

I must confess at the outset that these are not the words of an experienced and wizened professor of engineering and the geosciences, but rather the observations of an aspiring educator who has just finished teaching their first full class. While I have taught lab sections of various engineering classes, and had some opportunity to study learning theory, I will keep my remarks accordingly brief.

Engineering students, generally speaking, are motivated to learn any topic or subject they believe will be useful to their career goals. As a life-long student myself, this seems to be more true in engineering than in some other disciplines with which I am acquainted. We as instructors within the engineering sciences, however, often come to class with somewhat more formidable learning objectives than in other departments, particularly at the undergraduate level. I use an initial assessment of the students to give a gauge of both motivation and prior knowledge, and to give them an idea of the direction and breadth of the material to be covered. Because people tend to learn most effectively through a variety of routes, and because issues related to the acquisition and retention of complex engineering concepts are crucial to society and to the students, it seems advantageous to use any tools that foster and maintain interest. (To be honest, I also find it irritating on a personal level to look out over a bored or sleepy class, but it's easy to remind myself that this is a clear indication of failure on the instructor's part.)

To that end, I try to incorporate within lecture material: visual, auditory, and when possible, tactile elements. My experience is that this is fairly standard within engineering and the geosciences. Individual and small group projects often provide a mechanism for assimilating conceptual material into solid hands-on investigations. I include several such efforts within a course, starting with somewhat straightforward projects, usually on an individual basis, and progressing to team projects that involve more in-depth research, the synthesis of integrated or related concepts, and if at all possible, elements of design or decision making for specifications based on the best available real-world data.

In so far as the integration of geosciences and engineering, the relevant subject I am teaching, "Materials and the Environment," necessitates examining the relationships between hydrology, mining, energy, atmospheric science, materials science and economics. The Industrial Revolution has shifted the use of materials from almost entirely renewable resources to nearly complete reliance on nonrenewable resources, both in terms of energy and raw materials. Most of these feedstocks are derived from ore bodies, with reserve and resource bases playing critical roles in mankind's future, as well as implications of resource extraction affecting water and air quality. Although the integration of these related subjects is implicit, I am hoping to gain insights during the workshop on innovative mechanisms for presenting and teaching this topic.