The Case for Professional Science Master’s Degrees

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Three years ago, the AIBS education programs manager described the Professional Science Master’s (PSM) degree as a growing pathway for students interested in a career in biology outside of academia and highlighted the need for more institutions to offer such programs in order to expand the pipeline of professionally trained individuals for high-tech jobs (Musante 2009). At that time, there were 150 PSM programs at 78 institutions. Since then, the number of programs has grown dramatically. PSM programs now number over 290 at about 125 institutions. The majority of the programs (66%) are in biology, broadly defined (including environmental sciences). For an up-to-date list of programs and more details, see the Web site www.sciencemasters.com.

In a recent survey conducted by the Council of Graduate Schools (CGS), with 95% of the programs responding, Bell and Allum (2012) reported over 6300 applications for the fall 2011 semester, nearly 1700 first-time enrollees, and a total enrollment of nearly 5500 (54% of which were in biological PSM programs). Almost 1600 degrees were awarded by PSM programs in the 2010–2011 academic year. This represents a 15% increase in the total enrollment and a 43% increase in PSM degrees awarded over the previous year. These data include new programs that had not been included in previous surveys; however, if only those respondents from both years (2010 and 2011) are included, the data still show a 7% enrollment increase and a 27% increase in the number of degrees awarded.

Given that these are science degrees, the demographics are also promising. Of all of the enrollees, 56% were women and 44% men. The proportion of international students was 14%, and among US citizens and permanent residents, 27% were underrepresented minorities. When all science and engineering master’s degrees were counted (using 2009 data), the proportion of women was the same as that in the PSM data, but the proportion of international students was 27%, and that of underrepresented minorities was only 18% (these are 2009 degree recipients, not total enrollments; National Science Board 2012). A smaller CGS pilot survey of 2011 graduates indicated that, as of June of that year, 82% had jobs, 5% were seeking further education (some PSM graduates decide to pursue a PhD), and 12% were seeking employment. Of those working, 88% were in a job related to the PSM, and 39% got their job because of their PSM internship (Bell and Allum 2011).

The PSM is designed to allow students to pursue advanced training in science or mathematics while developing workplace skills highly valued by employers. PSM programs prepare graduates for careers in business, government, and nonprofit organizations, combining rigorous study in science and mathematics with coursework in management, policy, law, or related fields. Along with their emphasis on writing, leadership, and communication skills, most PSM programs require a final project or team experience, as well as an internship in a business or public sector setting.

The PSM curriculum is designed with input from employers to support present and future professional career opportunities for the graduates and therefore responds to calls from both corporate and political leaders for better articulation of graduate degrees and workforce needs—especially in areas contributing to innovation and economic competitiveness.

The PSM was one of the reforms made in response to an influential 1995 report by the Committee on Science, Engineering, and Public Policy of the National Academies (NAS et al. 1995). In the report, the committee argued that we were not training our PhDs for the jobs they actually get (including teaching positions). It made a number of recommendations, including providing more degree and curricular options for our students, especially training designed explicitly for the nonacademic positions that many graduates seek. However, much of the criticism of PhD education contained in the report was not widely heeded, and since that time, there have been many reports of an alleged overproduction of PhDs, especially in the biomedical sciences, such that there is an insufficient number of tenure-track academic positions to absorb the graduates. The percentage of science PhDs in tenure-track positions has been steadily dropping, with the situation in the life sciences being especially acute (Cyranoski et al. 2011). The economics of research funding creates demand and provides salaries for graduate student research assistants, but career prospects in science are increasingly dismal because of ever-lengthening apprenticeships, a scarcity of permanent academic positions, and the difficulty of getting independent funding (Stephan 2012). Students seem to be catching on, and, in contrast to the growth in PSM enrollments, the trends in admissions to biology PhD programs have indicated that applications and subsequent enrollments are down, although interest in master’s degrees remains strong (National Science Board 2012). Although the National Science Board reported data only through 2009 in their 2012 report,