
Examination of the Geoscience Workforce Supply Dynamics

Leila Gonzales and Christopher Keane

American Geological Institute, 4220 King St., Alexandria, Virginia 22302-1502

EXTENDED ABSTRACT

Current demographic trends within academia, government, and industry show a distinct shift towards an older workforce, of which half is within 15 years of retirement, with a smaller cohort of younger professionals poised to move into these positions. The exit of experienced geoscience professionals juxtaposed against the small annual influx of new geoscience graduates is cause of great concern not only because supply falls short of current and projected demand, but also because of the loss of technical experience and knowledge transfer between the exiting cadre and the new and future generations of geoscientists.

In this presentation, we explore the changing age demographics within the geosciences, and examine trends in gender parity and minority participation in geoscience university degree programs and in the geoscience profession as a whole. We also look at the globalization of the geoscience workforce by examining the percentage of geoscience Master's and doctoral graduates who are non-U.S. citizens.

Workforce Supply and Demand Trends

The U.S. Bureau of Labor Statistics projects an overall 19 percent increase in all geoscience-related jobs between 2006 and 2016, which is 9 percent faster than the growth rate for all U.S. occupations. When replacement for attrition is included in these projections, the expected vacancies for all geoscience-related jobs becomes 31 percent. Additionally, salaries for geoscience occupations will outpace all other life, physical, and social science occupations (Gonzales, 2009).

Despite the high demand and excellent salaries in the geosciences, there has not been a parallel sustained increase in enrollments and degrees at U.S. university geoscience programs. Geoscience enrollments at the university level have averaged 20,000 per year for undergraduate students and 10,000 per year for graduate students since the early 1990s (Keane, 2009). Furthermore, the average number of degrees conferred per year from U.S. institutions has also remained steady at about 3,000 per year at the bachelor's level and about 1,700 per year at the graduate level since 1995 (Keane, 2009).

Whereas the recruitment of students into geoscience programs at universities is an area of concern, another major concern is the profession's retention of geoscience graduates as they transition into the workforce. Data from the National Science Foundation's 2006 Scientists and Engineers Statistical Data System (SESTAT) database (National Science Foundation, 2006) indicates that although the majority of geoscience graduates work within science and engineering disciplines, only ~30 percent of all geoscience graduates work within their core discipline area. Furthermore, approximately 20 per-

cent of all geoscience graduates work outside of science and engineering disciplines. In closer examination of these trends, the percentage of geoscientists who work within their core training area increases by degree level (Bachelor's, 21%; Master's, 37%; and Ph.D., 54%) while the percentage of those who work outside of science and engineering disciplines decreases by degree level (Bachelor's, 49%; Master's, 25%; Ph.D., and 12%).

Diversity in the Geosciences

The current and projected shortfalls in the geosciences are extenuated by the under-representation of women and minorities in the geosciences profession. In order to attract not only sufficient quantities, but also the best quality of future professionals, the geosciences must move rapidly towards successful recruitment and retention of all ethnic and gender groups to near whole-population levels. Though the geosciences have shown marked success in the recruitment of women as geosciences majors in recent years, under-represented minority participation and overall retention remain critical issues.

According to the U.S. Census Bureau's national population projections (U.S. Census Bureau, 2009), women comprise 51 percent of the population, and under-represented minorities, who currently comprise 30 percent of the U.S. population, will account for 45 percent of the national population by 2050. In order to tap into this diverse pool of talent, the geosciences will need to increase the percentage of women and under-represented minorities who enroll in and complete geoscience degree programs and who work in the geoscience profession.

At the university level, women comprise 58 percent of the student body whereas under-represented minorities comprise approximately 22 percent. In geoscience programs, however, women comprise approximately 43 percent of geoscience graduates and under-represented minorities comprise approximately 6 percent of geoscience graduates. Whereas geoscience programs are well on their way to reaching gender parity in their student population, there is still significant progress to be made in reaching a minority student profile that is representative of the overall university student population. Additionally, in the workforce, the geoscience profession has much progress to make in achieving a representative profile of the nation's population base. Women continue to comprise approximately 29 percent of the geoscience workforce whereas under-represented minorities only comprise approximately 8 percent.

Examination of the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS) database provides some insight into the international profile of the geoscience graduate pool. IPEDS (2010) data indicate an increase in the percentage of non-U.S. citizens earning geoscience doctoral degrees since 2003 (2003, 25%; and 2008, 35%) whereas the percentage of non-U.S. citizens earning geoscience Master's degrees has remained around 10 percent over the same time period.

The geoscience supply shortage is exacerbated not only by the low number of students entering into university geoscience programs but also by the low number of graduates entering into geoscience professions. Additionally, the geoscience workforce demographic curve is not specific only to the U.S. Other countries are also experiencing the same concerns with a supply shortage of geoscience graduates. The geoscience profession has much to achieve in order to increase student recruitment and retention efforts, as well as to bring the profession's diversity on par with national population demographics.

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REFERENCES CITED

- Gonzales, L., 2009, U.S. geoscience salaries continue upward climb: American Geological Institute Geoscience Currents 24, <<http://www.agiweb.org/workforce/Currents-024-Salaries99-08.pdf>> Last accessed July 18, 2010.
- Keane, C., 2009, Geoscience enrollments jump sharply in 2008-2009: American Geological Institute Geoscience Currents 23, <<http://www.agiweb.org/workforce/Currents/Currents-023-Enrollments2009.pdf>> Last accessed July 18, 2010.
- Integrated Postsecondary Education Data System (IPEDS), 2010, Welcome to IPEDS, <<http://nces.ed.gov/ipeds/>> Last accessed September 4, 2010.
- National Science Foundation, 2006, SESTAT, Scientists and Engineers Statistical Data System, <<http://www.nsf.gov/statistics/sestat/>> Last accessed September 4, 2010.
- U.S. Census Bureau, 2009, Table 5: Percent distribution of the projected population by net international migration series, race, and hispanic origin for the United States: 2010 to 2050 (NP2009-T5), <<http://www.census.gov/population/www/projections/files/nation/summary/NP2009-T5-C.csv>> Last accessed September 4, 2010.