



The Role of Geoscience Departments in Developing the Earth Science Teacher Workforce: A Workshop Report

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Geoscience Departments as Partners

Currently our nation is facing a shortage of teachers who are well-qualified to teach Earth Science. Geoscience departments have an important role to play in meeting this challenge. Last spring 20 geoscience faculty came together with faculty and administrators from schools of education and current teachers teaching Earth science in elementary, middle and high school settings to discuss the ways in which geoscience departments can assist in the development of teachers well-prepared to teach Earth science. The workshop was sponsored by the American Geophysical Union and the National Association of Geoscience Teachers and funded by a grant from the National Science Foundation. Further information is available on the workshop website.

What is the Problem?

We know that content knowledge is important, however

- 79% of high school earth science students and 93% of middle school physical science students are in classes taught by teachers lacking a major or certification (SASS 1999-2000)
- The number of new high school Earth Science teachers increased by only 632 between 1990 and 2000. Physics teachers increased by 1783 and biology by 4700 (quoted by Bob Ridky-USGS)

Introductory Geology: A Major Source of Content Knowledge

Introductory courses play a particularly important role in the preparation of future teachers. Joan Prival (NSF) reminded workshop participants that teachers teach as they were taught. Thus strong pedagogy in these courses is particularly important. In addition to strengthening the pedagogy in introductory courses in general, workshop participants discussed alternative models for introductory courses for teachers:

- Separate courses designed specifically for pre-service teacher—these may be smaller sections that employ a range of teaching methods, they could be linked to courses in educational methods, or they could include linked discussions of content and teaching.
- Supplementary instruction for pre-service teachers—employing either a lab section or a shadow course, future teachers could receive additional instruction designed to convey best practices by teaching inquiry, constructivist theory, meta-cognition, pedagogical reflection, and other techniques that students could in turn use in their own teaching.
- Courses designed for elementary education students that take an integrated science approach. The strength of this approach is that it reflects the way elementary science is taught and builds connections between the disciplines.

Other Important Roles

Workshop participants discussed several other ways in which geoscience departments can be particularly helpful in preparing or supporting future teachers.

- Recruiting, mentoring and advising future teachers
- Providing research and teaching experiences for future teachers
- Developing strong links between education and geoscience departments
- Supporting alumni in the teaching profession

Suggestions in each of these areas are provided on the workshop website.

Keys to Success

Drawing on her experience with the Centers for Excellence in Teacher Preparation, Joan Prival at NSF offered these characteristics of successful programs.

- Collaboration among STEM and Education faculty
- Involvement of two-year colleges
- Multi-faceted collaboration between institutions of higher education and K-12 schools
- Reformed content and methods courses
- Integration of technology
- Faculty development and in-service teacher professional development
- Recruitment/future teacher conferences
- Mentoring
- Early field experiences in schools
- Research experiences
- Support through the transition from school to work

Workshop participants provided essays describing their programs which contain examples of these critical ideas.