



# Communicator

Council of Graduate Schools

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## Financing Graduate Education: Recent Trends, Future Concerns

American graduate education is expected to experience significant enrollment growth over the next ten years. According to the National Center for Education Statistics, total enrollment of students in master's and doctoral programs is expected to rise 19% over the next decade, when an estimated 2.5 million students will be seeking advanced degrees. Much of this increase will come from women, who are predicted to account for 62% of all graduate students ten years from now (up from 58% today), and from racial/ethnic minorities. Data from the Council of Graduate Schools' most recent Graduate Enrollment and Degrees survey report show that over the past 20 years, total enrollments of under-represented minority students (African Americans, Native Americans, and Latinos) have grown more than five times faster than enrollments of White students, and these enrollment trends are likely to continue.

While the increased diversity and predicted overall growth in graduate education should be celebrated, they raise a very important question: How are graduate deans and department chairs going to fund all of these new students -- particularly students of color, who may not have the resources to pay for graduate education without substantial monetary assistance? The answer to this question could have profound implications for the future growth of graduate education. Because the past is often a prologue to the future, before attempting to answer this question we first review some of the major recent trends in financing graduate students, and then examine what effect these trends may have on future enrollments.

Unfortunately, the recent trends in student financing of graduate education do not provide an encouraging picture for support of future enrollments. Data from NCES' National Postsecondary Student Aid Study show that from academic year 1999-2000 to 2003-2004, the annual total price of attendance (the total cost of tuition, fees, books, educational supplies, living expenses, and other education-related charges) for students in master's degree programs at public colleges and universities increased over 15%, and now totals nearly \$22,000. At private institutions, annual prices charged to master's degree candidates grew 14%, and now average more than \$34,100. Similarly, doctoral education has become more

expensive, with charges to students rising 27% and 20% at public and private universities, respectively (doctoral education increased at a higher rate than master's due primarily to higher expenses for educational supplies and similar costs).

Graduate schools increased the dollar amounts of their support for education from traditional sources -- fellowships, research and teaching assistantships -- to help students meet these added expenses. But their additional support has been unable to keep pace with students' need for aid funds. In the 2000 to 2004 period, the average amount of fellowships to doctoral candidates increased 28% at public institutions and 9% at private institutions. But these higher fellowships covered, on average, just 47% of the total price of attendance at public colleges and 34% at private institutions; for master's degree students, fellowship amounts also rose, but still covered less than half the total student charges. In addition, the share of doctoral candidates with teaching or research assistantships also increased, rising from 44% to 49% at public institutions and from 29% to 31% at private colleges and universities. But once again the average assistantship amounts in 2004 (\$12,664 at public, \$14,941 at private) were not enough to close completely the gap between students' total expenses and financial support received.

Graduate student financing trends varied by students' race/ethnicity. Average fellowship awards to under-represented minority doctoral

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## Financing Graduate Education

students grew by just 4% between 2000 and 2004, compared with gains of 11% for Whites and 10% for Asians. Additionally, just 28% of under-represented minority students in doctoral programs received assistantships in 2004; this compares with 65% of Asian/Pacific Islander Americans and 37% of Whites. Asian American doctoral students were also substantially more likely to receive fellowships (54%) than Whites (43%) and under-represented minority groups (39%).

Increasingly, all students generally and minority students especially have been making up the gap between fellowship and assistantship support and the total price of attendance by taking additional student loans. Between 2000 and 2004, the percentage of all under-represented minority doctoral students with student loans grew from 30% to 39%, and the average annual amount borrowed increased 36% -- from \$13,924 to \$18,869. In the same period, the share of White students with loans grew from 25% to 33%, and the average annual amount borrowed rose from \$13,089 to \$17,537 (34%). Among Asian/Pacific Islander American students, the proportion with loans increased from 6% to 13%, and the amount borrowed grew 53%, from \$11,659 to \$17,830.

Several recent reports have also documented the increasing amounts of education indebtedness for students at the doctoral level. The National Science Foundation's study, *U.S. Doctorates in the 20th Century*, published in October 2006, reveals that the proportion of doctoral students in non-science and engineering fields who graduated with more than \$20,000 in education loans quadrupled between the late 1980s and late 1990s. The percentage for science and engineering doctorates who owed at least \$20,000 at graduation more than doubled during the same period. The data from NCEES' study suggest that these trends

have been exacerbated in the early part of the 21st century. Further, the 2004 Survey of Earned Doctorates reveals that 28% of African American doctoral recipients finished their studies with \$50,000 or more in education-related debt, compared with 18% of Latinos, 11% of Whites, and 7% of Asian Americans. These findings demonstrate that the growth in borrowing has affected under-represented minorities more substantially than any other group.

One major reason minority students were more likely to borrow and less likely to receive fellowship and assistantship aid is that a comparatively smaller percentage of them are enrolled in science, technology, engineering and mathematics (STEM) disciplines -- fields that have relatively greater resources for grant and research support for graduate education. In 2004, just 13% of African American doctoral candidates were studying in STEM disciplines, compared with 21% of Whites and 51% of Asian Americans. Roughly 9% of African American master's degree candidates were in STEM fields, compared with 11% of Whites and 36% of Asians.

What effect will the rise in graduate borrowing have on future enrollment? Very likely, the three greatest changes will be in student attendance status, enrollments in STEM fields, and overall degree completion. From 2000 to 2004, the share of all students at public colleges and universities who attended graduate programs full-time fell from 33% to 31%, and at private institutions, the proportion of full-time students declined from 37% to 32%. Even more telling is the fact that the proportion of doctoral candidates at private institutions who attended full-time dropped from 58% to 54%. It is possible that more students attended part-time in order to avoid or limit their borrowing. Increases in part-time enrollment may diminish the proportion of students who enter STEM disciplines, as these fields of study almost always require full-time enrollment due to the extensive laboratory instruction and other training students must

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# The Professional Science Master's Degree: What's Next?

*The following article was derived from a plenary session at the 2006 Annual Meeting of the Midwestern Association of Graduate Schools, "The Professional Science Master's Degree: Perspectives from the CGS PSM Advisory Board." Donald Langenberg, Professor of Physics and Chancellor Emeritus of the University System of Maryland is Chairman of that Advisory Board, and this article represents his contributions to the MAGS session. A version of this article will appear in the MAGS 2006 Proceedings along with the other presentations from that session. The Council of Graduate Schools wishes to thank MAGS for permission to publish this reprint.*

The basic concept upon which professional science master's (PSM) degree programs are based is almost self-evidently a good idea. Science and technology innovation by highly skilled individuals has become the key natural resource in an increasingly competitive global economy. No part of the world has a monopoly on the raw material of that resource. Smart humans are born everywhere every day. What distinguishes the more successful societies from the less successful is their ability to educate and train true innovators and to provide them with an environment in which they can fully exploit their talents and capabilities.

It is increasingly obvious that a high level of scientific and technological expertise is necessary in a rapidly widening array of careers. Gone are the days when most enterprises only occasionally needed some sort of special expertise and, when they did, could simply go out and temporarily hire an appropriately trained technician. Gone are the days when a generic management expert with an MBA could successfully lead a biotechnology business by spending a few hours boning up on what the acronym DNA means. These days, often as not, that business's CEO has a PhD in genomics.

And therein lies part of our challenge. It has sometimes been said that few institutions in our world are as resistant to change as universities, especially those with traditional graduate programs. In this view, such graduate programs have long been designed to train research practitioners who will replicate the professors who run them. That means culling out those students who might envision non-academic futures early in the process and guiding the "select" remainder toward the PhD degree. The master's degree under this assumption becomes either a mere milestone on the path to a doctorate or else a consolation prize for those who were not selected.

Of course, traditional science graduate programs have long graduated individuals who later demonstrated that they can successfully run a biotechnology business or a university (me, for example), but that has been an accidental and unintended outcome. Fortunately, many of our modern universities have in recent years become more "engaged," with graduate education leading the way in reforms. Not only are graduate programs beginning to take pride in those graduates who have used their degrees to pursue non-faculty career paths, they have begun to take responsibility for their professional development and continued success. Is it now recognized that in today's technologically competitive world, there is a need for scientists and technologists with many of the skills and abilities that

research PhDs possess, but who have also actually acquired the tools necessary to manage complex enterprises? The academic mechanism to produce such graduates is the PSM degree program.

PSM programs are "science plus"! They train real scientists who are also prepared to lead and manage in diverse environments. Their graduates may enter careers in a wide variety of enterprises, from government to business. They may be venture capital executives, making decisions about which new biotech opportunities to invest in. They may be patent examiners, deciding which new intellectual properties to protect and which not. (It might be noted that this is not really a novel career path. A century ago the Swiss patent office hired a new examiner from Switzerland's equivalent of MIT. In his spare time from his day job, the young Albert Einstein revolutionized physics.)

It is important to note that developing PSM programs is not the sole prerogative of institutions offering traditional doctoral programs in the sciences, because they are not simply ancillary derivatives of such programs. Any institution offering the master's degree that has strong faculty in the sciences and in other disciplines essential to a strong PSM program can mount a successful PSM program.

About a decade ago, the Alfred P. Sloan Foundation began to support the development of PSM programs. It is fair to say that we now have a successful proof of concept. There are today about a hundred such programs in about fifty institutions. As in most new developmental enterprises, they vary considerably in their levels of success. Some are wildly successful, many are very promising, and some have failed. But the results to date support the conclusion that it is time to take the PSM movement to scale and to make it a ubiquitous feature of American graduate education. Part of the basis for that conclusion lies in the current deluge of reports, media attention, and legislative proposals focused on signs of our nation's possible loss of leadership in the global high tech economic competition. In one way or another, that attention tends to focus on the need for improved education of Americans in science, technology, engineering, and mathematics (STEM). PSM programs are certainly not the whole solution to that problem, but they are certainly a very promising partial response to that problem, and they have been explicitly recognized as such in the current debate, including in proposed legislation.

In response to this situation the Sloan Foundation has funded a major effort by the Council of Graduate Schools to foster and promote the spread of PSM programs. It is well understood that this will require strong efforts across the full spectrum of American graduate institutions. It will require grass-roots faculty initiatives and advocacy, and institution-level leadership. As has been noted by one of my colleagues here, this movement is not for the faint of heart. Changing entrenched attitudes and practices in academe always requires courage, fortitude, and persistence. But what is at stake here is nothing less than the competitive capabilities of our nation, as well as the competitive positions of our institutions. I urge you all to get with the program and to get on with it in your institutions. You can find help and support in CGS.

*by Donald N. Langenberg, Professor of Physics and Electrical Engineering, University of Maryland, College Park*

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receive. And any decline in the number of students with specific training in science and technology fields could have negative consequences for future US economic competitiveness and innovation. Growing part-time enrollments also could lead to more students who take longer to complete their degree programs.

For students of color, the jump in borrowing could have an even more dramatic impact on degree completion. NCES' most recent Baccalaureate and Beyond longitudinal study showed that 76% of under-represented students of color who received fellowships during their first year of graduate study completed master's or doctoral programs within ten years, while just 54% of those who did not receive fellowships completed their programs within this time frame. The relatively slower growth in fellowship aid for minorities thus has the potential to exacerbate the already lower shares of persons of color with doctoral-level training.

Even with the increase in borrowing, graduate education still provides a great benefit for many students and for American society. The US Census Bureau estimates that over a working lifetime, on average, someone with a master's degree will earn 19% more than someone with only a bachelor's, and a doctoral degree increases earning potential by 62%. Citizens with master's and doctoral training also provide the United States with needed high-tech and other skills to grow the economy and remain competitive with our major trading partners. But these benefits can only be realized when more people actually complete their degree programs. Borrowing has the potential of both limiting the number of students who enter graduate programs and extending the time to degree so that students have fewer years in order to realize the full benefits of their education and training.

Paying for graduate education thus has become a major challenge for all students, particularly for under-represented students of color, and for American society. These students have had to borrow more to pay for rising post-baccalaureate expenses. Added loan debt, combined with the growth in part-time enrollment, may adversely affect time to degree and degree completion rates. Growing debt also may limit the number of specially skill workers our society will need in order to remain economically strong. Graduate education has the potential to experience tremendous growth in the years ahead. But this growth may be stunted if student loan debt becomes an even greater burden for students and their families.

*By Kenneth E. Redd, Director of Research and Policy Analysis, Council of Graduate Schools*

## CGS Launches Initiative on Graduate Education and American Competitiveness

Last year the Council of Graduate Schools issued a white paper titled NDEA 21: A Renewed Commitment to Graduate Education. This paper reviewed the historical role that graduate education has played in developing a highly skilled workforce equipped with advanced and flexible skills, capable of operating at the frontier of knowledge creation. Additionally, it advanced a series of principles to address contemporary challenges and a proposed process for responding to those challenges. Key stakeholders who must be engaged in developing plans and policies to enhance US competitiveness include leaders in graduate education, industry and government.

Accordingly, CGS is launching an initiative on Graduate Education and American Competitiveness to explore and identify effective models for achieving results and improving synergies across the three sectors. This initiative will be guided by an Advisory Committee on Graduate Education and American Competitiveness consisting of university presidents, graduate deans and corporate leaders. The Committee will provide advice and guidance on the development of a policy paper that will document how US graduate schools produce individuals who can create, innovate and translate innovation into goods and services in response to demands world-wide. Among other things, the paper will elaborate on the specific roles of universities, government and business in ensuring that the nation's graduate education capacity is nurtured and advanced in the next decades.

The policy paper will be released at the CGS legislative conference in spring 2007 to an assemblage of stakeholders. Currently, there is considerable policy attention focused on increasing America's competitiveness in the global economy. The 21st century knowledge-based economy places increasing value on education, research, discovery and innovation. For the past half century, the United States has led the world in technological advances and innovation. U.S. leadership in research and innovation has been critical to our economic success and national security. Leadership in graduate education is the essential ingredient in the country's leadership in research and innovation. Enhancing US competitiveness will require effective synergies between key sectors of our economy including graduate schools, industry and government. Achieving strengthened collaboration among these three sectors is particularly important as other countries and regions of the world are increasing their own investments in these areas.

This new CGS initiative is one important step forward in our larger national effort to enhance and secure US competitiveness in the future.

*Contact: Patty McAllister, Director of Government Relations and Public Affairs, Council of Graduate Schools*

# CGS Announces New Publications

## *Graduate Education for the Responsible Conduct of Research*

This book is based partly upon a project sponsored by the Office of Research Integrity, which allowed CGS to fund ten member institutions to initiate programs to train graduate students in the responsible conduct of research. It distills from the experiences of these ten institutions a list of best practices in establishing and sustaining RCR education in graduate research departments. It also provides a rationale for promoting RCR as a regular feature of graduate education, by addressing and answering the most common objections to its implementation. Though the book is aimed primarily at graduate deans, it should also prove useful for department chairs and faculty members who are planning RCR courses or activities in their departments, and who need to know more about how to design and advance them.

Copies of the publication can be ordered on-line from the CGS website beginning November 15, 2006.

## *Selected Legal Issues*

Legal issues affecting graduate education surface in a variety of areas at the very heart of the university's academic enterprise: from academic and research misconduct, and admissions and employment, to disputes regarding the measurement and communication of academic progress. This updated and revised CGS publication is intended as a general guide for graduate deans and other university administrators to the range of these legal issues and their related implications for graduate education. Specific topics of discussion include evaluation of academic performance, student misconduct, fraud, personnel management, institutional liability and other special topics such as sexual harassment, student privacy and immigration. The publication also includes recommendations regarding policies and procedures designed to reduce risk of legal conflict. When legal challenges arise, it is important that graduate administrators seek appropriate legal counsel. However, an enhanced understanding of the legal issues that can arise may better position graduate education administrators to craft policies and procedures that minimize the risk or even prevent conflicts from escalating into legal issues in the first place.

Copies are available for order now at the CGS website.

## New Deans and Titles

Michael S. Bisesi is Senior Associate Dean at the University of Toledo - Health Science Campus. He replaces Keith K. Schlender.

Joseph W. Bruno is Provost & Vice President for Academic Affairs at Wesleyan University. He replaces Judith C. Brown

Rodney L. Custer is Associate Vice President for Graduate Studies, Research, & International Education at Illinois State University. He replaces Gary D. McGinnis.

Donna L. Dickerson is Dean of Graduate Studies at the University of Texas at Tyler. She replaces J. Milford Clark.

John P. Dirkse is Interim Associate Vice President, Academic Program/Dean, Undergraduate & Graduate Program at California State University, Bakersfield. He replaces Edwin H. Sasaki.

Larry Ewing is Interim Dean, College of Graduate & Professional Studies at Park University. He replaces Mathew Kanjirathinkal.

David A. Francko is Assistant Vice President, Academic Affairs & Dean, Graduate School at the University of Alabama. He replaces Ronald W. Rogers.

Lorna Gibson is Associate Provost at the Massachusetts Institute of Technology. She replaces Claude Canizares.

Owen W. Griffith is Interim Dean, Graduate School of Biomedical Sciences at the Medical College of Wisconsin. He replaces William R. Hendee.

Faith Hensrud is Assistant Vice Chancellor, Academic Affairs at the University of Wisconsin-Superior. She replaces Christopher L. Markwood.

John T. Ho is Acting Vice Provost, Graduate Education & Dean, Graduate School at the University at Buffalo, SUNY. He replaces Bruce D. McCombe.

Tom Jackson is Dean of Graduate Studies at Idaho State University. He replaces John M. Knox.

Steve Kramer is Graduate Dean, Interim at San Diego State University. He replaces Janis Andersen.

Amos O. Olagunju is Dean and Chief Research Officer at Winston-Salem State University. He replaces Linda Nixon Hudson.

Teofilo Ozuna is Associate Vice President, Academic Affairs, Graduate Programs at the University of Texas - Pan American. He replaces George P. Avellano.

Joe F. Pittman and George T. Flowers are Interim Deans, Graduate School at Auburn University. They replace Stephen F. McFarland.

Mark Rudin is Vice President, Research & Graduate Dean at the University of Nevada-Las Vegas. He replaces Paul W. Ferguson.

G. Richard Wetherill is Interim Dean, Graduate Studies at East Central University. He replaces Alvin O. Turner.

Peggy Yehl Burke is Dean, Graduate Studies & Dean, School of Education at St. Bonaventure University. She replaces Michael J. Fischer.

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We are looking forward to seeing you at the Annual CGS Conference in December. Be sure to attend the Peterson's sponsored reception honoring this year's recipient of the CGS/Peterson's Award for Innovation in Promoting an Inclusive Graduate Community.

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## CGS Welcomes New Institutional Members

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San Diego State University is seeking an innovative and energetic academic leader, committed to growth and expansion, to serve as its Dean of Graduate Affairs. San Diego State University is among the largest of the 23 campuses in the California State University system with a highly diverse student population of over 34,000, including 6,000 graduate students. With 75 master's and 16 doctoral programs, San Diego State University is currently designated a Research University/High Research by the Carnegie Foundation with \$130M in external grants and contracts. Additional information about Graduate Affairs at SDSU can be found at <http://gra.sdsu.edu/index.php>.

The Dean of Graduate Affairs reports directly to the Vice President for Research and will lead the direction of graduate education at SDSU. Primary responsibilities for the Dean include developing and implementing effective policies and strategies to increase graduate student enrollment; developing new graduate programs while sharpening the academic quality and focus of existing programs; expanding the number of doctoral programs offered by the University while maintaining a climate in which all doctoral programs can flourish; being an effective advocate for resources; building alliances with business, government, private sector, and other constituents to increase resources for graduate education; implementing effective policies to support an ethnically diverse graduate student population; directing the academic review process for graduate programs, and Chairing the Graduate Council.

Qualifications include an earned doctorate and a history of teaching and scholarly achievement appropriate for the rank of professor in a department of the University. The successful candidate must also possess a record of graduate teaching and mentoring of graduate students, directing master's theses and dissertations; significant, progressive administrative experience in graduate education including managing staff in a responsive, service-oriented office; demonstrated achievement as a program builder; knowledge of graduate curriculum and program trends, and active involvement with national issues in graduate education; demonstrated experience establishing and maintaining collaborative relationships with diverse individuals, groups and organizations across disciplines; outstanding communication skills.

Nominations are welcome. Candidates may also apply directly by sending a letter of application, curriculum vitae, and the names, addresses and phone/fax numbers of at least five referees, who will be contacted only with permission of the candidate at an advanced stage of the search. Candidates should address in their letters of application how they meet the Qualifications listed above. The review of applications will begin on December 1, 2006 and will continue until the position is filled.

Please send all communications to: Vice President for Research, Dean of Graduate Affairs Search Committee, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-8020.

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# Annual Meeting

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