

Do We Have a 20th or 21st Century Curriculum?

Two of the most pervasive reform movements in higher education are the establishment of formal program review processes and the regular reporting of metrics assessing student learning. In a very general sense, these activities are designed to serve as quality assurance programs. While implemented by university administrators, they have their origin in the activities of state legislatures and boards of higher education. While the growing list of evaluative tasks assigned to academic units can, at times, seem a waste of time, they do provide an important opportunity to think creatively about the ways in which we teach geology.

The American Geological Institute collects data on student enrollment in the geosciences and has reported a steady decline in number of undergraduate students and number of undergraduate degrees granted over the past 8 years. What are the origins of these declines? Without a doubt a changing economy and the decline in minerals and petroleum exploration play a major role. I would, however, suggest that at least some of this change is not driven by external factors but rather is self-induced. What are the factors that draw students to select a major? Clearly, future employment is critical to a student's decision; yet equally important is the attractiveness of the subject matter. Geology, I contend, has one great strength in this area and a critical weakness.

A unique aspect of geology, when compared to other disciplines, is the historical context of our science. At its core, geology is concerned with the integration of physical and chemical observations with an understanding of the temporal laws of geology to create a historical interpretation of a region. Linking together regional studies creates a history of the Earth. The fact that the Earth has a history, and that its history can be understood by the study of the rock record is, in my mind, the most fascinating part of our science. Students are easily excited by this concept and can be drawn into richer understandings of geological materials and processes in order to expand their ability to interpret Earth history. This activity, so central to our science, is not a central component of most undergraduate curriculums. Rather, students move from one traditional course to another: physical, mineralogy, petrology, sed/strat, structure, paleontology, and then a variety of courses with more limited scope, hydrology, geochemistry, solid earth geophysics, geomorphology. At the end of their studies, students have learned a great

deal about a large number of geological details, but have they lost the excitement and enthusiasm that drew them to the subject initially? I am convinced that an undergraduate curriculum firmly grounded in the integrative activities of establishing Earth history will provide students with both the essential academic rigor as well as a dynamic and exciting environment for learning.

Technological advance is driving the modern economy and is a pervasive aspect of our students' lives. How well have geology curriculums responded to changing technology? As the total number of students studying geology (as well as the other sciences) has fallen significantly over the last decade an additional problem has developed. Geology departments are forced to participate in ever more intensive competition for smaller numbers of highly skilled students. How do we attract the best students to our programs? Again, I am convinced curriculum reform is the answer. Skillful students will be drawn to what they perceive to be the most advanced subject areas. Those programs that offer the students opportunities to use advanced technology are the ones most likely to attract the best people to their profession. GIS and GPS techniques must become integrated throughout the curriculum. Advanced digital field techniques, including simulation, imaging, and analysis are essential. How can network-linked PDAs be used in the field? In short, our courses must continually strive to put the most advanced technologies in the hands of students at the most introductory levels. Only then can we hope to draw the most skilled students to our programs.

As I have in the past, I again call for those departments that have undergone significant program review and curriculum reform to submit manuscripts describing their activities. Likewise, I am extremely interested in manuscripts describing the integration of advanced technology into the field and classroom. Naturally, such papers must include a meaningful assessment of student learning. Finally, I call for a national discussion of the undergraduate geology curriculum. Are we still teaching in the 20th century - or have we taken a step into the 21st?

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