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SIDEBAR

The Big Picture: National Initiatives in Graduate Education

By Suzanne T. Ortega and Maureen Terese McCarthy

As the world faces ever more complex challenges, the need deepens for a diverse talent pool with rigorous training and analytic acumen. The key to meeting these evolving scientific, workforce, and humanitarian needs is a robust system of graduate education. To strengthen all aspects of graduate education, the Council of Graduate Schools (CGS) partners with graduate schools throughout the country on projects that range from recruiting the most talented students to preparing students for lifelong careers.

Founded in 1962, CGS is an organization of over 500 institutions of higher education in the United States and Canada engaged in graduate education, research, and the preparation of candidates for advanced degrees. The organization's mission is to improve and advance graduate education, which it accomplishes through advocacy in the federal policy arena, research, and the development and dissemination of best practices. CGS serves a broad range of institutions, represents the spectrum of academic disciplines, and is concerned with both master's and doctoral education. To provide some national context to the discussion of graduate education in oceanography, the CGS short-term research agenda is outlined below (visit <http://cgsnet.org> for more information and to access reports on the projects noted below under the "Best Practices" button).

Over the next five years, CGS will focus on four main areas: (1) broadening access to graduate degrees, (2) improving professional development for both academic and nonacademic careers, (3) better understanding career pathways, and (4) strengthening master's education. These efforts will result in resources available to the graduate education community that identify promising practices and contextualize challenges.

Broadening Access

Despite many years of effort toward and incremental progress in broadening access to graduate degrees, underrepresented minority (URM) students remain just that—underrepresented. CGS is committed to increasing the number of URM scholars engaged

in graduate study and completing their degrees. One current CGS effort, Innovation in Graduate Admissions through Holistic Review, seeks to better understand current graduate admissions processes and to identify the possibilities for increasing diversity through holistic (or "whole-file") application review. This project includes a survey of over 850 graduate deans, faculty members, and admissions professionals, as well as a workshop of experts. [Note: This report was published January 19 and is available through the CGS website.]

At the other end of the student life cycle, the recent CGS publication *Doctoral Initiative on Minority Attrition and Completion (DIMAC)* suggests that focused interventions in the late stages of doctoral study could significantly increase the total number of PhDs completed by URM students (Sowell et al., 2015). Using data from 21 institutions across the United States, this research project was funded by the National Science Foundation (NSF). The project provided the most complete portrayal of completion rates, attrition rates, times to degree, and times to attrition among underrepresented minority science, technology, engineering, and mathematics (STEM) doctoral students to date. CGS continues to seek opportunities to use lessons learned from DIMAC to support institutional efforts that promote URM student degree completion.

Professional Development

Graduate students at all levels and across disciplines are calling for stronger training in skills they will need no matter the career they pursue. The successful professional development of graduate students to meet the demands of a changing world requires curricular, co-curricular, and extra-curricular solutions.

A pilot study funded by NSF seeks to advance the national understanding of how universities can work with employers to enhance professional skills development for graduate students entering the STEM workforce. Questions being investigated by the CGS Identifying Professional Development Needs of STEM Graduate Students project include: What are the skills that graduate students

most need for success in the twenty-first century research workforce? What program structures and university and federal funding models best accommodate master's and PhD student acquisition of these skills? The project includes a survey distributed to over 500 CGS member institutions, interviews with industry leaders, and a workshop convening a wide array of stakeholders. The project will result in a publication that includes a framework for future action and an online searchable database of existing professional development programs for STEM graduate students.

Professional development should not simply be an "add-on" concept for graduate programs. Faculty and graduate leaders must examine the core activities of graduate study to ensure that they, too, support a variety of career paths. The Future of the Doctoral Dissertation presents one such opportunity for revisiting the purposes and value of graduate training. Changes in the way knowledge is funded, produced, and disseminated highlight the need to carefully consider how dissertation formats might or should change in the future. With the support of ProQuest, in January 2016, CGS convened a group of top scholars and leaders in graduate education, publishing, library science, and the disciplines to discuss how changes in scholarly communications, innovations in technology, and the growing awareness of more variable PhD career pathways are shaping the ways dissertations are used and shared. The goal of the workshop is to identify areas of policy or practice that may require additional focused attention from graduate faculty and administrators. Workshop results should be available in spring of 2016.

Looking ahead, major forces such as big data, globalization, and interdisciplinarity will continue to shape our world and our research, and graduate students need to understand and engage the issues they present. CGS therefore anticipates incorporating these areas into future projects.

Career Pathways

To inform institutions' work on professional development and in other areas, it is essential to compile more complete information about the career pathways of individuals with graduate degrees. Fuller information about career pathways could help students make better choices, inform our efforts to advocate for the value of graduate education, influence faculty attitudes, and most importantly, act as a powerful tool for improving graduate programs. With joint funding from the Alfred P. Sloan Foundation, the Andrew W. Mellon Foundation, and NSF, CGS is developing a core survey instrument and an implementation guide to support institutional data collection regarding PhD student career aspirations and PhD alumni career pathways. These tools are being designed to facilitate cost-effective and sustainable strategies for collecting and using career data that recognize institutionally specific needs; this common set of questions will also have the potential to be used for benchmarking or other purposes. Through this CGS initiative, universities will own the data and ultimately decide how they might best be used and shared. In a next phase of the project, we hope to launch a pilot "data collection for program improvement" effort. While the current career pathways project does not include master's students, we hope to expand it in the relatively near future to include this important majority of graduate students.

Master's Education

Approximately seven out of 10 current graduate matriculants enroll in master's programs. Yet, the factors that contribute to timely master's degree completion and subsequent career pathways and success remain unknown. The 2010 CGS project on The Role and Status of the Master's Degree in STEM, and more than a decade of Sloan-funded work on the professional science master's have made

important progress in strengthening master's education. However, a number of important questions remain: What types of professional development are most conducive to a broad range of career options for master's students, especially for those who are pursuing a master of arts degree? What are the highest impact, most cost-effective services to ensure timely completion of the degree for students, particularly those pursuing master's work on a part-time basis while balancing work, family, and other responsibilities? Further, the personal and public value of master's education is not always readily apparent, due to a lack of data, including the human interest stories that could make a compelling case. Clearly, there remains a great deal of very important work to do.

To lay the foundation, a CGS research team has developed a framework for analyzing secondary data sources to provide basic information about the careers and career mobility of master's degree recipients. When completed, we hope this information can be used to develop a new master's education best practices project and inform a strategic research and best practice agenda for master's education. This project, Labor Market Outcomes of STEM Master's Education, was recently funded by NSF.

Moving Forward

Embracing these opportunities to improve graduate education will help to ensure the vitality of the scientific enterprise. It is essential that we as a community work to draw from the full population of individuals interested in and prepared for graduate study, to create conditions for their persistence and success, and to prepare them not just for their first jobs, but for their entire careers. The Bureau of Labor Statistics (2015) reports that the average postsecondary-educated baby boomer experienced roughly 12 job shifts in his or her career, and we can hypothesize that our students will follow a similar, if not more varied, employment pattern. Today, a diverse career is the rule, not the exception. Better information about how to attract, retain, and prepare diversely talented graduate students will ensure a secure future for them as individuals and for our communities.

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AUTHORS

Suzanne T. Ortega (president@cgs.nche.edu) is President, and **Maureen Terese McCarthy** is Assistant Director of Advancement and Best Practices, both at the Council of Graduate Schools, Washington, DC, USA.

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