagues with different backgrounds, interests, and research projects from their own; and to enable them to engage social and scientific problems in a systems engineering context.

Because my own background is not engineering but the humanities, foregrounding complex social issues was a more authentic way for me to introduce a discipline that I understand conceptually but in which I lack technical knowledge. Because the problem statements were open-ended, they were not true case studies, but reflected principles of Problem-Based Learning (PBL); the exercises to address the problem statements focused on developing ways to communicate critical scientific information to groups of people whose needs and interests were not the same as the engineers’.

There was 100 percent participation, and all students were fully engaged throughout. In the first, even though one team offered a silly strategy (involving

training alligators as enforcers) for meeting homeowner resistance to a proposed condemnation of their land, even this was an opportunity for students to look at their own bias: people are simply a nuisance to be disposed of as efficiently as possible. It was easier to engage undergraduates in self-reflection while they were laughing and having fun, rather than remonstrating with them and calling them to order; although some would have preferred that I impose more structure and discipline, I believe genuine learning took place. In their evaluations, the students recommended repeating both workshops, with refinements, and adding a third on the Columbia disaster.