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History of the Development of the Professional Science Master's Degree

From its introduction in 1997 with funding from the Alfred P. Sloan Foundation and the William M. Keck Foundation, what has come to be known as the "Professional Science Master's Degree" (PSM) has grown to over 230 officially recognized PSM programs offered by more than 110 institutions (see www.ScienceMasters.com for current information). The PSM is distinguished by a combination of graduate-level science/math/engineering courses with a professional component that normally includes an internship and specific workplace skills such as business, communications, ethics and regulatory affairs. Conceptually, the early development of the PSM was motivated by an influential 1995 report by the Committee on Science Engineering and Public Policy (COSEPUP) of the National Academies, "Reshaping the Graduate Education of Scientists and Engineers." The report recommended a number of graduate education reforms, including "offering a wider variety of degree and curricular options" and "experiences that supply skills desired by … non-academic employers, especially the ability to communicate complex ideas to nonspecialists and the ability to work well in teams" (p. 4). Internships in industry or government were also recommended. Coincidentally, in that same year, the book *Rethinking Science as a Career: Perceptions and Realities in the Physical Sciences* (Tobias, Chubin and Aylesworth, 1995) was published as a reaction to the plight of many PhDs in the physical sciences who were facing difficulties obtaining their anticipated academic positions. The authors suggested that perhaps the PhD was not needed for many science careers and that a new kind of professional master's degree in the sciences might be invented.

In 1997, the Keck Foundation provided a grant of $50M to found a new institution, the Keck Graduate Institute of Applied Life Sciences (KGI), as a member of the Claremont Colleges Consortium. The stated goal was to produce "scientists and engineers who can help translate basic scientific discoveries into practical applications that will improve the health of people" (www.kgi.edu/about-kgi/history.html). It was thought that the innovative program structure needed would be too difficult to achieve in existing research universities; hence a new kind of institution would have to be created. KGI initially offered five tracks of what they called a Master's of Bioscience (MBS): four of them on the PSM model, with about 70% of the content advanced science, and a 5th track, the Business of Bioscience, which emphasized the professional components. KGI continues to offer these five MBS tracks and has graduated 10 classes, but has also expanded into related PhDs, certificates, and a professional master's designed for bioscience postdocs (PPM), although the majority of students are enrolled in the MBS programs.

The Sloan Foundation took a different approach. In 1997, they provided funding to two established research universities with the goal of developing at least three new professional master's programs at each institution, with a funding level of approximately $125K per proposed program. They had more confidence that science faculty would respond to the strong recommendations of the COSEPUP report, but in order to achieve the necessary level of programmatic innovation, the Sloan Foundation felt that developing multiple programs within the same institution would provide a critical mass of support across a number of departments and faculty. They also did not limit the programs to biology, but were open to all fields of science (but excluding engineering where the master's degree was already respected as an entry-level degree for employment). One of these pioneering institutions still has PSM programs, and they are thriving. This first phase of Sloan Foundation funding for PSM development lasted approximately three years with funding to an additional four institutions for about 10 more programs.

In 2000, recognizing that there was a rapidly growing demand from industry for individuals cross-trained in molecular biology and computational science (the emerging field of bioinformatics), the Sloan Foundation issued requests for "single-track" PSMs in bioinformatics. Nine institutions were funded. Initially these programs had fewer of the

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explicitly professional components, other than internships, as it was felt that the necessity for advanced coursework in two distinct areas precluded additional requirements. Several of the programs have since added more professional training, and more recent bioinformatics PSMs (subsequent to the single track funding year) all include typical PSM professional components.

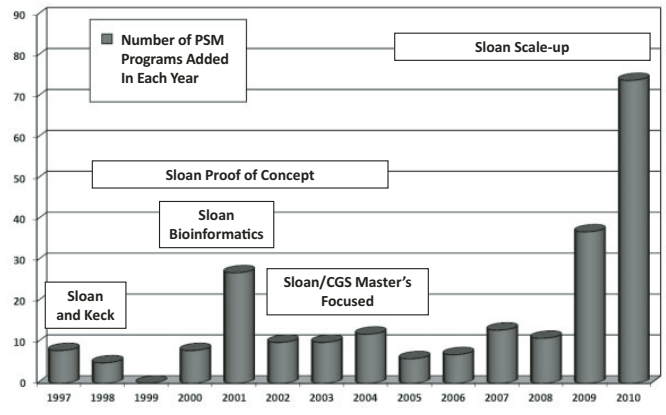
The partnership of the Council of Graduate Schools and the Sloan Foundation began in 2001, with CGS managing the expansion of PSM programs to "master's focused" institutions. This partnership employed a different model, with funding going to CGS which then invited selected institutions to respond to an RFP. The competition was held in two phases: first for a feasibility study and subsequently for an implementation grant to those institutions which planned to go on to develop PSM programs. The PIs on the proposals were graduate deans, assuring the participation and commitment of senior administrators from the start. Another innovation was an explicit requirement to engage regional industry and business leaders in a dialogue with departmental/program representatives about the need for graduates and desired aspects of their training. This early engagement with an employer advisory board has become one of the hallmarks of the PSM programs. These two competitions resulted in 26 new PSM programs; all but two still exist. The two-stage process and involvement of deans apparently had a positive impact on institutional visibility and sustainability of the PSM programs. External funding for these programs was less than were the original Sloan grants to research universities. Grants for feasibility studies were usually $6000—somewhat more when several programs were being investigated. Implementation awards started at $25,000, with additional funds provided to develop more than one program. These programs invariably had the benefit of matching institutional funds for their development.

During the period of the CGS/Sloan initiative for expansion to master's focused institutions (2001-2005), the Sloan Foundation continued to fund research universities through 2004 to develop multiple PSM programs as well as additional bioinformatics tracks, adding approximately 50 additional programs, including one at a Canadian university. Not all PSM programs have survived, although a high proportion are still in existence, and 89 of the programs begun through 2005 are still functioning. Considering that these programs were highly experimental, not within the faculty expertise of traditional science departments, and required interaction with employers and recruitment of professional courses and programming from outside the science departments, it is notable that more than 80% of the PSM programs developed during what may be considered the "proof of concept" phase still exist today. Most of the programs that were discontinued were multiple programs at large universities where key administrative support to sustain this kind of innovation was lacking, in some cases due to administrative turnover. During this phase of development, the Sloan Foundation also engaged professional societies and other influential organizations such as the Commission on Professionals in Science and Technology, the National Governor's Association, and the Council on Competitiveness (and later the National Conference of State Legislatures) to promote the PSM concept more widely among universities, potential employers and other potential funders.

In 2003-04, the Sloan Foundation began to explore ways to "scale up" PSM development by engaging university systems, rather than individual campuses. This was a new model where systems would have to demonstrate how they would add value to facilitate program development on multiple campuses, rather than simply passing through funds to individual campuses. Two grants were made, one in each year, for planning and feasibility studies. In 2005, Sloan moved fully into the scale-up phase. Grants were no longer made to individual campuses for PSM program development, but only projects where a larger impact was anticipated were funded. This included a major effort by CGS for the "institutionalization and promotion of the PSM degree as a regular feature of graduate education" (Council of Graduate Schools, 2006). Scale-up efforts continued through 2010, which marked the end of new grants by the Sloan Foundation for the PSM initiative. Besides the two initial university systems, an additional 12 systems or states were engaged in large-scale expansion of PSM degrees, including a novel regional alliance of HBCUs. Through outreach by the National Association of System Heads (NASH), other systems are becoming involved as well. Figure 1 illustrates the phases of PSM development and the number of currently existing PSM programs with the year in which they were started.

In 2005, the Keck Foundation made a $20M challenge grant to KGI to raise an additional $30M in 7 years. Although KGI has not added additional PSMs, their ability to achieve the match in only 6 years attests to the robustness of both the

Figure 1. Growth in PSM Programs*
(only existing programs listed)



*total number of PSM-affiliated programs as of December 31, 2010

PSM concept and the institution, and in 2011 KGI enrolled its largest entering class.

Accompanying the scale-up phase of the PSM, the Sloan Foundation encouraged and funded (in 2006 and 2007) the initial development and implementation of a National Professional Science Master's Association (NPSMA). The organization's goals are to support PSM programs, largely through a series of regional "best-practice" workshops, to engage businesses, industries, non-profit organizations and government agencies, and to promote the PSM degree as an important option for students in STEM fields. Initially organized by and for PSM program directors, the NPSMA increasingly attracts institutional members, and has made efforts to recruit students and alumni members.

There were several notable events during the scale-up period which have had a positive impact on the PSM, undoubtedly influenced by the extensive promotional efforts described above. In 2007 Congress passed the America COMPETES Act which, among other things, authorized the NSF to provide grants to create or expand PSM programs. In 2009, some funding for the NSF program was provided through the America Recovery and Reinvestment Act (ARRA); NSF ran a competition and funded 22 programs (not all of which met the guidelines for a PSM—see next paragraph). In 2008, the National Research Council of the National Academies of Sciences issued a report, "Science Professionals—Master's Education for a Competitive World" that provided a resounding endorsement of the PSM concept. PSM programs have proved an attractive option to almost every category of institution with a graduate education mission. PSM programs are also drawing international interest, with programs now officially recognized in Great Britain and Australia.

A critical activity in which CGS has been engaged is to "brand" the PSM as a recognizable degree by establishing and disseminating guidelines for PSM affiliation and reviewing and approving programs that meet the PSM guidelines under a license from the Sloan Foundation. In 2010, CGS, with support from the Sloan Foundation, undertook a year-long project to develop a more formal, sustainable, widely-recognized and accepted review process to assure the quality of the PSM brand into the future. This was in large part a response to the increase in both the quantity and diversity of applications for PSM affiliation. CGS convened three meetings of PSM "stakeholders" to establish clear principles to guide the development of principles that would inform revised guidelines for PSM program affiliation and to create those guidelines. Twenty-two representatives comprised the broad stakeholder group, including PSM program directors, graduate deans, employers from the business, nonprofit, and government sectors, policymakers, as well as representatives from the Sloan Foundation, NPSMA, and CGS. The guidelines and a comment form were widely distributed and posted on www.sciencemasters.com. Well over 90% of the respondents indicated approval of the revised guidelines. (See Council of Graduate Schools, 2010 for details.) Looking towards permanent sustainability, the stakeholders group also recommended a process for ongoing quality assurance, and specified the characteristics of an organizational structure that would be responsible for implementing and managing the quality assurance process (Council of Graduate Schools, 2011).

There are some challenges facing the PSM degree for the future. Most obvious is the lack of an explicitly identified source of external funds to start new programs. The support provided to systems by the Sloan Foundation will continue to result in new programs for the near future, but budget cuts common in the current economic climate make it difficult for institutions to find start-up funds to invest in new programs. Several federal agencies have expressed an interest in supporting the PSM model, but incremental funds for new programs are not likely to be appropriated by the current Congress. The PSM community needs to find a way to engage industry more broadly and at higher levels to support these programs. In order to continue to argue that more PSM programs are among the tools needed to fuel innovation and economic development in this country, the high quality of PSM programs will need to be assured by an appropriate body monitoring the PSM "brand." Nevertheless, the growth and persistence of PSM programs provide reasons for optimism. Both extensive anecdotal information and a recent survey (Bell and Allum, 2011) have shown that PSM graduates enjoy high employment and very competitive salaries. We trust the success of the PSM initiative will provide the momentum to indeed establish this degree as "a regular feature of graduate education."

By Carol B. Lynch, Senior Scholar in Residence and Director, Professional Master's Programs

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Case Study: The Involvement of Graduate Students in International Engagements at the Massachusetts Institute of Technology (MIT)

Graduate students are involved in a diverse array of international programs and engagements at MIT, which vary widely in goals, scope, and structure. There are many educational benefits to graduate students who participate in international activities, such as enhanced research skills, expanded research networks, access to specialized equipment and expertise, exposure to different academic, pedagogical and scientific styles and increased career prospects ("Joint Degrees, Dual Degrees, and International Research Collaborations," Council of Graduate Schools Report 2010). Such experiences can train students to become "globally-cognizant" scholars: those who have an appreciation of their discipline in a broader cultural and socio-economic context, who attain a meaningful understanding of different regions of the world, and who construct deep local relationships that constitute a basis for lifelong interactions with other institutions, countries and cultures. In addition, immersion in another culture often adds greatly to the personal development of the student, in particular self-confidence, leadership skills, ease in working in multinational teams, and communication. This article describes a few MIT international programs involving graduate students, focusing on innovative aspects and potentially scalable best practices in the areas of educational integration and enhancement, cultural preparation and acclimation, personal support, professional development and community. International models at MIT generally have been driven by intellectual interests, possess a strong research component, and follow a culture of integrating research and education. The examples described fall under a number of categories; 1) research team-based, 2) internships, 3) curricular and 4) individual faculty-driven collaborations. Dual and joint degrees have traditionally not been pursued due to a commitment to maintain sufficient on-campus residential-based educational components.

Research Team-Based

The *Singapore-MIT Alliance for Research and Technology* (SMART) is a major research center located in Singapore, established in partnership with the National Research Foundation of Singapore in 2007. SMART engages MIT doctoral students in collaborative binational interdisciplinary research groups (IRGs) consisting of faculty, post-doctoral research associates, and undergraduates from both MIT and Singapore universities (e.g., National University of Singapore, Nanyang Technical University), research labs, and government agencies. MIT doctoral students often participate in virtual trans-pacific video-enabled research team meetings with members of the IRG in Singapore. They then visit the SMART center in Singapore for a period of weeks with other IRG members to carry out research that contributes to their thesis dissertation. The students are provided with step-by-step instructions to prepare for their travel, arrival and acclimation process. While in Singapore, a local support structure and a full-time administrator assist doctoral students to integrate academically and socially within the Singapore community. This type of program is reported to work well when principal investigators in both countries are committed to and intellectually engaged in the collaboration; when there is value-added on both sides in terms of scientific expertise and contributions; when there is frequent and effective communication between the team members; and when there is long-term and flexible financial support. Academic advising, organization, and planning are critical considerations to ensure a high quality, productive intellectual experience for graduate students, as well as timely graduation.

The *Abdul Latif Jameel Poverty Action Lab* (J-PAL) is a network of 55 affiliated professors around the world who utilize randomized evaluations to answer questions critical to poverty alleviation. Through J-PAL, doctoral students in the MIT Department of Economics can conduct field research as junior investigators for 8-10 weeks the summer after the first year of their program, prior to which they have taken a course in development economics. The students work as part of a team with J-PAL associated faculty both from MIT and abroad, undergraduates, and a dense local support network, all of whom interact together prior to arrival. It is advantageous for doctoral students to participate in early stage projects so that they can contribute intellectually, participate in the decision-making process and have an investment in the outcome. In many cases, this initial international experience serves as a basis for dissertation work and can lead to additional international visits later in the student's academic career.

Internships

The *MIT International Science and Technology Initiatives* (MISTI) matches hundreds of MIT students annually with all-expenses-paid intensive, professional internships in companies, research laboratories and universities abroad. Since its inception in 1983, MISTI has fielded ~3500 students, of which ~30% are graduate students. MISTI follows in the time-honored MIT tradition of "Mens et Manus" ("Mind and Hand"): real-world engagement through the pairing of ideas, innovation, and research with action, practical applications and testing. MISTI employs a programmatic structure that is unique in its depth and breadth and includes; proactive recruitment and a competitive admissions process; preparatory country-specific cultural training (e.g., safety; political and socioeconomic background and history; language; culture, etc.); personalized internship matching and coordination via a full-time country program director; experiential learning; in-country cohort-building retreats; reflection sessions after completion and return; assessment surveys; on-campus activities related to the country of interest; and "re-entry" mechanisms for continued interaction.

In the *Department of Urban Studies and Planning (DUSP)–Public Service Center (PSC) Summer Internship Program*, planning graduate students work on an international development project in the field for 8 to 12 weeks over the summer. International opportunities include placement with non-profits, government offices, or international aid agencies, but also grassroots organizations or for-profit social enterprises. These internships are highly personalized and specialized to the students' interests and career exploration, and can serve as part of thesis research, satisfying field work requirements in the DUSP curriculum. Administrators in DUSP and the PSC act as facilitators in preparation prior to departure, but the student is required to take full ownership of the project, detailing his/her own timetable and deliverables. A local contact person is identified by the student; the student communicates back weekly reports that include information on current activities, plans for the next week, what has been learned, and personal experiences. Upon return, the student debriefs by writing a short report and attending events that encourage reflection on the work and cultural experiences.

Curricular

The *MIT Sloan Action Learning Program* is a portfolio of topically diverse courses offered by the MIT Sloan School of Management for elective academic credit. These "lab courses" combine traditional classroom learning with intensive real-world, practical experience, at no additional cost to the student. They are generally taken by Master's of Business Administration (MBA) graduate students. Working on organizational challenges at Sloan and then on site, students get the unique experience of tackling a wide array of pressing operational and strategic issues facing entrepreneurs in emerging markets, established multinational corporations, and NGOs and nonprofits tackling sustainable business and public health issues. Sloan Action Labs create an exceptional international experience for students through the diversity and specialization of the learning opportunities. As one example, China Lab creates international student teams consisting of two MIT Sloan students and two Chinese students who work on a 3-month, mini-consulting project for a company. The company, working in collaboration with the students, sets the project focus and work plan, which includes the scope of work, timetable, and deliverables. Students begin their international collaboration virtually, using video-conferencing software such as WebEx and Skype, project management software such as Basecamp, tools such as surveymonkey.com, e-mail and instant messaging, as well as sharing documents via Google. Mid-way through the course, each team spends two weeks on-site at the Chinese firm's headquarters, and then to complete the project work, the Chinese students come to MIT Sloan. An MIT faculty mentor is assigned to each team and serves to support their interactions with the company. Evaluation of the experience is solicited from students and companies after the project is concluded. The financial commitment of the company is minimal, enabling more project flexibility and risk-taking on the part of the team.

Individual Faculty-Driven Collaborations

Many graduate students undergo individualized international experiences in the context of a faculty advisor's research, which may not be affiliated with a formalized Institute-wide program. Such activities may include visiting a collaborative laboratory or a large international center, participating in international conferences, workshops or short courses, or carrying out dissertation research abroad. MIT offers support through the MIT International Students Office (ISO), which provides advising on immigration issues, required legal documentation and forms, and acts as a point of contact and additional support for students abroad. The MIT Office of Sponsored Programs also offers training on responsible conduct of research.

General Considerations

In terms of educational aspects, additional areas to bear in mind include: maintaining admissions standards and processes; synergy of educational curricula and activities; program quality assurance and assessment; accurate accounting of costs and resources needed; sustainability; and differences in graduate student funding models. For risk management, student itineraries, passport and health insurance information should be collected and clear travel policies and documentation should be established. Students should begin the process of securing an educational visa from the embassy or consulate of the country they will visit early; international students may need to contend with additional immigration complexities to return to the US in a timely fashion, and should be aware that their pre- and post-completion employment benefits may be impacted. Other important considerations for graduate students traveling abroad are personal support, professional development, cohort building and community. Equivalent support to those services and offices available on the US campus should be identified.

Summary and Future Outlook

Graduate education is becoming increasingly international and often serves as a critical component of global collaboration and innovation. The goals of graduate education have evolved beyond the creation of original knowledge at disciplinary frontiers to include an appreciation of this new knowledge in a broader context, and a transferable skillset to act on it. International experiences contribute greatly to the latter objectives. Additionally, incoming graduate students are more often socially conscious and engaged, diverse, technologically savvy, and desire interdisciplinary and non-traditional educational experiences that supersede their physical on-campus laboratories, research groups and classrooms. A variety of mechanisms have proven to be successful at MIT, ranging from highly structured to flexible and personalized. Specific best practices depend on the goals of the experience, but in all cases preparation, organization, communication, documentation, and faculty engagement are critical components.

By Christine Ortiz, Dean for Graduate Education, Professor of Materials Science and Engineering, MIT and Heather Fry, Office of the Dean for Graduate Education, Communications Officer, MIT

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Data Sources: Trends in First-Time Graduate Enrollment in Education Programs

The results of the latest *CGS/GRE Survey of Graduate Enrollment and Degrees*, released in September, revealed that first-time graduate enrollment in the broad field of education fell sharply by 8.3% between fall 2009 and fall 2010 (Council of Graduate Schools, 2011). This decline was the largest of any broad field in 2010 and is particularly concerning since about 20% of all first-time graduate students are enrolled in education. This article provides a closer examination of the decline in first-time graduate enrollment that occurred in education in fall 2010, exploring variations by field of study, attendance status, race/ethnicity, degree level, and gender.

As shown in Table 1, first-time graduate enrollment fell in 2010 in most fields of study within the broad field of education. Declines between fall 2009 and fall 2010 were particularly steep in secondary education (-16%.1), elementary education (-14.9%), and education administration (-12.9%). The only two fields of study to experience gains in first-time graduate enrollment in fall 2010 were higher education (8.7%) and early childhood education (0.6%), but these are two of the smallest fields of study, accounting for just 4.3% of all first-time enrollees in education. Despite the one-year decline, first-time graduate enrollment increased 3.3% annually on average over the past decade, with growth in all fields of study except elementary education and early childhood education.

Much of the decline in first-time graduate enrollment in the broad field of education between 2009 and 2010 was driven by a steep drop in part-time enrollment. Overall, part-time enrollment among first-time graduate students fell 13.1% in education in fall 2010, compared with a 2.8% decline in full-time enrollment (see Table 2). By field of study, declines in part-time enrollment among first-time graduate students were particularly steep in student counseling and personnel services (-25.0%), elementary education (-22.1%), and secondary education (-21.7%). Declines in first-time graduate enrollment were greater for part-time enrollees than full-time enrollees across all fields of study within education. For example, part-time enrollment fell 15.3% among first-time enrollees in education administration, compared with a 7.6% decline in full-time enrollment. Only in higher education did both full-time and part-time first-time graduate enrollment increase, with gains of 8.7% and 8.6%, respectively.

Declines in first-time graduate enrollment in the broad field of education were particularly large for Blacks/African Americans and American Indians/Alaskan Natives between 2009 and 2010, with decreases of 17.7% and 16.8% respectively (see Table 3). These declines are concerning since 25.4% of Black/African American and 23.4% of American Indian/Alaskan Native first-time enrollees in fall 2010 were in the broad field of education. The declines are also troubling because Blacks/African Americans are more highly represented in education than in most other broad fields; they comprised 10.5% of all US citizen and permanent resident first-time enrollees in education in fall 2010, a share that was second only to the share they enjoyed in public administration and services (15.8%).

In every single field of study within education in fall 2010, Blacks/African

Table 2. Changes in First-Time Graduate Enrollment in Education by Field of Study and Attendance Status, Fall 2009 to Fall 2010

	Full-Time	Part-Time
Education, Total	-2.8%	-13.1%
Education Administration	-7.6%	-15.3%
Curriculum and Instruction	-1.3%	-5.7%
Special Education	-1.8%	-6.6%
Secondary Education	-8.4%	-21.7%
Student Counseling and Personnel Services	0.8%	-25.0%
Elementary Education	-6.2%	-22.1%
Educational Assessment, Evaluation, and Research	-7.1%	-9.2%
Higher Education	8.7%	8.6%
Early Childhood Education	5.8%	-9.3%
Education, Other	-1.6%	-10.0%

Source: CGS/GRE Survey of Graduate Enrollment and Degrees

Table 1. Changes in First-Time Graduate Enrollment in Education by Field of Study, Fall 2000 to Fall 2010

	First-Time Graduate Enrollment, Fall 2010	% Change, 2009 to 2010	Average Annual % Change, 2005 to 2010	Average Annual % Change, 2000 to 2010
Education, Total	75,523	-8.3%	-1.5%	3.3%
Education Administration	11,368	-12.9%	-1.6%	3.5%
Curriculum and Instruction	8,249	-3.9%	4.5%	3.9%
Special Education	7,734	-4.6%	4.2%	8.1%
Secondary Education	6,845	-16.1%	-3.9%	7.4%
Student Counseling and Personnel Services	6,826	-9.5%	-2.0%	0.9%
Elementary Education	5,796	-14.9%	-6.1%	-1.1%
Educational Assessment, Evaluation, and Research	2,075	-6.8%	2.2%	2.5%
Higher Education	1,895	8.7%	7.1%	8.6%
Early Childhood Education	1,317	0.6%	-0.4%	-0.5%
Education, Other	23,418	-5.8%	-2.8%	3.2%

Source: CGS/GRE Survey of Graduate Enrollment and Degrees

Americans or American Indians/Alaskan Natives experienced the largest decline. For example, the largest decline in education administration was a 30.0% decrease for Blacks/African Americans, and the largest drop in curriculum and instruction was a 27.0% decrease for American Indians/Alaskan Natives. While relatively large decreases sometimes reflect the normal enrollment fluctuations that occur with small populations of students, the overall declines for these populations of students compared with their Hispanic/Latino and Asian/Pacific Islander counterparts are concerning. Also troubling is the 7.0% decline for White students, since they comprised two-thirds (65.8%) of all US citizen and permanent resident first-time enrollees in education in fall 2010.

The majority (90.9%) of all first-time graduate students in the broad field of education are enrolled at the master's degree or graduate certificate level. This level also includes students enrolled in education specialist programs. Just 9.1% of all first-time graduate students in education are enrolled at the doctoral level. Between 2009 and 2010, first-time graduate enrollment decreased more at the doctoral level (-10.1%) than at the master's/graduate certificate level (-8.1%), but no strong patterns were observed by field of study and degree level. For example, first-time graduate enrollment fell 15.2% at the master's/graduate certificate level in education administration, but only dropped 2.4% at the doctoral level in this field of study. In contrast, first-time graduate enrollment fell 1.6% at the master's/graduate certificate level in educational assessment, evaluation, and research, but dropped 17.9% at the doctoral level. And in curriculum and instruction, first-time graduate enrollment fell by a similar amount at both the master's/graduate certificate and doctoral levels (3.9% and 4.0%, respectively).

Finally, first-time graduate enrollment fell slightly more for women than for men in the broad field of education between 2009 and 2010 (-8.6% and -6.9%, respectively). This is important to note since women comprised about three-quarters (74.7%) of all first-time enrollees in education in fall 2010. As with first-time graduate enrollment by degree level, no strong patterns were observed by field of study and gender, with decreases by field of study sometimes greater for men and sometimes greater for women.

This closer examination of the data reveals that the overall decline in first-time graduate enrollment in the broad field of education in fall 2010 was driven mainly by a combination of three factors: a sharp drop in part-time enrollment; decreases in secondary education, elementary education, and education administration; and declines for Blacks/African Americans, American Indians/Alaskan Natives, and Whites. The recession is likely at the root of this decline. Since most graduate students in education are self-funded or employer-funded, we can surmise that the decrease in first-time graduate enrollment in education in fall 2010 reflects the hesitancy of prospective students to take on debt or to leave jobs for graduate school and an uncertain future, the hesitancy of employers to pay for graduate school for employees, and austere local and state budgets that affected the job market and support for continuing education for teachers.

By Nathan E. Bell, Director, Research and Policy Analysis

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Table 3. Changes in First-Time Graduate Enrollment in Education by Field of Study and Race/Ethnicity, Fall 2009 to Fall 2010

	American Indian/ Alaskan Native	Asian/ Pacific Islander	Black/ African American	Hispanic/ Latino	White
Education, Total	-16.8%	3.8%	-17.7%	5.9%	-7.0%
Education Administration	-4.0%	-1.2%	-30.0%	6.5%	-9.3%
Curriculum and Instruction	-27.0%	-4.4%	9.2%	-4.0%	1.1%
Special Education	-3.0%	4.7%	-19.2%	9.1%	-2.6%
Secondary Education	-27.3%	-15.2%	-5.6%	3.4%	-17.5%
Student Counseling and Personnel Services	-18.0%	15.3%	-40.8%	2.0%	-2.7%
Elementary Education	-43.5%	-2.8%	-4.4%	-14.6%	-16.1%
Educational Assessment, Evaluation, and Research	-71.4%	4.1%	-1.5%	-0.9%	-6.6%
Higher Education	-50.0%	-18.3%	7.1%	13.1%	12.6%
Early Childhood Education	-14.3%	-14.3%	15.2%	40.4%	-8.4%
Education, Other	-9.8%	14.7%	-8.7%	17.2%	-6.0%

Note: Includes US citizens and permanent residents only.
Source: CGS/GRE Survey of Graduate Enrollment and Degrees

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Case Study at MIT

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