

Dan Morgan

## Teaching from multiple perspectives

“Like most North Americans of his generation, Hal tends to know way less about why he feels certain ways about the objects and pursuits he's devoted to than he does about the objects and pursuits themselves. It's hard to say for sure whether this is even exceptionally bad, this tendency.”

- David Foster Wallace (1996)

“Crazy kids on the loose, but on the loose in the wilderness, and that made all the difference.”

- Terry and Renny Russell (2001)

My approach to integrating engineering and geoscience is influenced by the above quotes, by David Orr's perspectives about teaching [e.g. “What is education for?” (1991) and “The problem of education” (1992)], and my training in geology and life cycle assessments. These influences help me think about issues on multiple timescales, to think about the role of humans in earth systems, and to consider the effects of these issues on real communities.

It is easy for a geologist to be flippant with the concept of sustainability. When viewed over the long term, we can recognize that people will not be able to “destroy” the planet, just as we will not be able to “save” it either. I suspect that many geologists would consider themselves environmentalists because we tend to value the natural world highly, but I think that many geologists would consider environmental issues to be mainly about self-preservation. Viewed in this light, pollution and over consumption are issues simply because we plan poorly for the long term.

The long-term perspective is something that I really appreciate in geology because it helps me think about the consequences of my actions past the here and now. But I often feel like it does very little to address the issues that need to be solved on shorter timescales to ease human suffering. My experience with life cycle assessments trained me to think about the consequences of our actions today, and how we can improve those impacts now to improve conditions. This training in engineering helps me consider how we design, build, use, and dispose of materials on a human timescale. To me, one of the important aspects of integrating engineering and geoscience is the blending of the timescales that we consider.

One of my favorite thought questions to ask my students in class is paraphrased from Robert Heinlein (1988): what's the difference between a dam built by a beaver for beaver purposes and a dam built by humans for human purposes. In my teaching, a fundamental goal of education is not simply literacy in a subject area; the goal is to become responsible citizens who will use their increased knowledge with an awareness of how it affects real communities. I am influenced by David Orr and the quotes above because I am concerned that students are too concerned with learning only what will be on the test, and not how this information plays out and affects communities. I believe it is important for students to understand that humans can affect earth's systems. This doesn't mean that I am trying to impart a certain morality upon my students, but that they do think about why they feel certain ways, that they look at issues from multiple perspectives, and that they learn how to think critically. Gaining perspective by getting out into the wilderness helps us consider the role that humans play in earth systems.

When I teach the introductory geology class, I am always trying to make sure that my students understand the applications of what we're learning so that they can see how it directly affects human lives. Many of my students will never take another science class, so it is imperative to me for them to recognize how science and engineering affect their daily lives. Thus, one of my teaching goals is that students who are successful in my classes know how to apply the scientific method to break down complex problems into measurable parts so that they can think of critical and creative solutions to any problem they may encounter in life.

I would like to incorporate more examples from contemporary life into my teaching so that I can demonstrate the impact of geology on our lives more acutely. This is where I can see a real need for me to learn more examples from engineering. In addition to the introductory geology class I teach, I also teach a structural geology course and it would be very useful to incorporate more examples of how materials break and deform from this literature. I think giving my students more examples from engineering would help them recognize the impact that these topics have on real communities.

### **Works Cited**

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