Instructional Practices in Introductory Geoscience Courses: Results of a National Faculty Survey (ED41A-0242)

R. Heather Macdonald, College of William and Mary, Department of Geology
Cathryn A. Manduca, Carleton College, Science Education Resource Center
David Mogk, Montana State University, Department of Earth Sciences
Barbara J. Tewksbury, Hamilton College, Department of Geology

Introduction

The NAGT Teacher Salaries Development program On the Cutting Edge recently surveyed all geoscience faculty in the United States to develop a snapshot of current instructional practices in undergraduate geoscience courses, faculty strategies for learning new content and new teaching approaches, and faculty involvement in the geoscience education community. The Statistics and Research Center of the American Institute of Physics developed the survey instrument, administered the survey, and did the initial analysis of results. We received 2207 responses, a response rate of 39% based on 5700 initial requests.

We asked respondents to describe methods in a specific course or courses for which they were responsible. The survey data contain substantial evidence that engaging their students in learning, problem solving, and higher level thinking. Papers are widely-employed in introductory courses and their use in large introductory courses is notable. The primary literature and in interpretation of data to address these problems. Most faculty appear to be engaged in trying techniques beyond lecture to engage students in learning.

While lecture dominates undergraduate geoscience teaching, the data indicate that most faculty incorporate some interactive activities into the lecture portion of the class. Although faculty who teach large introductory courses use interactive techniques much less frequently than faculty who teach smaller courses, we are struck by the number who do use what many consider to be “impossible” techniques in large courses. Of those teaching large classes, 55% use all-class discussion at least once a term, 52% use in-class exercises at least once a term, and 17% even use classroom debates and role-playing at least once a term. In many cases, these activities are not reported as a regular part of students’ classroom experiences suggesting that while faculty are aware of these techniques, they are facing barriers to widespread incorporation in their teaching.

Conclusions

The survey data contain substantial evidence that faculty are implementing creative solutions to engage their students in learning, problem solving, and higher level thinking. Papers are widely-employed in introductory courses and their use in large introductory courses is notable. The use of problem solving, including activities that address problems of local, national, and global interest, suggests that faculty understand that students are motivated to learn by real world problems. Faculty engage students with the primary literature and in interpretation of data to address these problems. Most faculty appear to be engaged in trying techniques beyond lecture to engage students in learning.

On the other hand, there is room for growth. Most faculty are still experimenting infrequently with these techniques. These results strongly support the continued offering of professional development activities that both bring new ideas to faculty and address the practicability of widespread implementation of these techniques.

For more information about On the Cutting Edge visit
http://serc.carleton.edu/NAGTWorkshops

Columns are grouped in fives, and indicate the following classes for all strategies: 1: Small Introductory Class (30 students or fewer), 2: Medium Introductory Class (31-80 students), 3: Large Introductory Class (91 students or more), 4: Small Majors Class (30 students or fewer), 5: Medium Majors Class (31-80 students), 6: Large Majors Class (91 students or more), 7: Sm. Intro, 8: Med. Intro, 9: Lg. Intro, 10: Sm. Maj., 11: Med. Maj., 12: Lg. Maj., 13: Other.

Types of courses are organized as follows: faculty were asked to indicate the percentage of courses in which students experience different types of teaching methods, activities, or assessments.

What courses are Geoscience Faculty Teaching?

What teaching methods are faculty using?

What kinds of assessment strategies do faculty use?

What kinds of activities do faculty ask their students to do?