

Steps towards Creating an Engaging Earth Science Curriculum

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When I teach I strive to “put the phenomena first” and to “put observations before explanations” I do this not because I want to, but because I have found it to work. Initially in my teaching I stressed the understanding and appreciation of the basic physical and chemical processes which underlie the workings of the Earth, unfortunately this approach did not get me far with community college students. Eventually by trial and error I found it important to describe what I was explaining before explaining it. In retrospect this is less than surprising, but at the time it was an important realization to me! I have found students to be more likely to ‘bite’ and engage in learning if I begin with specific examples which are accessible and relevant to the students. My goal in teaching is to engage students in learning about the Earth, to make science accessible and to provide a solid foundation for those students interested in pursuing earth science careers. To achieve these goals I find myself reorganizing courses around engaging accessible and relevant topics. I begin G201 Physical Geology with the eruption of Mount St. Helens, not mineral structures as the text would have it. I begin G202 surficial process with the Missoula Floods, not landslides as the text would have it. I begin G203 historical geology with the Younger Dryas impact hypothesis not the Archean as the text would have it. I begin GS108 Oceanography with coastal processes along the Oregon shore, not plate tectonics of the sea floor as the text would have it. In each case the texts’ initial topics, which are typically abstract and far from the students’ daily experience, are replaced by topics which are more relevant and accessible to the students. The first quarter or so of each course is spent exploring these topics and building up the earth science knowledge required to explain them. This creates challenges in that additional prep time is required to develop well researched initial case studies and that the course structure no longer matches the structure of the text. To keep my teaching accessible I minimize vocabulary and calculations as much as possible. In place of having the students learn disarticulated flash card factoids I stress the development of explanations which ‘connect the dots’ and test the students’ ability to do this by including written response questions in my tests. I have not found a way to successfully minimize quantification. In general each course I teach includes one or two labs which are largely quantitative in nature and these labs ‘trip up’ the third or so of my students which are poorly prepared in math and/or have math anxiety. A further challenge is to increase the relevancy of my courses by thoroughly integrating hazards, resources and global change into every topic rather than leaving them relegated to the ghetto of the penultimate and ultimate chapters as is common in most earth science texts. Also important to student success are field based and independent research learning experiences. I was instrumental in rewriting course level learning outcomes for geology and general science courses to include field based learning. All my courses include some sort of field based learning component and I have reorganized my teaching load so that I will be able to teach a one unit field methods class each quarter during the 2013/2014 academic year. I have worked with the UCORE (Undergraduate Catalytic Outreach & Research Experiences) and IDES(Increasing Diversity in the Earth Sciences) programs to provide students with mentored off campus independent research experiences, and have had some of these students return to my classes to share their experiences and encourage further student participation in these programs. This year I created an independent study courses in geology which will be available to student for the first time next academic year. An upcoming challenge is to create low barrier to entry research experiences which can be incorporated into my courses and hopefully provide gateway experiences to independent study. As always a further challenge is to institutionalize these curriculum improvements in such a manner that they are accessible to part-time faculty. At this time I find myself strongly favoring learning experiences which stress depth over breadth but am challenged in implementing them.