NDEA 21: A RENEWED COMMITMENT TO GRADUATE EDUCATION

The Council of Graduate Schools

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About CGS:

The **Council of Graduate Schools** (CGS) is the leading national organization dedicated to the improvement and advancement of graduate education. Council members are colleges and universities engaged in research, scholarship and the preparation of candidates for advanced degrees. Current CGS membership includes over 450 universities in the United States and Canada, and 11 international affiliates. CGS member institutions award annually more than 90 percent of all doctorates and 85 percent of all master's degrees.

Established in 1961, CGS accomplishes its mission through advocacy in the federal policy arena, conducting research, and through development and dissemination of best practices. The Council acts as a convening authority, bringing graduate deans together in task forces, committees, workshops, seminars and an annual meeting, to discuss and take action on major issues in graduate education

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What is the current situation?

The United States emerged over the last hundred years as a nation of unparalleled prosperity and strength on the merits of industry and manufacturing. Our nation's education system, from kindergarten through graduate school, has fueled this emergence, providing a workforce highly adept at meeting the needs of the public, private, and non-profit sectors. The conditions for U.S. economic success and national security in the future, however, require new educational strategies at all levels and a renewed commitment to higher education, and to graduate education in particular. Today's top business leaders and thoughtful observers recognize that while industrial and manufacturing economies were key to past prosperity, future success depends crucially on the synergies between new knowledge and human capital (Becker 2002). Summarizing this global consensus on the knowledge economy, Intel CEO Craig Barrett recently argued: "We're not going to have an economy based on natural resources. We're not going to have an economy based on low labor rates. We're going to have an economy based on knowledge… A knowledge-based industry. A knowledge-based economy" (Barrett 2002).

Half of the economic growth over the last half century has been the result of technological innovation (U.S. Department of Commerce 2000). Technological advances in the biomedical and computer sciences and in the information and telecommunication infrastructure have each made the country more secure and economically sound. Such technological innovation has been enabled by a policy environment conducive to economic growth, a diverse population of ready talent, and a higher education system that is unparalleled in terms of quality and expertise. At the same time, advanced research in fields such as information technology (IT), nanotechnology, and aeronautics have strengthened national security as military engagement has evolved to reflect a new technological and economic environment. Looking ahead, America's prosperity and security in the 21st century depend upon innovation, scientific discovery, and knowledge creation (Council on Competitiveness 2004). In the knowledge-based global economy, the clearest path for the country to remain competitive and secure is promotion of a highly-trained workforce equipped with advanced and flexible skills, capable of operating at the frontier of knowledge creation. A major part of the responsibility for preparing such a workforce will rest on our nation's graduate schools, and it is for this reason that we as a nation must strengthen our commitment to graduate education.

For nearly 50 years, our country has reaped the benefits of its commitment to graduate education and research. U.S. graduate schools have been the jewel in the crown of our educational system, attracting the top domestic and international students by creating dynamic graduate programs that foster research, scholarship, and scientific discovery. Today there are over 1.5 million graduate students studying in the U.S., more than any other country in the world. But beyond the numbers, historically this has been a story of extraordinary talent attracted to U.S. graduate study.

The work of graduate students contributes directly to sustained economic growth, prosperity and national security. Graduate students have gone on to conduct ground-breaking research in universities, national laboratories, and private industry. Many international students have remained in the U.S. and contributed to our scientific and technological accomplishments, while others have returned home to become national leaders and ambassadors for America.

However, several factors are now converging to pose a serious threat to America's ability to sustain a competitive science, engineering and technology workforce. Former U.S. Defense Secretary William Perry, backed by the nation's hi-tech community, recently warned a congressionally appointed commission that the United States is "losing its edge in the information technology that has been key to this country's military superiority" (Armstrong 2005). And other reports have echoed this warning in terms of the country's economic competitiveness (The Task Force on the Future of American Innovation 2005; Council on Competitiveness 2004).

One of the key factors contributing to this situation is the diminished ability of our nation's graduate schools to attract the best international and domestic talent. Until recently, the U.S. produced more Ph.D.'s in science and engineering and attracted more international graduate students than any other region of the world. Due in part to a stagnation in the numbers of U.S. domestic students who have chosen to pursue research Ph.D.s in science and engineering (S&E), Europe has now surpassed the U.S. in S&E Ph.D. production, and China is poised to do so within the next few years. The United States is no longer attracting a sufficient number of highly qualified students into key research fields to develop the next generation of innovators and discoverers needed to sustain our economic leadership and national security into the 21st century. One key reason that this situation has emerged is that as a nation we are under-investing in research and human capital development.

This fact was noted in the final report of the Hart-Rudman Commission on National Security, which stated that "the U.S. government seriously under-funded basic science research in recent years…. The inadequacy of our system of research and education poses a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine. America's leadership must understand these deficiencies as threats to national security. If we do not invest heavily and wisely in rebuilding these two core strengths, America will be incapable of maintaining its global position long into the Twentieth century" (U.S. Commission on National Security 2001).

Many of our nation's remarkable achievements to date have been made possible by a national commitment to the funding of graduate education and research. Currently, U.S. doctoral students are funded through graduate teaching or research assistantships that support students in exchange for their contribution to the teaching and research institutional mission. Doctoral students are also funded through fellowships or traineeships, which directly support students during their graduate studies for their individual course work and/or thesis work (See Figure 1).

A large portion of graduate students are supported on research assistantships through faculty research projects. This form of support is an extraordinarily important driver of research and innovation because graduate students constitute a significant part of the science and engineering labor force in U.S. research labs. Research assistantships provide graduate students the opportunity to contribute to leading-edge research while gaining critical financial support to pursue their doctoral studies.

Recent research suggests that the most effective approaches to maximizing doctoral outcomes are funding models that leverage departmental and institutional commitments to student success (see Bowen and Rudenstine 1992; Nelson and Lovitts 2001; Nettles and Millett forthcoming). One successful model is competitive fellowships, also known as traineeships, awarded to universities based upon their demonstrated excellence in several core areas that are vital to ensuring a highly skilled research and development workforce. Such core areas include doctoral training in the disciplines and at the interface of disciplines, effective mentoring, and appropriate skills development. Successful institutions then make awards to qualified students within designated fields. The National Science Foundation has initiated such competitive fellowship programs in the Integrative Graduate Education and Research Traineeship (IGERT) and the Alliances for Graduate Education and the Professoriate (AGEP). And the National Institutes of Health has established the Ruth L. Kirschstein National Research Service Awards Training Grants and Fellowships on this competitive model (Pion 2001). These models reward creative approaches to doctoral preparation and are at the forefront of contemporary graduate support.

There are many specific advantages of such a model. Because the competitive institution receives the grant and then awards the fellowship to students, funds may be targeted toward strategic national priorities and mission objectives rather than dispersed to a variety of research paths chosen by individual students. Because the institutions selected are proven agents of accountability and change, this structure also allows for a clearer assessment of program funding impact to ensure scarce resources are well spent. The university is able to identify students with the greatest potential to succeed in its unique institutional environment and to ensure the success of those students through supportive policies and program enhancements. And finally, students benefit from the comprehensive model of doctoral preparation that such traineeships reward through greater integration into the department that leads to higher completion rates, lower drop out rates, and better career preparation for the diverse array of jobs awaiting them.

Portable fellowships are another approach, one which offers the student considerable flexibility, discretion and control during the admissions process. Because the fellowships go directly to students, they have flexibility in selecting the institutions that best meet their interests. For those applicants who have a clear understanding of the characteristics of the graduate training program options available, this flexibility allows them to self- match effectively . They can identify the faculty they want to work with and the specialty they want to pursue. These highly motivated students can make enormous contributions to the STEM disciplines. The NSF Graduate Research Fellowship (GRF) program has a fifty year track record of attracting some of the highest caliber students using a portable fellowship model. (WestEd 2002).

All three forms of support are needed. Research assistantships will continue to be supported through federal investments in research and development. Expanded federal support for students through competitive fellowships and portable fellowships offers the opportunity to significantly strengthen doctoral student preparation for both immediate and sustained contributions to national competitiveness and security. The most strategic use of an incremental increase in new federal resources would be an appropriate mix of institutionally-awarded competitive fellowships and portable fellowships that capitalize on the strengths of each mode of funding.

How well positioned are we to produce the knowledge creation workforce of the future?

Our historic national commitment to graduate education and research has been an important component of our economic prosperity and domestic security for a half-century; looking forward, the future is much less clear. We are not well positioned to sustain and expand the knowledge creation workforce that our country needs because:

- In science and engineering, the share of U.S. graduate students is diminishing. This is, in part, due to student financial considerations. When faced with lucrative opportunities in law or business, too often many of our most talented domestic students choose to pursue non-science and engineering careers. This leak in the domestic science and engineering pipeline diminishes our ability to sustain a robust domestic science and engineering workforce. This decline in U.S. participation will inevitably result in fewer discoveries by scientists within the U.S. and a decline in the very technology development and innovation upon which U.S. economic prowess has depended.

- Unless we increase the participation of all segments of our domestic talent pool in graduate education, we are unlikely to meet the challenges of the 21st century. We are living in an increasingly ethnically and culturally diverse nation and anticipate that there will be enormous growth in the country's ethnic minority population over the next several decades. Over the next 50 years, the nation's Hispanic and Asian populations will triple and the United States will be a country with no clear majority group. According to the U.S. Census Bureau, the population of Hispanics in the U.S. will increase from 35 million in 2000 to over 100 million in 2050, while the population of Asians will increase from 10 million to more than 30 million. Diversity is a valuable and important part of American society, yet Hispanic and African American students are highly under-represented in graduate schools, particularly in science and engineering where each group makes up less than 10% of graduate enrollment and less than 5% of new Ph.D.'s. While women are the fastest growing group in graduate education, they too remain under-represented in engineering and the physical sciences. These demographic trends present a long-term challenge to America's economic competitiveness. We cannot afford to ignore the intellectual contribution of a significant percentage of our society.

- In recent years, international students have compensated for declining domestic enrollment in science and engineering. While international students represent less than 5 % of enrollment in education and public administration, today international students make up half of the graduate enrollment in engineering, over 40% in the physical sciences, and a significant portion of graduate enrollment overall (See Figure 2). The large number of Nobel prizes awarded to foreign-born American scientists, particularly in physics, chemistry, and physiology/medicine, is a testament to the contribution of international scholars (See Figure

3). But changing visa policies and negative perceptions of the U.S. abroad now make it more difficult to attract international students. These changes occur just as the rest of the world awakens to the power of the U.S. strategy of economic growth through excellence in graduate education. Thirty years ago the U.S. produced the vast majority of the world's doctoral degrees each year. In 1998, Europe surpassed U.S. production of Ph.D.'s in science and engineering, and Asia is rapidly closing the gap in doctoral production (See Figure 4). The governments of China, India, and Korea are heavily investing in capacity at the graduate level. Collectively, European countries are harmonizing their systems of education, making their degrees more portable, flexible, and accessible to students in countries from which the U.S. has traditionally drawn students. The broad-based recent declines in international applications to U.S. institutions (- 28%) and first-time enrollment (-6%) could signal a shift in the extent to which we can rely upon international students to support our research endeavors in science and engineering and perhaps all fields (See Figure 5).

- Society is experiencing a dramatically escalating rate of knowledge gain and increasing complexity. Our future competitive success will demand creativity, problem solving ability, knowledge across fields (science, technology, engineering, mathematics, social sciences, and critical foreign languages), and effective communication skills in addition to discipline knowledge. Historically, the strength of U.S. graduate education has been advanced preparation at the core of each discipline. Increasingly, new knowledge creation occurs at the interface of academic fields, demanding that graduate programs modify their disciplinary traditions and adopt approaches that span academic fields in teaching and research. Innovation also demands teamwork, dictating a greater focus on communication and collaboration skills. The need to apply new knowledge in multiple research domains will also be a defining characteristic of the next generation of research. The graduate community is committed to respond to these challenges. Effective doctoral preparation in the future will build on the unheralded traditions of the past and incorporate new modes of training and skill-development to produce the next generation of new knowledge creators. The emergence of professionally-oriented master's programs will also provide a new career pathway for graduate students interested in joining the STEM workforce.

Maintaining our national competitiveness and renewing the nation's commitment to scientific discovery and innovation is a challenge, particularly when state budgets for higher education are being eroded (See Figures 6). State spending on higher education has declined from around 8% of total expenditures in the late 1970s, to less than 6% in 2000. Reductions in state budgets have, in part, resulted in fewer opportunities for graduate schools to provide critical financial support. Because graduates are so mobile and job opportunities so dispersed, states have falsely assumed that investment in graduate education does not directly benefit state economic development (Ehrenberg 2005). The federal government has historically recognized this dilemma by supporting graduate education and research, but recently federal support for science and engineering research has declined as a percentage of GDP, further threatening the nation's ability to compete (See Figure 7).

What did the country do when faced by a similar threat in the past?

This is not the first time we have met the dual challenge of bolstering economic competitiveness and national security. During the Cold War and Sputnik era, we believed that our national security was contingent upon maintaining a robust doctoral and scientific enterprise. Presidents Eisenhower and Kennedy worked to establish and maintain support for the National Defense Education Act (NDEA) despite economic uncertainties. President Eisenhower argued, “The strength of our arms is always related to the strength of our minds. Our schools are strong points in our national defense” (Lawrence 1957).

The NDEA was a remarkable national statement about the shared purpose of the federal government and our institutions of higher education in promoting doctoral education. The NDEA contributed to growth in capacity and quality of doctoral education by providing a broad range of institutions the opportunity to fund over 27,000 doctoral fellowships across all fields. These fellows completed their degrees faster than non-fellows and have been leaders in U.S. scholarship, scientific discovery, and business innovation for the last fifty years. The remarkable contributions that NDEA fellows have made to the nation’s prosperity led a group of scholars to recently rank the NDEA as one of the most significant pieces of legislation of the last fifty years (Jacobson 2005).

Call for NDEA 21

The challenges we face today call for new solutions. Global terrorism and nuclear proliferation must be addressed by harnessing the intellect of our research community. At the same time we confront an increasingly competitive and knowledge-based global economy. As some have argued, the space race has become the skills race. To compete in this century as we did in the last, we must reinvigorate our national research and scholarship base through a major new program to support doctoral education.

Clearly the challenge of national economic competitiveness and security relate broadly to improving the quality of our K-12 schools and increasing the participation of a wider-range of students in undergraduate programs in key fields. However, one of the lessons of the original NDEA was that effective support for graduate education provides a necessary starting point for a comprehensive plan to address challenges across the educational spectrum as well as in industry and government sectors.

Our current national needs are also different from the 1950s. The original NDEA responded to the Sputnik challenge and the regional concentration of graduate programs that left many parts of the country without adequate capacity to train doctoral students. However, it was clear to all concerned that the U.S. was rapidly losing its competitive advantage. The goals of the NDEA were to enhance our national security and economic competitiveness. Through NDEA funding we accomplished these goals and to this day the country is reaping the benefits of a relatively small public investment.

Although there is now substantial graduate infrastructure in all parts of the country, many institutions have a diminished capacity to support graduate students. For several years, deans of America’s graduate schools have named student support as the most pressing issue they face (Brown and Doulis 2005). The challenge of the 21st century is not only to replenish the supply of an ever-aging faculty, but also to increase the number of highly trained scientists, researchers, and scholars equipped to create new knowledge in all segments of the economy and to sustain America's prosperity and security.

In order to meet this challenge, we must maintain existing support for graduate assistants, but we must also increase competitive fellowship and portable fellowship programs. We must target support to fields with declining domestic participation and which are most closely linked to economic prosperity and national security. We must also support the development of professional science master's programs which will increasingly prepare important segments of the STEM workforce by providing alternative career pathways. The legacy of NDEA shows we will best meet the challenges of the 21st century by entrusting graduate schools to develop the next generation of knowledge creators through innovative graduate programs, leading-edge research, and effective partnerships with key stakeholders. Graduate schools accept accountability for this goal and are responding aggressively within the constraints imposed by resource limitations. By building on effective models of graduate support that combine rigorous research instruction with career preparation and the development of varied skills for careers in key fields, we will ensure the challenges of this century will be overcome. Institutions that commit to this approach should be the model and backbone of NDEA 21.

What are the Principles of NDEA 21?

A new NDEA program should draw on the experience of the original NDEA, address contemporary challenges, and bolster the foundation in graduate education by:

- Establishing stronger links between graduate schools and employers. Employers require a highly-trained workforce equipped with advanced and flexible skills, and capable of operating in interdisciplinary teams at the frontier of knowledge creation. Our graduate schools recognize this need, but more effective translation requires strong linkages.
- Providing funding to support students trained at the doctoral level in the sciences (including aspects of the social sciences that advance competitiveness and security), technology, engineering and mathematics, as well as disciplines that foster global understanding of languages and culture. All these fields will be essential to maintaining America's leadership in the knowledge-based economy of the 21st century.
- Expanding U.S. citizen participation in doctoral study in selected fields through graduate support awarded through a mixture of different models of graduate support: some awarded competitively to universities across America and others awarded individually through portable fellowships. Portable fellowships offer certain benefits to attract the highest caliber of students and give these students discretion over which institution they attend. The model of competitive fellowships, or traineeships, where support is given to doctoral students through a comprehensive institutional program, offers another effective way to meet the nation's goal of expanding the science and engineering workforce, equipped with a broad range of career-skills. Similar in design to the original NDEA program, such institutionally-awarded competitive fellowships are efficient funding mechanisms because they permit universities to leverage additional private funding, maximize public investments, and effect positive change. An appropriate mix of both funding models is needed and should be determined by a committee of experts from the graduate education community.

- Providing incentives to support the establishment, implementation, and sustainability of professional science master's programs. These new programs offer a new pathway to STEM careers and by design link graduate preparation with workforce needs.

- Requiring recruitment, outreach, and mentoring activities which promote greater participation and success, especially for under-represented groups.

- Fostering interdisciplinary research preparation, because knowledge creation and innovation occur at the interface of disciplines and demand partnerships.

- Directing attention to maximizing program quality as well as student quantity. This is an important component of competitive success and demands reassessment of the structure, function and outcomes of graduate education for the 21st century.

- Identifying appropriate ways for institutions to document their successes by reporting student progress and program accomplishments.

What are the next steps toward establishing NDEA 21?

A federal initiative of this magnitude and significance must be formulated with the participation of stakeholders in government, universities, and private industry. Fortunately, key public policy makers, including leaders in the House and Senate, already recognize these challenges and have begun work to address them. There is a need for a comprehensive approach, developed through a consensus building process with key stakeholders, to take the principles articulated above and craft meaningful public policies. Accomplishing this goal will greatly contribute to the nation's ability to compete globally in the 21st century.

The scope of the original NDEA encompassed public policy interventions across the educational spectrum. Thus, by starting with the graduate component of a new national competitiveness strategy, we will establish a model and a process that can be expanded to other areas of education and other strategically important sectors. The 21st century has begun and it is now time for an NDEA 21 to develop the talent and infrastructure needed to maintain our prosperity and national security in this new era.

For more information on the proposed implementation of these principles and of NDEA-21 see: Policy Principles and Recommendations for Legislative Implementation available at www.cgsnet.org.

Works Cited

Armstrong, David. (2005) Tech Industry Weighs in on U.S.-China Relations Ex-defense Head Says U.S. Losing Its Edge; Execs Decry Piracy. San Francisco Chronicle. (April 22).

Barrett, Craig. (2002). Reinventing the Communications Industry. Keynote address delivered at SuperComm 2002.

Becker, Gary. (2002). Human Capital. The Concise Encyclopedia of Economics. Available at: http://www.econlib.org/library/Enc/HumanCapital.html.

Bowen, William and Neil Rudenstine. (1992) In Pursuit of the Ph.D. Princeton, N.J.: Princeton University Press.

Brown, Heath and Maria Doulis. (2005) Data Sources: What Are the Most Pressing Issues on Your Desk? CGS Communicator. (May).

Council on Competitiveness. (2004) Innovate America. Washington, D.C. Available at: http://www.compete.org/pdf/NII_Final_Report.pdf.

Ehrenberg, Ron. (2005) Graduate Education, Innovation, and Federal Responsibility. Paper Presented at CGS/ORAU Conference on Graduate Education and American Competitiveness, March 9, 2005.

U.S. Commission on National Security (2001). Road Map for Security: Imperative for Change. Final Report.

Jacobson, Louis. (2005) Ten Bills That Really Mattered. Roll Call. (May 3).

Kane, Thomas J., Peter Orszag, David L. Gunter. (2003) State Fiscal Constraints and Higher Education Spending: The Role of Medicaid and the Business Cycle. Urban Institute, Washington, D.C. Available at: http://www.urban.org/url.cfm?ID=310787.

Lawrence, W. H. (1957) President Spurs School Aid Drive as Defense Need. New York Times. (April 5).

National Science Foundation. (2004) Science and Engineering Indicators, 2004. Washington, DC.

Nelson, Cary and Barbara E. Lovitts. (2001) 10 Ways to Keep Graduate Students from Leaving. Chronicle of Higher Education. (June 29).

Nettles, Michael and Katherine Milett. (forthcoming) Coming Up a Winner: Students and the Ph.D. Gamble. Baltimore, MD: The Johns Hopkins Press.

Pion, George. (2001). The Early Career Program of NRSA Predoctoral Trainees and Fellows. US Department of Health and Human Services, National Institutes of Health. NIH Publication Number 00-4900.

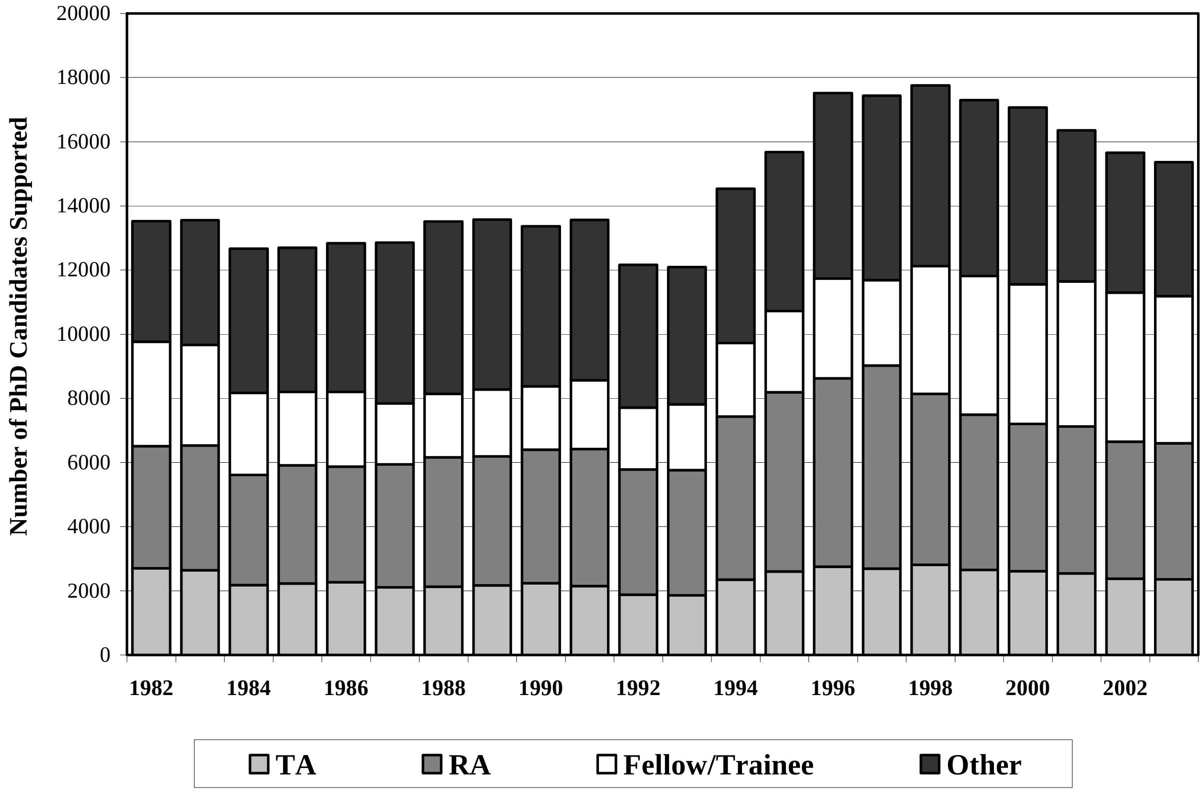
The Task Force on the Future of American Innovation. (2005) The Knowledge Economy: Is the United States Losing Its Competitive Edge? Available at: http://www.futureofinnovation.org/PDF/Benchmarks.pdf.

The National Academies. (2005) Policy Implications of International Graduate Students and Postdoctoral Scholars in the United States, Washington, DC.

U.S. Department of Commerce. (2000) Economics and Statistics Administration. Economy 2000. Washington, D.C.: Department of Commerce.

WestEd. (2002). National Science Foundation Graduate Research Fellowship Program Final Evaluation Report.

<u>FIGURE 1</u>: SOURCES OF SUPPORT FOR U.S. CITIZEN AND PERMANENT RESIDENT PH.D. CANDIDATES, 1982 – 2003



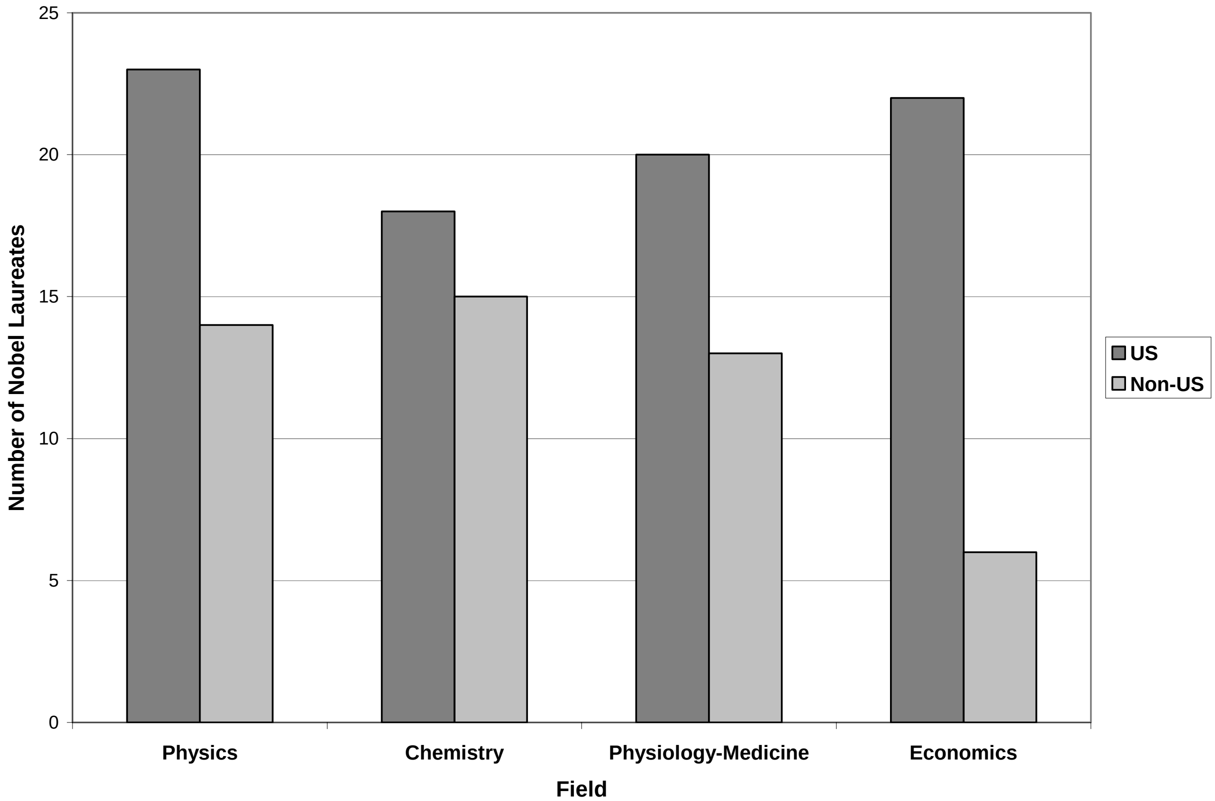
Source: Adapted from National Academies, Policy Implications of International Graduate Students and Postdoctoral Scholars in the United States (2005)

FIGURE 2: GRADUATE ENROLLMENT BY ETHNICITY AND FIELD OF STUDY (2004)

Major Field	Total	U.S. Citizens and Permanent Residents		Non-U.S. Citizen Temporary Residents	
Total	**1,503,540**	**1,129,606**	**83%**	**224,820**	**17%**
Biological Sciences*	66,593	46,892	74%	16,833	26%
Business	221,245	163,651	83%	34,404	17%
Education	295,191	261,084	96%	12,075	4%
Engineering	105,767	51,429	50%	50,675	50%
Health Sciences	98,799	83,540	90%	8,837	10%
Humanities & Arts	100,876	79,723	86%	13,173	14%
Physical Sciences	105,518	59,041	59%	41,639	41%
Public Administration and Services	54,252	46,986	95%	2,358	5%
Social Sciences	110,748	83,751	83%	16,798	17%
Other Fields**	97,694	80,604	89%	10,340	11%

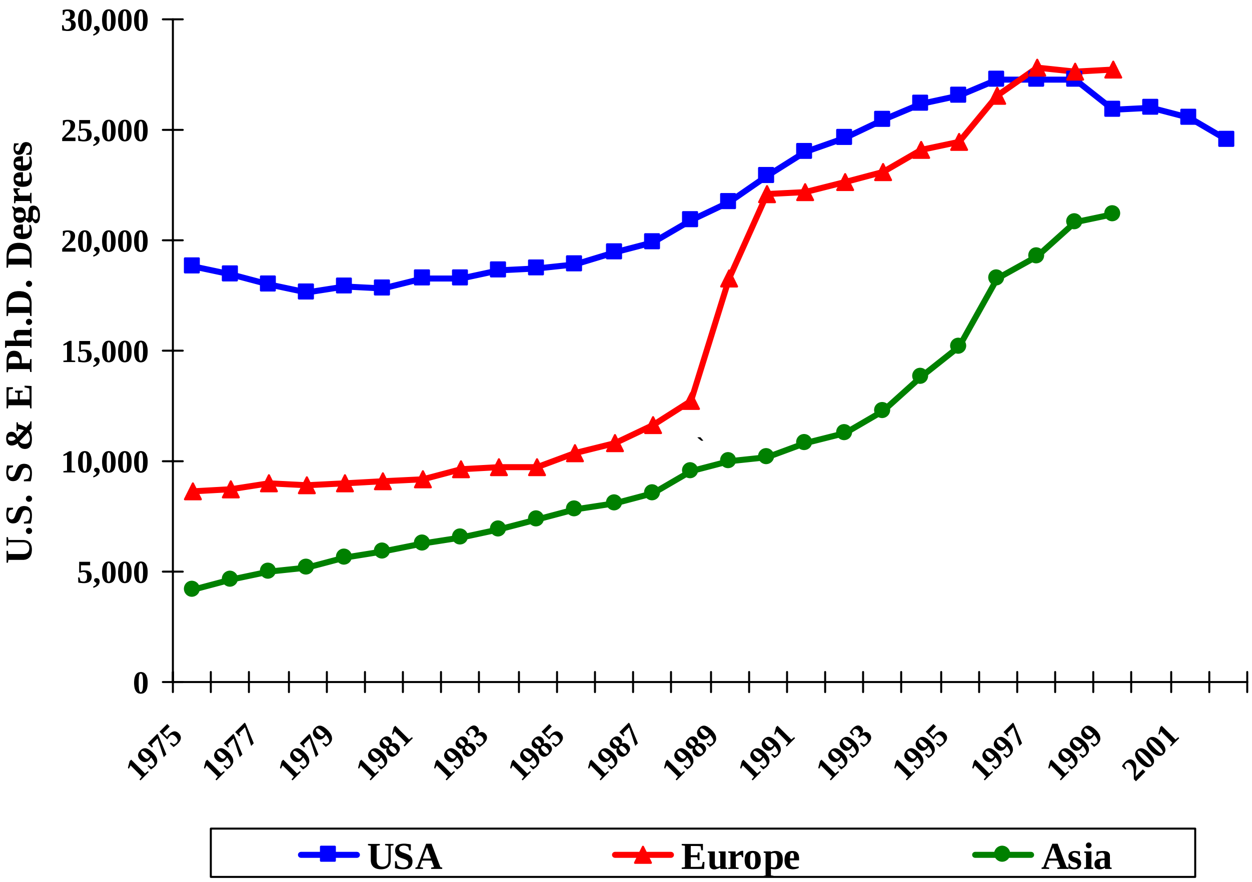
Source: Council of Graduate Schools, Survey of Graduate Enrollment and Degrees (2005)

<u>FIGURE 3</u>: EXCEPTIONAL CONTRIBUTIONS: U.S. NOBEL LAUREATES' COUNTRY OF GRADUATE EDUCATION, 1990 - 2004



Source: Adapted from National Academies, Policy Implications of International Graduate Students and Postdoctoral Scholars in the United States (2005). Data from the Nobel Foundation.

FIGURE 4: DOCTORAL SCIENCE AND ENGINEERING DEGREES BY WORLD REGION



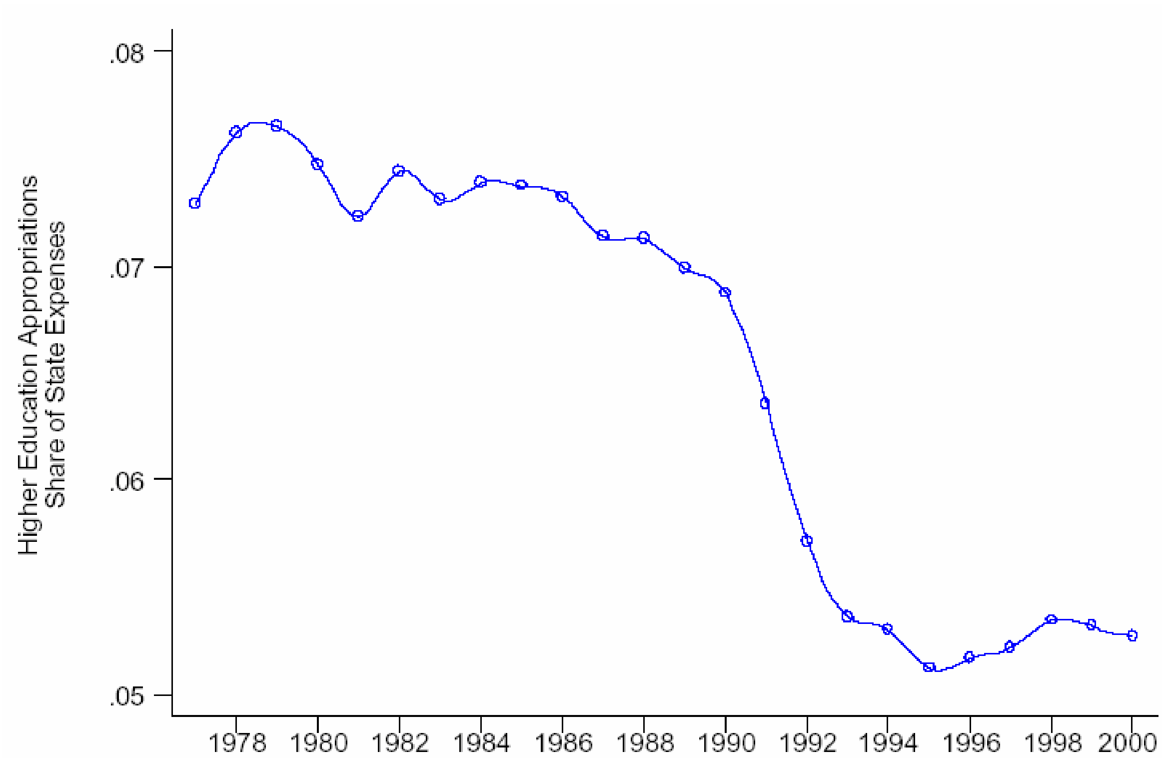
Source: Adapted from National Science Foundation, Science and Engineering Indicators (2004)

<u>FIGURE 5</u>: PERCENT CHANGE IN INTERNATIONAL GRADUATE APPLICATIONS AND FIRST TIME ENROLLMENT, FALL 2003 – FALL 2004

	Applications	First Time Enrollment
U.S. Citizen and Permanent	**0%**	**-2%**
International	**-28%**	**-6%**
<u>Country of Origin</u>		
China	**-45%**	**-8%**
India	**-28%**	**-4%**
Korea	**-14%**	**·11%**
Middle East	**4%**	**-2%**
<u>Field of Study</u>		
Business	**-24%**	**·12%**
Education	**-21%**	**-7%**
Engineering	**-36%**	**-8%**
Humanities	**-17%**	**-6%**
Life Science/Agriculture	**-24%**	**·10%**
Physical Science/Earth Science	**-22%**	**6%**
Social Science	**-20%**	**·10%**

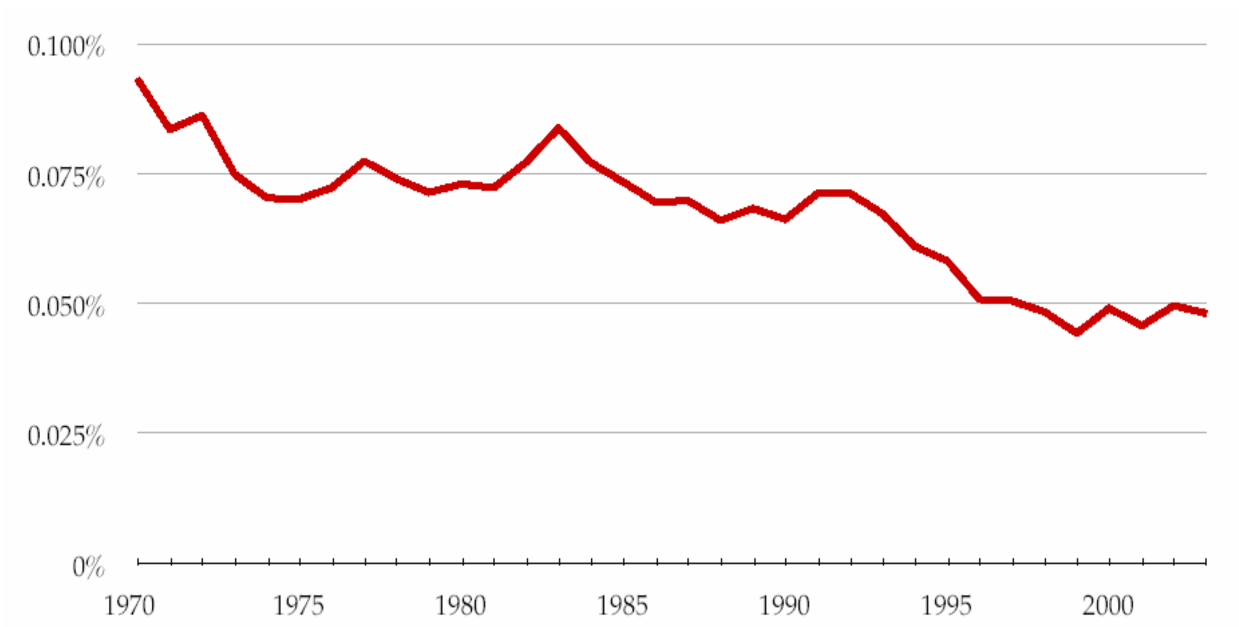
Source: Data drawn from Council of Graduate Schools, International Survey Program (2004)

<u>FIGURE 6</u>: STATE APPROPRIATIONS FOR HIGHER EDUCATION AS A SHARE OF STATE EXPENDITURES



Source: Taken from Kane et al. (2003)

FIGURE 7: RATIO OF U.S. FEDERAL GOVERNMENT FUNDING FOR PHYSICAL SCIENCES RESEARCH TO U.S. GROSS DOMESTIC PRODUCT, 1970 – 2003



Source: Taken from Task Force on the Future of American Innovation (2005)