

Importance of role models, introductory courses, and outreach to increasing the number of majors in geosciences

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Many of us have likely had experience with the following ideas and strategies for increasing the number of geosciences majors in our programs and increasing the diversity of our undergraduate students. Although I don't have hard data to demonstrate effectiveness, I believe that the strategies described below "make sense" and can have significant impact; and there is some anecdotal evidence of their effectiveness.

Importance of role models: The faculty of the Department of Earth, Atmospheric, and Planetary Sciences (EAPS, <http://www.eaps.purdue.edu/>) at Purdue University currently consists of 39 professors (12 are joint appointments with other departments on campus) of whom six are women, two are Native American, and one is African-American. A little over a decade ago, the department had (temporarily) no women faculty members. The impact of role models has been important in attracting women undergraduate and graduate students and is evident in the number of students who choose to work with the women professors. Also, the department's percentage of women undergraduate students has increased from 27.2% in 2009 to 39.1% in 2014. The impact is also evident in students who work with the other URM faculty members in the department. The University has had Sloan Foundation funds for many years to attract and support Native American graduate students and several have completed programs or are currently enrolled in our program. We have also observed that the existence of a "critical mass" of URM faculty is important in recruiting new URM students and faculty members to the department. The university has been very receptive to dual career hires, and eight EAPS professors (current or recent faculty members) have been hired, including a spousal hire, within our department or in other areas of the university. The dual career hires have been important in attracting URM faculty members in EAPS. Another area of impact of role models in our department (which is likely similar to many other programs at other colleges and universities), is that we have an alumni advisory committee that meets with the department about twice each year. In addition to the important feedback and recommendations from committee members, the committee membership, with a diverse group of former students, is an opportunity to highlight the success of minority alums which impacts our current students who also help the department recruit future students.

Introductory geosciences courses: Another program characteristic that can attract geosciences majors is effective introductory courses. Almost all geosciences programs at U.S. colleges and universities include introductory courses. Some of the introductory courses are intended for majors and some are courses (we describe them as service courses) that help larger numbers of undergraduate students meet a science course degree requirement, or that simply attract undergraduates as an elective of interest in their academic program. Generally, a very small

percentage of students in the service courses are attracted to the department as majors. This situation is often due to the fact that most students in these courses have already selected a major (some enroll as juniors or seniors because they delayed taking their science requirement, and have selected the geosciences in preference to physics, chemistry or biology), and are enrolled in the course to complete a science course requirement. This result (very few majors recruited from introductory courses) can be discouraging to faculty teaching these courses and to the department (and to deans). However, there are significant benefits to having quality introductory geosciences courses that enroll large numbers of students. Firstly, the courses are an opportunity to engage a large number of students who, as members of the public and future leaders, will be responsible for important decisions and policymaking related to societal issues that are fundamentally geosciences – including energy, resources, environment, and natural hazards. Using these and other topics, we can illustrate that the geosciences are interesting and an important part of their daily lives. Also, public understanding, knowledge and appreciation of these subjects, and other areas of the geosciences, are important to the world and to the future of the geosciences. Secondly, if these courses are effective and relevant, the students that are currently enrolled may recommend the courses to their fellow students resulting in increased impact and greater potential for attracting future majors. Thirdly, some of the students in these courses will likely be future teachers, so providing them with geosciences background and knowledge may impact their future teaching and eventually lead to increased interest in geosciences and numbers of majors in our programs. Finally, the large introductory service courses often include significant numbers of international and minority students (may be a reasonable “cross section” of the student population at our institutions), so the courses are an important opportunity to engage these students in the geosciences and attract majors.

Of course, outreach to students, K-12 teachers and the public through formal outreach programs, attractive displays and museum content within our departments, and Internet home pages are useful in enlarging the audience and enhancing our message.