Broadening Participation *in* Graduate Education

COUNCIL OF GRADUATE SCHOOLS

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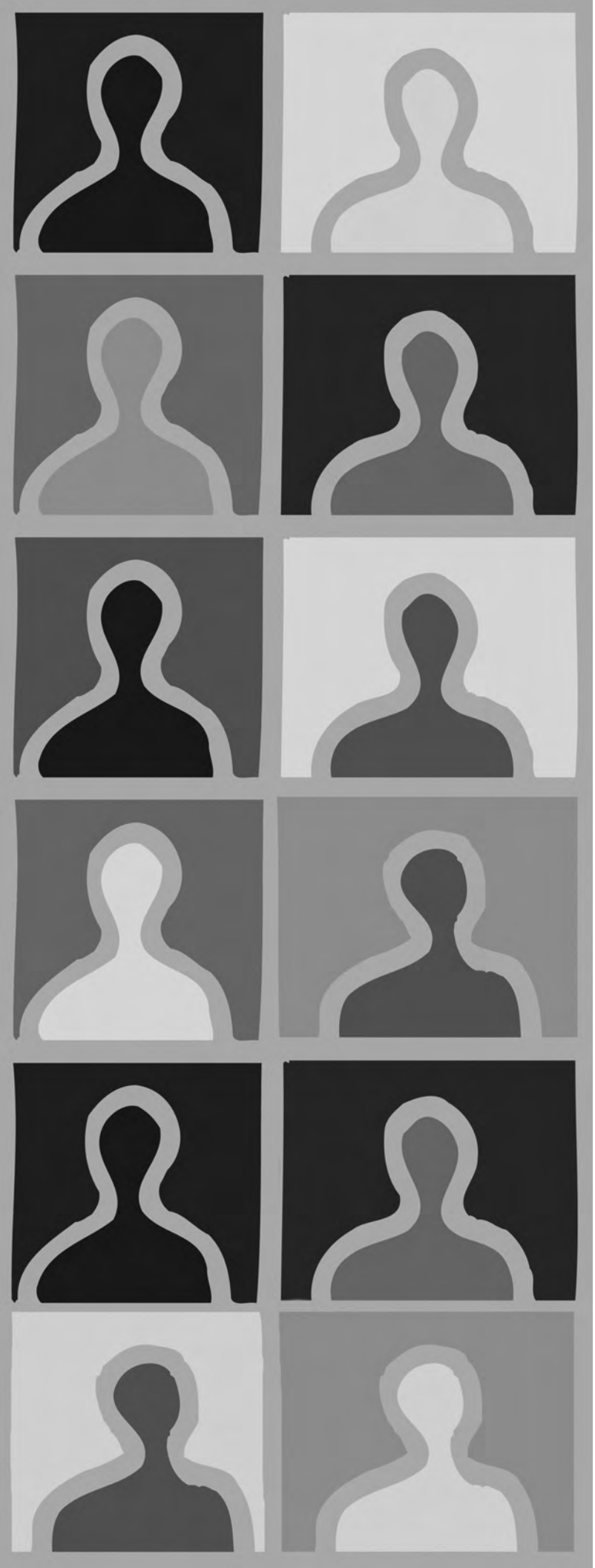

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Executive Summary

The face of higher education does not mirror the face of our nation. The proportion of college students who are members of underrepresented groups has been increasing, from 22 percent in 1997, to about 28 percent in 2006.[1] However, not enough students from underrepresented groups get their degrees, and not enough go on to graduate school.

Focusing on the increasingly diverse domestic talent pool must be a national priority. Diversity and inclusiveness are about more than gender and race; these concepts include socio-economic status, age, people with disabilities, international students, immigrants, and those who are the first generation in their family to pursue higher education.

Just a few months ago, we inaugurated the 44th president of the United States, the first African American leader of our nation. The president's new cabinet and other members of his administration are a mosaic of ages, races, genders, and ethnicities. Along with policy makers and other leaders, this diverse group brings a fresh perspective and energy to solving problems, revitalizing our economy, strengthening our national security, and improving the perception of the United States in the international arena.

During the presidential campaign, Barack Obama made the connection between a robust educational system and American economic strength and security, and he stressed the need to increase access and affordability of high quality education at all levels. Education must play a key role in our national strategy to enhance our competitiveness in the global economy.

Our system of higher education is arguably the best in the world, and graduate education is its bedrock, attracting top domestic and international students to our nation's graduate programs. A recent survey ranked the top 200 universities in the world. Six of the top 10 and nearly 40 of the top 100 universities are located in the United States.[2] To develop the talent we need to strengthen our economy and to maintain our quality of life, we must enhance diversity and inclusiveness initiatives in graduate education.

For the past 50 years, the United States has benefited from an investment in the preparation of knowledge creators, innovators, world leaders, and professionals in key fields, particularly science, technology, engineering, and mathematics (STEM). But many of the professionals who received their education under far-sighted programs such as the GI bill and the National Defense Education Act (NDEA) are approaching retirement. We are faced with the need to replenish this vital resource of people.

This critical need presents us with the opportunity to reverse a troubling trend. There is a leak in the domestic science and engineering pipeline. At a time when the need for STEM professionals is growing, the percentage of U.S. students pursuing graduate study in these fields is declining. If it continues, this decline in U.S. participation will inevitably result in fewer discoveries by scientists within the United States and a decline in the

technology development and innovation on which U.S. economic success has depended in the past.

Our nation is becoming increasingly diverse, yet Hispanic and African American students are highly underrepresented in graduate schools, particularly in fields such as science and engineering, where each group makes up less than 10 percent of graduate enrollment[3] and approximately 5 percent of new PhDs.[4] While women are the fastest-growing group in graduate education, they too remain underrepresented in some key fields. These demographic trends present long-term challenges that can be overcome only by a national commitment to developing all our country's talent.

This report, ***Broadening Participation in Graduate Education***, advocates for strengthening diversity and inclusiveness efforts in the graduate education enterprise as a key component of a national talent development strategy, which will ultimately strengthen our economy and maintain our quality of life. Clearly, one factor that contributes to the existing diversity of U.S. graduate programs is the presence of international students, and to remain strong, U.S. programs must continue to welcome talent from abroad. This report, however, focuses on the development of the domestic talent pool and particularly people from traditionally underrepresented groups.

This document explores the relationship between diversity and inclusiveness, and it offers definitions of these terms. We provide statistics on demographic population trends and their implications for higher education, and for graduate education in particular. A sampling of university-based programs that have had success in broadening participation is provided in the body of the report and in a separate section at the end, along with the results of select evaluations and federal and private initiatives.

We conclude with policy recommendations to develop the talent essential to respond to the challenges we face now and in the future. The historic cooperation and collaboration between government, higher education, and the private sector must be revitalized and strengthened. Considerable progress has been made to expand diversity in higher education and to promote inclusiveness, but more can be done.

We offer recommendations for both universities and policy makers in recognition of the shared partnership that exists between these two entities and the need to strengthen this partnership going forward. Doing so will realize the power of diversity and inclusiveness in graduate education to continue to achieve the promise of our land.

In these challenging economic times, we might consider what economist Robert Reich, former Secretary of Labor, has called a "bailout" of America's human capital, arguing that "the future competitiveness and standard of living of America depend on our people's skills, their capacities to communicate and solve problems, and innovate."[5] The time for action is now.

Introduction

The United States has been blessed with an abundance of resources. Arguably, one of the most valuable resources is its people, and the diversity of this population is unique when compared to other countries. The time has come for our nation to capitalize on this distinction to the fullest extent possible.

We have made progress on the diversity and inclusiveness continuum, but we need to do more. In 2008, we had an historic presidential election that resulted in the selection of Barack Obama as our 44th president. That same year, a more diverse group of people ascended into leadership positions in federal and state governments across the country.[6]

These are positive and encouraging developments that speak to the power of diversity and inclusiveness in our country. But diversity and inclusiveness are about more than gender and race; these concepts include socio-economic status, age, persons with disabilities, immigrants, and those who are the first generation in their family to pursue higher education. Diversity and inclusiveness have a direct relationship to the public good and to our quality of life. Everyone benefits from an environment of inclusiveness—which is not so much about counting people but about making people count.[7]

In 2008, the Council of Graduate Schools released a report on ***Graduate Education and the Public Good*** that illustrated how a world-class graduate education system benefits our country and the world. Included in the report were stories of people who obtained their graduate degrees in the United States and the myriad ways they have made our world a better place.

Over the past half century, the United States has benefited from an investment in the preparation of knowledge creators, innovators, world leaders, and professionals in key fields—particularly science, technology, engineering, and mathematics (STEM). But many of these professionals are now approaching retirement, and we are faced with the need to replenish this vital resource. This would not be a concern if women and underrepresented minority students pursued STEM degrees at the same rate as white men. Note that it is not just a question of recruiting more minorities and women into key fields, but rather an issue of recruiting more American students from underrepresented groups.

In the past, we relied on a steady stream of international students who flocked to the United States to pursue graduate studies. Many of these students later sought citizenship in the United States and made important contributions to our country. Now there is more competition for these students from their home countries as well as from other nations and regions of the world, and this situation is likely to continue.

We must develop our domestic talent pool now to ensure that the next generation of leaders, knowledge creators, and professionals is ready to carry us into the future. The changing demographics of the U.S. population require new strategies to

prepare more students from diverse backgrounds for graduate level education.

Previous CGS reports, specifically, ***Graduate Education: The Backbone of American Competitiveness and Innovation***, published in 2007, put forth recommendations for strengthening U.S. competitiveness and innovation. Those recommendations included both expanding the domestic participation of underrepresented groups in key fields and continuing to attract and retain the best and brightest students from around the world.

This report, ***Broadening Participation in Graduate Education***, makes the case for strengthening diversity and inclusiveness efforts in the graduate education enterprise as a key component of a national talent development policy. It reviews statistics on demographic population trends and their implications for higher education and graduate education in particular. It argues that policies and practices of the past have had some success but that new policies must be developed to enhance diversity, promote inclusiveness, and expand opportunity for all, especially given the challenges of the 21st century global economy.

"…new policies must be developed to enhance diversity, promote inclusiveness, and expand opportunity for all…"

The report explores the relationship between diversity and inclusiveness, and it offers definitions of these important terms in the context of graduate education. Many U.S. graduate schools have been working proactively to broaden participation on their campuses. Examples of successful programs are provided in the body of the report and in a separate section at the end.

There are potential new policy opportunities to broaden participation in graduate education through legislative initiatives, such as the America COMPETES Act (P.L. 109–69), the new GI bill (P.L. 110–52), and possibly through a more inclusive National Defense Education Act for the 21st Century.

The report concludes with policy recommendations that recognize the central role of graduate education in preparing future innovators, discoverers, and global leaders.

What Are Current U.S. Demographic and Educational Trends?

For too many years, it was thought that higher education, and science programs in particular, was the domain of white men, and little effort was made to recruit and/or nourish women or members of underrepresented racial/ethnic groups. This belief has changed over the past century. The United States cannot rely on one gender, one race, or one ethnic group to maintain its scientific and technological leadership. We must recognize that developing and utilizing our entire domestic talent pool, while still welcoming foreign-born students and scholars, can only strengthen our national human resources.

Diversity and inclusiveness foster natural creativity and lead to the enrichment of the scientific and nonscientific workforce by expanding opportunities for everyone. This is becoming increasingly important as our nation becomes more racially and ethnically diverse, as documented in recent projections by the U.S. Census Bureau.[8] This diversity is particularly evident in our pre-college population. While this report focuses on graduate education, it should be obvious that without a full pipeline of educated students from K–16, the pool of future knowledge creators, scientists, and other leaders will be reduced. Institutions of higher education and policy makers must recognize that the demographics in primary and secondary schools are changing and that the higher education enterprise must evolve and embrace these changes in order to produce both the knowledge and the talent we need.

In 2005, nearly 40 percent of students in our elementary and secondary schools were from underrepresented groups, up from 31 percent ten years earlier.[9] By 2023, the Census Bureau projects that half of all children will be members of underrepresented groups.[10] In 2050, it is expected that 62 percent of the nation's children will come from underrepresented groups, up from 44 percent today.[11] (When referring to underrepresented groups in this report, the term includes African Americans, Hispanics, American Indians, and Alaska Natives.)

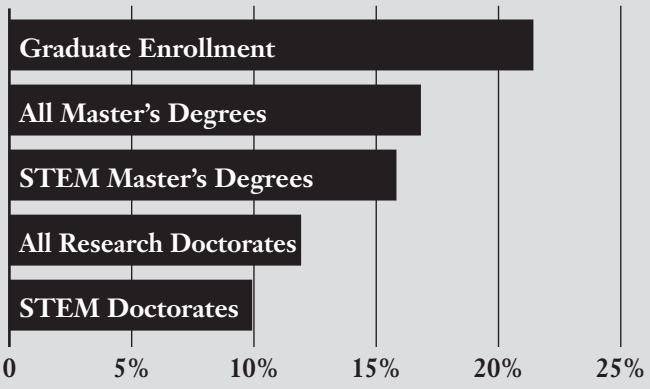
High school completion rates have remained relatively flat over the past 20 years (1987–2006) at around 82 percent, with women completing high school at higher rates than men. By race/ethnicity, Hispanics have the lowest rate of high school completion, despite the progress made over the last two decades.[12] High school completion rates for African Americans showed little gain over this time period. In 2006, Asian Americans had the highest rates of high school completion (91 percent) followed by whites (87 percent), African Americans (76 percent), American Indians (71 percent), and Hispanics (68 percent).[13]

When high school completion rates are compared internationally, other countries have moved ahead of the United States; our country dropped from the top position 40 years ago to 18th out of 24 industrialized countries by 2006.[14] There are similar declines in higher education attainment: In 1995, the United States, along with New Zealand, had the highest proportion of young people with a college degree, but by 2006, the United States had dropped to 14th place.[15]

Enrollment at the undergraduate level increased 21 percent in the decade between 1997 and 2006, primarily due to the increasing participation of women.[16] In 2006, women made up nearly 58 percent of total undergraduate enrollment, up from 56 percent ten years earlier.[17] Since 1984, women have outnumbered men at the graduate level, although the distribution is uneven across fields. Between 1997 and 2006, the number of male graduate students increased by 19 percent, compared to a 37 percent increase for female graduate students.[18] If the college-going rates between the sexes continue, the gap between numbers of males and females in graduate school will widen.

The face of higher education does not mirror the face of our nation. The proportion of college students who are members of underrepresented groups has been increasing, from 22 percent in 1997, to about 28 percent in 2006.[19] However, not enough students from underrepresented groups complete college; while they represent more than one in every four undergraduates, they earned only about one in every five (18 percent) bachelor's degrees conferred in 2006, and only 14 percent of those were awarded in STEM fields.[20]

Underrepresented Minorities in Graduate Education Populations, 2006



Sources: NCES and NSF.
Note: "STEM" includes social sciences and psychology. Data include U.S. citizens and permanent residents only.

This trend carries over at the graduate level. In fall 2006, underrepresented groups comprised 21.4 percent of total graduate enrollment (certificates, master's, and PhDs).[21] Among all U.S. citizens, underrepresented groups earned 12 percent of the total research doctorates awarded in 2006, and only 10 percent of the research doctorates awarded in STEM fields.[22]

What Are the Implications of U.S. Demographic Trends for Higher Education and Graduate Education in Particular?

Despite the progress that has been made to create a more inclusive educational system, disparities remain and will grow if progress continues at the rate of the past ten years. The U.S. Census Bureau reports that nearly two of every five students in elementary and secondary schools are from underrepresented groups, and this proportion will grow. Overall, the Hispanic population is projected to nearly triple during the 2008–2050 period, increasing to 30 percent of the nation's total population. The African American population is projected to increase by over 20 million, from 41.1 million to 65.7 million by 2050, with the proportion of American Indians and Alaska Natives projected to rise as well.[23]

These demographic trends are particularly troubling when one looks at the small number of students from underrepresented groups interested in—and graduating from college with—degrees in key STEM fields. As a nation, we need to recognize and communicate that science is for all talented individuals, regardless of gender, race, ethnicity, age, disability, or socio-economic status. It will become increasingly important for the United States to examine "Who Will Do Science?" in the coming years and to develop and nurture a more inclusive, skilled, and versatile technical talent pool.

In 2008, the National Science Board published the 18th biennial *Science and Engineering Indicators* report. The indicators provide quantitative insight into the breadth, quality, and vitality of the United States and international science and engineering enterprises. The indicators are intended to inform the development of future policies by providing data on the need and importance of support for science and engineering. The 2008 report shows that while the number of doctoral degrees in science and engineering earned by underrepresented groups more than doubled from 1985 to 2005, these degrees still comprise only about 10 percent of the total STEM doctorates awarded to U.S. citizens.[24]

"As a nation, we need to recognize and communicate that science is for all talented individuals, regardless of gender, race, ethnicity, age, disability, or socio-economic status."

This year, for the first time, the American Academy of Arts and Sciences, in conjunction with a consortium of national humanities organizations, released a prototype set of humanities indicators. Modeled after the *Science and Engineering Indicators*, these data provide a comprehensive picture of the state of the humanities in the United States, from primary to higher education to public humanities activities. One indicator noted that from 1977 to 2004, the number of graduate degrees earned by members of underrepresented groups in the humanities increased modestly.[25] In 2004, individuals from underrepresented groups had earned about 10 percent of the PhDs awarded in the humanities.[26] Indicators such as these will allow scholars and policy makers to track diversity and inclusiveness in the humanities and to become informed about the scope and value of support for these fields. These indicators, as well as the STEM-focused ones described above, show a clear need to make graduate education in many fields appealing and attractive to students from underrepresented groups.

The Ph.D. Completion Project, an initiative of CGS, sponsored by Pfizer Inc and the Ford Foundation, recently released baseline demographic data that show the substantial differences in completion and attrition rates for students of different races, genders, and citizenships. The data show that, after 10 years, the cumulative completion rates for men, whites, and international students are higher than those for women, other U.S. racial/ethnic groups, and domestic students, respectively.[27] The purpose of the demographic data is to give " '… us a baseline that we can use to measure the impact of new policies and practices designed to increase PhD completion rates, particularly for women and minorities,' said Debra W. Stewart, CGS president. 'We expect that what we learn from this project will transform our understanding of the factors contributing to higher completion rates.' "[28] The study is now in the next phase, and participating institutions have put various interventions in place, such as mentoring efforts and/or financial aid practices. One of the project's primary goals is to discover which types of interventions work best for students from various groups and backgrounds.

What Has Been Our Historical Record on Enhancing Diversity and Opportunity?

The 1960s were a time of civil unrest and upheaval in the United States.[29] There was also an increasing awareness of multicultural issues and a societal awakening to the potential of all citizens. During the next two decades, female professionalism was strengthened, and there was a tremendous influx of women into higher education. In the mid-1960s, women earned about 43 percent of the bachelor's

degrees, 34 percent of the master's degrees, and 12 percent of the PhDs awarded in the United States.[30] Forty years later, women earned 58 percent of the bachelor's degrees, 60 percent of the master's degrees, and 45 percent of the PhDs awarded.[31] And while the proportions of degrees awarded to women were much lower in many STEM fields, considerable progress was seen there as well.[32]

"…we must build upon our past efforts toward inclusiveness and incorporate a sensitivity and acknowledgment of cultural and economic conditions in our increasingly diverse nation."

The Civil Rights Act of 1964 prohibits discrimination in employment on the basis of race, sex, national origin, and religion. At the time this law was passed, there was no federal statute that required institutions of higher education to collect and report data by racial/ethnic category. It was not until the mid- to late 1970s that data on degrees by racial/ethnic group were collected regularly. Thus from the mid-1960s to the 1970s, the proportion of students from underrepresented groups in higher education was not precisely known, but it is believed to have been small. The Rehabilitation Act of 1973 prohibited discrimination against people with disabilities in the federal government, but it was not until the passage of the Americans with Disabilities Act in 1990 that discrimination was prohibited in the private sector, as well as by state and local governments.

These federal laws were primarily focused on providing equal opportunity for various groups that had experienced discrimination. Today the challenges are different; we must build upon our past efforts toward inclusiveness and incorporate a sensitivity and acknowledgment of cultural and economic conditions in our increasingly diverse nation. Our efforts must become more focused on recognizing and supporting talent from all sectors of society.

What Is Inclusiveness and How Does It Relate to Diversity?

Our evolving views and understanding of the power of diversity inform the need to develop and support all talent in the United States. U.S. graduate schools are sensitive to the issues of students from underrepresented groups and have been working to support these students, embrace the many advantages of diversity, and recognize this currently untapped pool of talent in our country.

In 2003, CGS undertook a review of inclusiveness and diversity in graduate education in light of changing demographics. The conclusion was that there had been progress, but more progress was needed. CGS conducted research and published a series of booklets promoting inclusiveness in graduate education. The three-volume series focuses on achieving an inclusive graduate community, recruiting for inclusiveness, and ensuring inclusiveness through retention efforts.[33] The series highlights a number of successful programs that identify, recruit, retain, and graduate diverse students across the country. CGS recently reaffirmed its commitment to inclusiveness in the resolution *Building An Inclusive Graduate Community: A Statement of Principles*.[34]

While inclusiveness and diversity are sometimes used interchangeably, they are different. Diversity in this report refers to a mix of talented men and women of all ages from all racial/ethnic groups, particularly those from historically underrepresented populations. It includes people with disabilities, who comprise about 20 percent of our population.[35] It includes those from all socio-economic classes, those who are the first-in-family to enroll in higher education and subsequently in graduate school, and international students from different cultures. The emerging talent pool looks very different than it did 25 years ago; it is much more diverse. Graduate education leaders are committed to enriching and enhancing diversity in their graduate programs—but more is needed than just increasing the numbers of underrepresented students.

The graduate community must go beyond simply recruiting students from diverse groups and increase inclusiveness by providing students with the support and resources needed to graduate and to succeed. For the purposes of this report, inclusiveness is the commitment, support, infrastructure, and follow-through that are necessary for all students to achieve the desired result, which is degree completion.

Institutions of higher education cannot simply create a static program and expect success to follow; instead, a commitment to inclusiveness is a promise to discover and support the initiatives that will succeed and expand opportunities for all. Colleges and universities must work to make their institutions inclusive by diversifying the faculty and administration at all levels. This was clearly articulated by John Slaughter, president of the National Action Council for Minorities in Engineering, in his "call to action" to every American.[36] The time for talking is over; it is time to act to produce change and to make our institutions more inclusive

at all levels of the educational pathway—from kindergarten through graduate school.[37] And it is essential to remember that inclusiveness is a dynamic commitment—it never stops.

Why Are Diversity and Inclusiveness Important?

The diversity of the U.S. population is a special and tremendous asset. All efforts must be made to fuel our economy with domestic talent, as well as with the best and brightest from abroad. Otherwise, America may fail to build national capacity in key fields such as science, engineering, and technology, as suggested by Dr. Shirley Ann Jackson in "The Quiet Crisis."[38] Only a well-educated workforce comprised of people who have learned to work productively and creatively with individuals from a multitude of backgrounds can maintain America's leadership in this knowledge-based economy.

America enjoys a high standard of living due to its economic success, but this success is not guaranteed in the future. Our scientists and engineers comprise only about 5 percent of the nation's 154.7 million labor force,[39] but that 5 percent have been responsible for a disproportionate share of our nation's sustained economic growth over the past 50 years.[40] Science and engineering are the building blocks of innovation, and the United States has been the world's leader in innovation over the last half century, in large part, due to the quality of its science and engineering workforce. Our continued strength in innovation depends on sustaining the quality of that workforce.

U.S. graduate schools produce the future young scientists, engineers, and other members of the "creative class" of knowledge workers with the skills, expertise, and cultural awareness needed to strengthen our economy and protect our national security. But the number of civilian scientists, engineers, and other knowledge workers in our workforce in sensitive positions who are nearing retirement is growing. Relying on the importation of foreign talent is not a solution; most foreign nationals are not eligible for many positions because of security concerns and regulations. Therefore, it is imperative that the United States strive to increase the number of U.S. citizens prepared to enter these critical fields.

Many corporations have found that the insights and cultural sensitivities of a diverse workforce lead to creation of new and innovative products and solutions to problems, as well as to new customer bases and market opportunities. Many companies have emphasized that the students of today are tomorrow's corporate and community leaders and "… it is essential that they be educated in an environment where they are exposed to diverse people, ideas, perspectives, and interactions … today's global marketplace and the increasing diversity in the American population demand the cross-cultural experience and understanding gained from such an education."[41] A recent study notes that the racial attitudes of students who are exposed to and given the opportunity to interact with students from different ethnic groups change in a positive way.[42]

"Diversity is an asset—an enabler that makes teams more creative, solutions more feasible, products more useable and citizens more knowledgeable."

The connection between people with U.S. graduate degrees and the American quality of life and continued global leadership was illustrated in the report ***Graduate Education and the Public Good***. Increasing the diversity of people

who earn graduate degrees is needed to achieve new discoveries, expand technological boundaries, initiate medical breakthroughs, and enter new industries.

"Diversity is an asset—an enabler that makes teams more creative, solutions more feasible, products more useable and citizens more knowledgeable. Diversity makes science and engineering more competent."[43] American businesses have shown the value of diversity by making clear that "the skills needed in today's increasingly global marketplace can only be developed through exposure to widely diverse people, cultures, ideas and viewpoints."[44] As a testament to this belief, a recent *BusinessWeek* article called attention to employers' interest in increasing diversity in MBA programs, noting that if universities did not emphasize diversity and graduate an inclusive, representative cohort, industry would recruit elsewhere.[45]

"If other countries are first in the world in terms of technological mastery and innovation, we risk losing more than our market share—we risk our national security."

Additionally, high-ranking retired officers and civilian leaders of the U.S. military assert that, based on their experiences, a "highly qualified, racially diverse officer corps … is essential to the military's ability to fulfill its principle mission to provide national security."[46] All segments of society are embracing the need to utilize the talents of all of our citizens in recognition of the power of diversity and inclusiveness; graduate education must be included in this effort.

How Can Enhancing Diversity and Inclusiveness in Graduate Education Improve Our Economy and National Security?

Enhancing diversity and inclusiveness in graduate education is essential if we are to improve our economic situation, effectively compete in the 21st century global economy, and maintain our national security. As John Slaughter noted, "By failing to provide opportunities for the education of all Americans, we doom ourselves to a future in which we are following the leaders in science and technology—thereby further threatening our economy and placing our national security more at risk."[47] If other countries are first in the world in terms of technological mastery and innovation, we risk losing more than our market share—we risk our national security.

U.S. graduate schools prepare our scientists, engineers, teachers, and other knowledge creators and expose them to "diverse" ideas that often foster creativity and innovation. The way new revenues are going to be generated in this country and around the world will involve people putting their minds to work to solve big, tough, complex problems. And where people learn to solve problems of that magnitude is in graduate school.[48] Graduate education will be key to producing a well-educated workforce comprised of people who have learned to work productively and creatively with individuals from a multitude of races and backgrounds. This will lead to maintaining America's leadership and competitiveness in the increasingly diverse and interconnected world economy.

What Are Some Successful Efforts to Enhance Inclusiveness and Expand Diversity in Graduate Education?

Graduate schools have been proactive in their efforts to broaden participation on their campuses and create an environment to advance inclusiveness. They have focused on recruiting the best and brightest students, particularly those from underrepresented groups. For example, at the University of Memphis, faculty members are encouraged to develop pipelines from Historically Black Colleges and Universities (HBCUs) to recruit promising scholars from underrepresented groups to their campus. This "pipeline model program" has proved very successful.

Over the years, many graduate schools have benefited from the National Science Foundation's Integrative Graduate Education and Research Traineeship (IGERT) Program grants as well as other federal funding mechanisms designed to foster a cultural change in graduate education. IGERT, in particular, focuses on promoting collaborative research that transcends traditional disciplinary boundaries and facilitates diversity.

Other institutions have concentrated their efforts on retention activities, such as mentoring and providing a support network and sense of community on their campuses. For example, Arizona State University has a project to develop programs that reduce the barriers to graduate degree completion, including mentoring, research opportunities, and alumni involvement.

Still other institutions have created programs where talented undergraduate students, particularly those from underrepresented groups, thrive and are prepared to enter graduate school. One of the most successful is the Meyerhoff Scholars Program at the University of Maryland, Baltimore County (UMBC). For more than 20 years, the Meyerhoff program has been one of the leading sources of graduate students from underrepresented groups.

Consortia have also formed regionally, such as the Committee for Institutional Cooperation, which brings together the Big Ten universities plus the University of Chicago to promote opportunities for an inclusive body of students. Programs can develop within a state's public university system as well, such as the University of California's new Leadership Excellence through Advanced Degrees Program. Another system-wide program, at the State University of New York, sponsors Graduate Diversity Fellowships that assist individual colleges and universities to recruit, enroll, and retain disadvantaged yet exceptional students.

Below we describe in more detail a sampling of institutional programs that are increasing diversity and inclusiveness in graduate education through interventions at all levels. Other programs, at the University of Washington, Oklahoma State University, the University of Mississippi, the University of Missouri-Columbia, the College at Brockport-State University of New York, and the University of Georgia are listed in a separate section of this report. Most of the programs were chosen based on input from the CGS Board of Directors or because the programs have been recognized by the CGS/Peterson's Award for Innovation in Promoting

an Inclusive Graduate Community. This award has been granted each year since 1994 to an outstanding program as part of CGS's mission to improve and advance graduate education.

Institutional Programs

One CGS/Peterson's Award winner is Arizona State University. The "Pathways to Success: An Undergraduate-Graduate Collaboration" is a joint project between the graduate school, the Honors College, and the Vice President for Undergraduate Initiatives.[49] A council that includes faculty, administrators, and both undergraduate and graduate students, works to reduce barriers to underrepresented students who are pursuing advanced degrees. Activities include mentoring and research opportunities, alumni involvement, fellowships, and a winter-break workshop series designed to prepare undergraduates for graduate school.

"Graduate schools have been proactive in their efforts to broaden participation on their campuses and create an environment to advance inclusiveness."

Another initiative that contributes meaningfully to a culture of inclusiveness in our graduate program community is sponsored by the State University of New York: The Graduate Diversity Fellowship Program. These student fellowships assist the university in recruiting, enrolling, and retaining graduate students who will contribute to the diversity of the graduate student body, especially those who can demonstrate that they have overcome a disadvantage or other impediment to success in higher education. The program provides both tuition scholarship support and stipends. During the 2008/2009 academic year, graduate students have been admitted to English and Liberal Studies Masters' programs under the direct support of the fellowship program. One graduate student has expertise in counseling clients with HIV/AIDS, and the second is in pursuit of a second professional career. A unique attribute of this program at the College at Brockport is the opportunity for Diversity Fellows to engage in a mentoring relationship with faculty who share their area of interest.

The University of California has a system-wide program aimed at developing promising undergraduate students and enhancing their opportunities for graduate education. The University of California's new Leadership Excellence through Advanced Degrees (UC LEADS) Program focuses on students in STEM fields, identifying those students "…with the potential to succeed in these disciplines, but who have experienced situations or conditions that have adversely impacted their advancement in their field of study."[50] This innovative two-year program provides opportunities for scientific research and mentoring by faculty members who work with students to develop a personalized "action plan" for each scholar, which includes academic year research; paid summer research experience; opportunities to develop leadership and networking skills at conferences and professional society meetings; and preparation for the Graduate Record Examination (GRE).[51] The UC LEADS Web site highlights recent news related to scholars, including announcements for those who receive prestigious awards such as the National Science Foundation (NSF) Graduate Research Fellowship, the Fulbright U.S. Student Scholarship, or other scholarships.

For fifty years, the Committee for Institutional Cooperation has brought together the Big Ten universities plus the University of Chicago to collaborate on providing opportunities for students and faculty. Their Summer Research Opportunity Program (SROP) serves as a gateway for students into graduate school. An inclusive program, SROP

seeks to open access to graduate school for "…students from groups underrepresented in graduate education, including minority students, first-generation college students and students from low-income families, regardless of race or ethnicity."[52] The Web site for the program also offers examples of successful graduates whose SROP experience helped them choose and complete graduate programs. One recent graduate is now an assistant professor and has made an effort to give back by working with new SROP undergraduates as the next generation looks toward graduate school.[53]

A grant program for faculty members might not seem, at first glance, to be a way to enhance diversity, but at the University of Memphis this program has encouraged the university's professors to develop pipelines with HBCUs to host underrepresented minorities interested in becoming scholars.[54] During campus visits, these prospective students are invited to attend graduate research forums, meet with mentors and other doctoral students, and are guided through the graduate admissions process. Because of this pipeline model, the University of Memphis is recognized as the largest producer of African Americans holding PhDs in philosophy. These graduates create and enhance the scholarship in race and feminist philosophy. This innovative program drew wide praise and earned the CGS/Peterson's Award.

"…the Meyerhoff Scholars Program at the University of Maryland, Baltimore County, has been working for more than 20 years to change the face of science in America."

Finally, the Meyerhoff Scholars Program at the University of Maryland, Baltimore County, has been working for more than 20 years to change the face of science in America. This program aims to increase the number of underrepresented students, primarily African Americans, who pursue graduate degrees in science and engineering. Since 1993, there have been more than 410 graduates, 200 of whom have completed advanced degrees at universities across the nation.[55] Most of the other alumni are enrolled in graduate or professional schools. Currently, there are 220 Meyerhoff scholars enrolled at UMBC. A nationally recognized program, it earned the CGS/Peterson's Award and is also considered exemplary by the Building Engineering and Science Talent (BEST) initiative (see the next paragraph).

Evaluations and Federal and Private Initiatives

In addition to institutional programs that are enhancing diversity and inclusiveness, we also highlight evaluations and other initiatives that have documented success. For example, in 2001, BEST, an initiative of the Council on Competitiveness, was established as an independent organization with the mission of developing an action agenda to build a stronger, more diverse U.S. technical workforce. Three panels of practitioners, researchers, and policy makers carried out the first-ever comprehensive assessment of "what's working" in pre-kindergarten through grade 12, higher education, and the workplace to increase the participation of women, underrepresented minorities, and persons with disabilities in the science, engineering, and technology professions. The results of their undertaking were published in three reports in 2004.

In the area of higher education, BEST rated seven programs as exemplary: three at the undergraduate level, one at the graduate level, two programs that were successful at transitioning women and minority PhDs to college and university faculty positions, and one state-wide, discipline-focused

partnership. One of the undergraduate programs that received accolades was the Meyerhoff program described above.

The sole graduate program that BEST evaluated as exemplary was the National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM). For more than three decades, GEM has helped thousands of students from ethnic groups traditionally underrepresented in the physical sciences, engineering, and life science disciplines to overcome one of the most pervasive barriers to pursuing an advanced degree: identifying and securing funding for their studies. This is often the difference between enrolling for an advanced degree and entering the workforce with a baccalaureate degree. Each year, more than 300 graduate students are on college campuses around the nation working on obtaining an advanced degree through the efforts of the GEM consortium.[56]

"…GEM has helped thousands of students… overcome one of the most pervasive barriers to pursuing an advanced degree: identifying and securing funding for their studies."

There are a number of federal programs that are promoting diversity and inclusiveness, including an outstanding program at the undergraduate level. The Gateway Engineering Education Coalition, a multi-institutional collaborative program, is supported by the Engineering Directorate at NSF. The objective of the coalition is to open new gateways for learning by embedding students in learning-by-doing and learning-in-context experiences that go beyond the classroom and highlight applications, ethics, and the breadth of skills required of engineering professionals.[57]

NSF has developed a number of other programs aimed at increasing the number of individuals from racial/ethnic groups at various steps along the education pathway in STEM fields: Alliances for Graduate Education and the Professoriate (AGEP); the Louis Stokes Alliances for Minority Participation (LSAMP); Centers for Research Excellence in Science and Technology (CREST), and Historically Black Colleges and Universities Undergraduate Program (HBCU-UP). NSF is also working to extend its efforts to increase inclusiveness beyond its Education and Human Resources Directorate to all of its research directorates as well.

Oak Ridge Associated Universities (ORAU) successfully promotes inclusiveness and diversity through its postdoctoral research programs, which place more than 1,100 recent PhDs in positions at 65 to 70 national laboratories and research centers each year. Through comprehensive recruitment efforts organized and led by ORAU's own diverse recruiting team, the proportion of women and underrepresented racial/ethnic group students each year significantly exceeds their overall representation among PhD recipients in physics, chemistry, engineering, and other science disciplines. As ORAU's Vice President for Education Wayne Stevenson writes, "A dedicated staff that is committed to specific recruitment objectives and supported with the financial resources to achieve has resulted in a high quality, diverse applicant pool—selection then takes care of itself."[58]

Other exemplary programs include the U.S. Department of Education's Ronald E. McNair Postbaccalaureate Achievement Program, the Gates Millennium Scholars Program, the Sloan Foundation's Minority Ph.D. Program, the Sloan Indigenous Graduate Partnership, and efforts at the National Institutes of Health (NIH) to improve the working environment of women and underrepresented scientists. These programs are described more fully in a later section of this report.

In addition to programs specifically for students, programs that focus on faculty inclusiveness can also positively affect graduate students. For instance, many of the institutions funded by the NSF ADVANCE Program ensure that graduate students are also positively affected by those grants. Currently, women from underrepresented groups represent only about 3 percent of science and engineering faculty in 4-year colleges and universities.[59] The goal of ADVANCE is to improve this situation by increasing the representation and advancement of women in academic science and engineering careers. Through these awards, NSF supports new approaches to improving the environment for women in U.S. higher education institutions and to promoting women's participation in the highest ranks of academic leadership.

BEST identified two programs that were exemplary for transitioning women and minorities to faculty positions. One was the Compact for Faculty Diversity (CFD), which was formed in 1994 by the New England Board of Higher Education, the Southern Regional Education Board, and the Western Interstate Commission for Higher Education; its goal is to increase the number of minority students who earn doctoral degrees and become college and university faculty. Success is already evident. When the compact started, nearly a third of U.S. college students were minorities, but only 10 percent of college faculty were.[60] Today, 15 percent of full-time faculty members are minorities.[61]

The other program lauded by BEST was Preparing Future Faculty (PFF), a partnership of CGS and the Association of American Colleges and Universities, with support from NSF, Pew Charitable Trusts, and Atlantic Philanthropies. Today, PFF programs are active in more than 45 doctoral degree-granting institutions and nearly 300 partner institutions in the United States.[62] Both CFD and PFF support systemic changes to inform, prepare, and develop future faculty who will influence and empower the students they teach.

What Have We Learned from These Successful Programs?

"…NSF supports new approaches to improving the environment for women in U.S. higher education institutions and to promoting women's participation in the highest ranks of academic leadership…"

It is clear that university-based policies and actions can improve inclusiveness and increase the representation of diverse populations in the graduate education enterprise. The programs cited in this report are illustrative of the many that currently exist across the country that could be scaled up to achieve a national impact.

Institutions of higher education typically require funding from external sources, which they can often match, to institute new programs and develop successful initiatives to broaden participation and support inclusiveness. Recent public policy initiatives include the new GI bill and the America COMPETES Act, which support higher education and, specifically, graduate education. These initiatives are described in the next section along with a proposal to create a new NDEA for the 21st Century (NDEA 21).

What Policy Initiatives Might Foster Diversity and Inclusiveness?

The America COMPETES Act authorizes new spending for science education, although the amount lags behind the original NDEA. In a letter to our 44th president, Charles Vest, president of the National Academy of Engineering, states "…full funding of the America Competes Act [should be] a nonnegotiable first-term priority.... It would jump-start improvement in K–12 science and math education, strengthen and sustain long-term basic research, make the U.S. the best place in the world to study and do research, and help ensure that we remain the most innovative nation on the planet. Its cost is about 0.14 percent of the Wall Street bail out."[63]

Another example of a recent policy initiative is the new GI Bill,[64] which enhances the various education assistance programs that are available to veterans, service members, and some dependents of disabled or deceased veterans. It is administered by the Department of Veterans Affairs. In fiscal year 2007, before the new bill was enacted, over 500,000 individuals utilized their GI Bill benefits at every educational level, including graduate school. As a point of reference, approximately 8 percent of those supported by the original GI Bill used it for graduate school.[65]

By helping veterans complete degree programs, our nation further broadens the understanding of diversity and inclusiveness. Veterans tend to be an older group, bringing the advantage of age and maturity to our colleges and universities; of the approximately 24 million living veterans in 2007, the median age was 60.[66] The new GI Bill offers veterans a broader pathway to an advanced degree.

One specific program that might appeal to veterans is the Professional Science Master's (PSM) degree. California State University is moving forward in its efforts to market the PSM to active and reserve/retired military personnel. The PSM is an innovative graduate degree designed to prepare students for 21st century jobs in an increasingly technological and interdisciplinary world. PSM degrees are designed with input from employers and thus reflect the needs of businesses, government, and nonprofit organizations. PSM programs provide intensive course work in science or mathematics, and they include professional course work in communications, finance, regulatory affairs, and other areas that provide students with the well-rounded skills employers seek. An internship or capstone project is a signal feature of the program, and these often lead to job offers or job advancement.

Should the United States Implement a National Defense Education Act for the 21st Century?

The NDEA, enacted in 1958, was the catalyst for the dramatic increase in the number of PhDs awarded, particularly in the STEM fields, by providing graduate fellowships in science and a loan program that later became the Perkins Federal Loan Program. The number of PhDs awarded in all fields rose by nearly three-fold from 17,949 in

1966 to 45,596 in 2006, while the number of doctorates granted in the STEM fields increased from 11,570 to 29,854—an all-time high.[67] The NDEA also expanded the geographical distribution of PhD programs in the United States.

We answered an important challenge then, and we can do it again. President John F. Kennedy's imperative to send people to the moon, and our nation's desire to become the world leader in space some 50 years ago, can be matched today by imperatives for "fixing the economic crisis," energy independence, environmental sustainability, and national security, among others. It is vital that the policies and actions of our new president set a course for our nation in the 21st century. Our ability as a country to meet these and other new challenges hinges on our success to train American students across gender and all racial/ethnic groups in key fields, including the social sciences, history, languages, and the arts.

"By helping veterans complete degree programs, our nation further broadens the understanding of diversity and inclusiveness."

In January 2006, CGS called for an NDEA for the 21st Century that would be guided by three principles: (1) providing funding to support students in the STEM fields as well as disciplines that foster global understanding of languages and culture; (2) expanding U.S. citizen participation in doctoral study in select fields through a variety of different models for graduate support; and (3) providing incentives to support the creation and sustainability of PSM programs that link graduate preparation with workforce needs.[68] We must increase the "flow of U.S. talent," into STEM fields, said Debra W. Stewart, CGS president, and at the same time, "continue to attract the best and the brightest [talent] from around the world." Now is the time to call again for an NDEA for the 21st Century—one that makes a special effort to develop the full diversity of talent in our nation. Talent is not the sole province of any particular type of student; it is everywhere, resident in both genders, all ethnic and racial groups, ages, and backgrounds.

Summary and Policy Recommendations

Our country is at a critical crossroads. Education must be a key component of our short- and long-term strategy to improve our economy by developing human talent. Other countries are investing in higher education and particularly graduate education; we must do the same and more.

We still have the best universities in the world, but this may not continue if we do not make investments now. Graduate education is the bedrock of our higher education system, producing the future faculty to teach undergraduates, prepare future teachers, and develop the knowledge creators of tomorrow.

President Obama has noted the connection between a robust education system and our economic competitiveness and national security. He himself is an example of a talented person whose education at some of our nation's finest universities prepared him to lead our country. Our challenge today is to identify and cultivate talent wherever it resides around the world, with a particular emphasis on developing domestic talent in traditionally underrepresented groups.

As President Obama said in his inaugural address on January 20, 2009: "What is required of us now is a new era of responsibility—a recognition, on the part of every American, that we have duties to ourselves, our nation, and the world; duties that we do not grudgingly accept but rather seize gladly, firm in the knowledge that there is nothing so satisfying to the spirit, so defining of our character, than giving our all to a difficult task."

The historic partnership between higher education and government has produced much of the economic success we have experienced over the past 60 years. Like all partnerships, this one must be nourished and cared for if it is to continue to thrive. Federal support for graduate education and research must be sustained. Corporate leaders must continue to engage in the process of encouraging the development of talent and supporting higher education as appropriate.

To that end, we offer recommendations intended to revitalize the partnership between institutions of higher education, government, and the private sector to meet the current challenges head on, armed with solutions and the will to implement them broadly.

For Institutions of Higher Education

Institutions of higher education, and graduate schools in particular, are national strategic assets that must be sustained and supported as key components of our human capital and talent development strategy. Graduate education can be strengthened by:

- Closely monitoring completion and attrition rates of students from underrepresented groups and implementing best practices to improve completion rates.
- Developing training programs for graduate student mentors who can help a diverse group of students navigate graduate school successfully.
- Experimenting with programs that use technology, which attracts and appeals to today's students.

- Identifying strategies for recruiting a more diverse faculty by broadening faculty search criteria and by advertising positions as widely as possible.
- Identifying possible faculty members by establishing linkages with specialized targeted institutions, including HBCUs.
- Encouraging faculty to be ever vigilant of opportunities to promote a more inclusive environment for students as well as themselves.
- Encouraging graduate deans, who are uniquely positioned in institutions of higher education to become leaders in inclusiveness by:
  - Working to ensure that inclusiveness is a team effort in the institution, involving the student body, faculty, and the highest levels of administration.
  - Supporting the development of a more inclusive curriculum with courses that appeal to a wide range of students.
  - Using their understanding of the academic pipeline to assist in diversifying the faculty.
- Continuing to foster partnerships with those in the business community who have made inclusiveness an essential part of their organizations.
- Continuing to develop strategies that are effective in helping to make graduate education responsive to the intellectual aspirations of all students.
- Recognizing that broadening participation is a dynamic process and that supporting diversity and inclusiveness is a priority. In this increasingly global community, developing culturally competent graduates, faculty, and administrators is integral to continued U.S. leadership.

For Federal and State Governments

We must restore and revitalize the historic partnership between institutions of higher education and government by explicitly acknowledging the central role of graduate education in preparing future innovators, discoverers, and global leaders. Government should enact policies that make graduate education a viable option for a growing rather than a shrinking number of Americans by:

- Organizing a national summit on investing in human capital and talent in the 21st century.
- Creating incentives for students, particularly students from underrepresented groups, to pursue graduate education in the STEM fields, social sciences, and humanities, through portable and competitive fellowships and traineeships, loan forgiveness, and other measures.
- Creating a program, funded by H-1B visa program revenues, to encourage U.S. domestic students, particularly students from underrepresented groups, to pursue graduate education in key areas of national need that are at the cutting edge of new markets.
- Identifying strategies and funding mechanisms that will encourage more women and underrepresented groups in STEM fields to advance to leadership positions.
- Enacting an NDEA for the 21st Century.
- Increasing support for graduate fellowships at NIH and NSF as well as at the Departments of Energy and Education, and other appropriate federal and state agencies.

Government should increase the awareness, particularly of students from underrepresented groups, of the breadth of career paths for those with graduate education by:

- Supporting innovative professional master's degrees in order to address pressing national needs in critical fields such as mathematics, science, engineering, social sciences, and humanities.
- Fashioning graduate support and research programs to reward creativity and inclusiveness as key components of a U.S. strategy on innovation.

Exemplary Programs

The College at Brockport, State University of New York, supports the hiring of faculty who will strengthen its culture of inclusiveness via the Presidential Fellowship Program. In the program, two PhD or ABD-qualified faculty Fellows are hired each year for two-year appointment periods. Each receives a reduced teaching load so that they may positively contribute to the student learning environment, teaching excellence, and campus research community. Examples of activities that they lead include the hosting of lectures, the presentation of research, and the creation of sustaining learning and teaching initiatives. The Fellows' impact is intended to be macro-level, and to contribute to the university's inclusive culture. In the ideal circumstance, it is hoped that the program will lead to an increased number of permanent faculty hires, thus meeting sustainability objectives on multiple levels.

The University of Washington is constantly working to improve its 30-year-old Graduate Opportunity and Minority Achievement Program (GO-MAP).[69] Two very successful facets of the program are the Voices in Academia (ViA) and Voices in the Community (ViC) lunches, now offered online and in person, as well as the Graduate Diversity Recruiter (GDR) Program. The ViA and ViC events offer small groups of students the chance to hear from campus and community leaders; recent lunches have focused on subjects such as mentoring and community engagement. GO-MAP, a recipient of the CGS/Peterson's Award, has expanded and now trains a corps of current graduate students who are available to assist all departments by mentoring prospective students, leading tours, and making themselves available to answer any questions.

Broadening participation is not just about recruiting students right out of college; sometimes the outreach is geared to qualified and interested working adults and offering them a way to achieve a graduate degree. An **Oklahoma State University** (OSU) program recruited, for their PhD programs, minority teachers who already had master's degrees and were teaching at high schools and grade schools in the area.[70] Some of these teachers pursued PhDs in their teaching field, such as science, but many moved forward with a doctorate in education. By offering the stipend and actively recruiting applicants with the help of superintendents who wanted to publicize this program with their teachers, OSU recruited a cadre of minority doctoral candidates. Their success earned them the CGS/Peterson's Award.

At the **University of Mississippi**, the Graduate Student Council created an initiative to build an inclusive graduate community that encourages social and intellectual discourse between campus groups that might not otherwise interact.[71] This innovative program earned the CGS/Peterson's Award. Activities sponsored by the program range from one-on-one, to small-group endeavors, including a writing assistance program. Also, awards are presented to the students, faculty members, and departments that make the most significant contribution toward an inclusive graduate school.

Directors of Graduate Studies (DGS) play an important role in recruiting and mentoring graduate students, but they often have little formal training for that role. **The University of Missouri-Columbia** created a leadership development program specifically designed for its DGS, which has helped the university increase its inclusiveness and earned it the CGS/Peterson's Award.[72] The program provides ongoing training, including a summit as well as monthly seminars.

The University of Georgia received the CGS/Peterson's Award for its work to create a "Climate of Inclusiveness" by offering a best practices handbook for faculty on how they can successfully influence diversity and inclusiveness in their programs.[73] An additional goal of the project is to develop a way to measure and reward faculty success in their efforts to encourage diversity and inclusiveness.

The Ronald E. McNair Postbaccalaureate Achievement Program is a federal program designed to encourage undergraduate students from low-income and underrepresented groups with strong academic potential to pursue doctoral degrees and to become college or university teachers. Administered by the U.S. Department of Education, the program awards grants to nearly 200 higher education institutions across the United States and Puerto Rico.

The Gates Millennium Scholars Program was established in 1999 with a $1 billion grant from the Bill & Melinda Gates Foundation. The goal of the program is to promote academic excellence and to provide an opportunity for outstanding students from underrepresented racial/ethnic groups with significant financial need to reach their highest potential in the disciplines of education, engineering, library science, mathematics, public health, and the sciences. Support is offered from undergraduate school through doctoral completion. Since the inception of the program, there have been more than 12,000 Gates Millennium Scholars, and 3,912 have already graduated.[74]

The Alfred P. Sloan Foundation promotes graduate education in mathematics, science, and engineering to underrepresented groups. Their programs include the Minority Ph.D. Program and the Sloan Indigenous Graduate Partnership. The latter is a partnership between the Sloan Foundation and four universities to increase the number of Native American students earning STEM graduate degrees. The program at the University of Arizona, which initiated the partnership, is now the largest in the country. The Sloan Indigenous Graduate Partnership is designed to address the national need for academically prepared Native Americans who can catalyze economic development in their communities and reservations and occupy leadership positions in colleges and universities, government, and the corporate world.

Federal agencies such as the **National Institutes of Health** (NIH) continue their efforts to improve the working environment for women and underrepresented scientists, from predoctoral students to long-term investigators. One of the flagship fellowship programs of the federal government is the Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellowships. This program offers a specific award designed to promote diversity in health-related research by supporting the training of predoctoral students from groups that have been traditionally underrepresented. "Such candidates include individuals from underrepresented racial and ethnic groups, individuals with disabilities, and individuals from disadvantaged backgrounds."[75] For women scientists at NIH, a recent series of practical policy changes includes extended leave options for maternity and other family needs, increased mentoring options, and an extension of the "tenure clock."[76]

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The Council of Graduate Schools (CGS) is an organization of over 500 institutions of higher education in the United States and Canada engaged in graduate education, research, and the preparation of candidates for advanced degrees. Among U.S. institutions, CGS members award 95 percent of the doctoral degrees and 84 percent of the master's degrees.* The organization's mission is to improve and advance graduate education, which it accomplishes through advocacy in the federal policy arena, research, and the development and dissemination of best practices. This CGS report, ***Broadening Participation in Graduate Education***, was released at the 2009 Legislative Forum on April 23, 2009 in Washington, DC.

* Based on data from the 2007 *CGS/GRE Survey of Graduate Enrollment and Degrees.*

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