

Women in Academic Science and Engineering

Dr. Gretchen Ritter¹

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Executive Summary

1. The largest remaining barriers to women's advancement in academic science and engineering include:
 - a. *Climate* - Even when universities are successful in recruiting women and minority faculty, they tend to leave at greater rates due to climate concerns.
 - b. *Professional Assessment and Rewards* - The professional assessment and reward structures of universities often allow for unconscious or implicit bias to play a role in providing disparate opportunities and rewards for equally qualified male and female faculty.
 - c. *Work-Family Balance* - Within academia, our expectations about tenure, career trajectories and productivity, and the conduct of research and professional service to one's department and discipline, still presume that the fulltime faculty are unencumbered by family responsibilities or caregiving expectations for children, partners, or elderly parents.
 - d. *Absence of Senior Women* - The presence of women in the senior ranks has a large impact on climate, mentoring, the role of implicit gender bias in faculty assessment, the visibility of positive role models, and the creation of a family friendly institutional culture.

2. Universities should focus on the following in addressing these barriers:
 - a. *Accountability* - Universities should implement procedures that promote accountability in their efforts to recruit and retain women faculty.
 - b. *Assessment* - Universities should also assess their efforts to increase recruitment and retention of women in order to identify which efforts are most successful and which efforts are not.
 - c. *Continuity* - These efforts take sustained, continuous commitment to make a substantial difference. Too often, when successful programs end, so does progress in the recruitment and retention of women faculty.
 - d. *Leadership* - The universities that have made substantial gains in recruiting women faculty in under represented fields are the ones that have a president or a provost who is forthright, articulate, and visibly committed to the value of having a diverse and equitable faculty.

3. The Federal Government should:
 - a. Expand the ADVANCE initiative to include minorities and women in other underrepresented fields, especially in the social sciences.
 - b. Use Title IX enforcement as a means of advancing women in academic science and engineering.

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I. Introduction

It has been 35 years since the passage of Title IX of the Educational Amendments of 1972, yet women continue to lag behind men in educational achievement, particularly in the STEM² disciplines. Research suggests that these disparities are not due to differences in aptitude or potential interest between men and women. Rather, the causes lie elsewhere – in the institutional structures and culture that discourage women’s participation in science and engineering, and limit their potential for success in those fields.³ While the era of explicit sex discrimination in higher education may be fading, social science research suggests that implicit bias continues to play a significant role in determining opportunities for entry and advancement for women (as well as minorities) in higher education. The barriers to women’s achievement remain significant.

We can not afford to tolerate women’s continued exclusion from these fields. The absence of women in academic science, social science, and engineering has a negative impact in a variety of important areas. Having a diverse higher education faculty is important to the nation’s well-being. If the United States is to remain a world leader economically, and in scientific and technological innovation, we must recruit talented people from all sectors of our society to become scientists and engineers. If we want to encourage women to become engineers, African American men to become elementary school teachers, and Hispanic women to be business professionals and lawyers, then we need a faculty that shows our students that women and people from different racial and ethnic backgrounds can achieve and succeed in every field. Too often, I have had women students tell me that they came to college wanting to be scientists or engineers, but left that field because they felt isolated or discouraged when they had no women classmates or women professors.

² STEM is an acronym that stands for Science, Technology, Engineering, and Math.

³ See the National Academies, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*, (Washington, DC: the National Academies Press, 2006).

We also need to have a diverse faculty in order to advance academic excellence. If we fail to recruit and retain women in economics or physics, then we deny ourselves the opportunity to benefit from the talent and insights of half of the population. If we have no black or Hispanic senior faculty in psychology or government, then we might have a faculty that is less motivated to exploring issues such as the impact of racial stereotyping on social achievement or the role that black churches play in national politics. Recruiting faculty from all sectors of the population allows us to draw on a broader pool of talent in building academic excellence. Retaining a diverse faculty means we benefit from having researchers and teachers whose approach to knowledge is shaped by a range of social experiences and interests. Women are more likely to enter technological and scientific fields because of their interest in social issues, like advancing children's health, or improving the lives of the disabled. So recruiting a more diverse faculty is likely to shape the research agenda and scientific innovations of the next generation.

Finally, it is worth remembering that American universities have always played a vital role in the development of our nation's economic, political and social leadership. It is part of the mission of public universities in particular to provide access to educational opportunities as a means of developing a diverse leadership for a democratic nation. With the advent of globalization, it is more important than ever that we encourage the development of leaders who operate well in an interconnected world marked by differences of race, religion, gender and culture. Public universities can provide both a social climate and an intellectual environment that is supportive of diversity and leadership. Since advances in fields like information technology will shape our economy and our society in decades to come, it is essential that women and minorities be recruited into those fields, as scientific leaders in a sector that will shape our nation's future. We will all benefit if the Michael Dells, Bill Gates, and Steve Jobs of the next generation come from a more diverse cross section of our community. Our universities can help to make that happen.

II. Efforts at the University of Texas at Austin to Recruit and Retain Women in Science and Engineering

Currently, at the University of Texas at Austin, women make up 10.6% of the tenured and tenure track faculty in the College of Engineering, and 12.7% of the tenured and tenure track faculty in the College of Natural Sciences.⁴ Among assistant professors, women make up 19% of the faculty in Engineering and Natural Sciences. Overall, at the university as of 2006, women constitute 18% of the full professors, 38% of the associate professors, and 39% of the assistant professors. Further, 24% of the tenured faculty are women at the university. So while there are fewer women in science and engineering, women are under represented within the tenured and tenure track faculty university wide. According to the *AAUP Faculty Gender Equity Indicators 2006* report, the comparable figures for the proportion of women faculty at doctoral universities nationwide are 19% of the full professors, and 40% of the assistant professors.⁵ This same report indicates that 26% of the tenured faculty are women at doctoral institutions nationwide. So the University of Texas at Austin is close to these national averages, but slightly below those averages.

There are programs at the University of Texas at Austin that seek to address the under representation of women in academic science and engineering. The College of Engineering created the Women in Engineering Program (WEP) in 1992. This program seeks to recruit women students, and increase the proportion of women receiving undergraduate degrees in engineering at the University. The primary focus of their efforts has been to provide academic and peer support to first and second year women undergraduates. Within the College of Natural Sciences, the Women in Natural Sciences program (WINS) focuses primarily on issues facing

⁴ These figures are calculated from the *2006-7 Statistical Handbook* (Office of Information Management and Analysis, UT Austin). Please see table FS 8, pp. 119-120. For the College of Natural Sciences, the faculty in the Department of Human Ecology were not included in the calculation, since these are primarily social scientists.

⁵ Martha S. West and John W. Curtis, *AAUP Faculty Gender Equity Indicators 2006* (Washington, DC: AAUP, 2006). See Figures 4 & 5, pp. 8 & 10.

women students at the undergraduate level. One successful WINS initiative that began in 2001 is the Honors Residential Program for women undergraduates in natural science. The students who participate in this program are found to have a higher level of academic success and retention than female students in natural sciences who do not participate in the program. The College of Engineering now offers a similar residential program for first year students, called WELD.

Both WEP and WINS offer K-12 programs as well, designed to encourage interest in sciences and engineering among middle school and high school girls. The “Science in Action Program” is aimed at area schoolgirls between the ages of 11 – 15. This daylong program allows students to participate and observe science demonstrations at the college’s research labs. WINS also supports the work of Girlstart, a local nonprofit organization which promotes science and math learning among elementary and middle school girls. Likewise, each February, the College of Engineering hosts the “Introduce a Girl to Engineering Day,” which attracts over 1000 area schoolgirls to participate in demonstrations and workshops designed to promote interest in engineering. In addition to these efforts, the Center for Women’s and Gender Studies (CWGS) has a school partnership agreement with the Ann Richards School for Young Women Leaders. The Ann Richards School is a public, all girls middle school that focuses on success in the STEM disciplines. Under the partnership agreement, CWGS provided mentoring and professional development support to the faculty and staff at the school. CWGS faculty also conduct research at the school to assess the effectiveness of its programs.

Less has been done at the graduate or the faculty level to promote the recruitment and retention of women in engineering and science. In the late 1980s and 1990s, Target of Opportunity funding was made available through the provost’s office to assist in recruiting women and minority faculty in fields where they were under represented. This funding made a substantial difference in the number of women faculty hired. In the College of Engineering, for instance, the number of tenured or tenure track faculty increased from just 8 in 1987 to 21 in 1997. When this funding was withdrawn, hiring and retention efforts stalled, so that in 2002

there were still only 21 women faculty (9% of the total) in the College of Engineering⁶. With the help of leadership by the dean and various department chairs in recent years, the number of women faculty in the college has now risen to 26, which still represents under 11% of the total tenured/tenure track faculty in the college. Within the College of Natural Sciences, over the past five years WINS has sponsored five workshops for chairs, executive assistants, and search committee members on best practices for diversity recruiting and has created an online faculty recruiting handbook. Three CNS departments have implemented these best practices, under the leadership of a strong Chair or search committee chair, and all three have doubled their representation of women faculty. Apart from these workshops and chair led efforts in particular departments (such as Computer Science), relatively little has been done to promote increased recruitment and retention of women faculty. To date, UT Austin has not participated in the ADVANCE program.

At the level of the university as a whole, efforts have been made to address the needs of women faculty and the situation of women in under represented fields. In 1999, a report was done on the status of women, which revealed some faculty salary inequities by gender. The provost's office set aside funding to address those inequities in 2000. One barrier to professional achievement for women academics nationally involves work-family balance issues. Overall women are still more likely to have primary responsibility for addressing dependent care needs within families. Further, women academics are also more likely to be married to male academics (and to male professionals), which makes dual career issues of greater importance to women academics. UT Austin has sought to address these concerns in recent years by expanding the amount of university provided childcare that is available to faculty, and by reserving some spots at the childcare center for use in faculty recruitment. Funding is also available from the provost's office for faculty spousal hiring. Further, the university now offers a modified instructional duties

⁶ These figures were obtained from a powerpoint presentation made by Dr. Sherry E. Woods, (Director of Special Projects in the College of Engineering), dated November 1, 2002.

policy, which is intended to allow faculty with substantial caregiving responsibilities for newborns to be relieved of their obligation to teach fulltime for a semester while still receiving their full salaries.

In 2006, the university created the Division of Diversity and Community Engagement which is charged with promoting diversity and gender equity for students, staff, and faculty. This division is working with the provost's office to promote hiring that will increase the number of women and minorities on the faculty. The provost's office also recently created the Gender Equity Task Force which is charged with examining the situation of women faculty on campus and recommending policies that promote gender equity. The task force (which I co-chair, along with Dr. J Moore, chair of computer science) is expected to complete its work and issue its report next spring.

These efforts are important, but more remains to be done. Nationally, many universities have become aware that the advancement of women faculty in under represented fields requires focused and continuous effort by the institution as a whole. UT Austin does not currently have a clear and effective leader on gender equity in our central administration. While the president and the provost have voiced support for gender equity, there need to be mechanisms created that will hold deans and department chairs accountable for their achievements in this domain. There also needs to be someone with authority in the higher administration whose primary responsibility includes oversight of efforts to increase the university's recruitment and retention of women in under represented fields. Finally, more effort should be given to assessment, so that we know whether the programs and policies that we sponsor are effective and should be sustained.

III. Remaining Challenges, Promising Solutions

Nationally, there have been substantial increases in the number of women obtaining undergraduate degrees in the sciences, social sciences and engineering. The numbers of doctorates awarded have also increased substantially in many disciplines, yet this has not

translated into comparable increases in the proportion of women faculty in these fields. What are the major barriers to the retention and promotion of women faculty within higher education nation wide? Further, how might these barriers be most effectively addressed within academia? In this section, I briefly highlight the most significant barriers to the advancement of women in under represented fields in the areas of climate, professional assessment and reward, work-family balance, and the absence of senior women. Following the discussion of these challenges, I review the most promising areas where solutions may be sought to the problem of women's under representation in academia. My recommendations in this area focus on accountability, assessment, continuity, and leadership.⁷

Climate

Institutional climate has a large impact on whether women and minority faculty thrive and are retained in fields where they are under represented. Even when universities are successful in recruiting women and minority faculty, they tend to leave at greater rates due to climate concerns. Sometimes women and minority faculty have less access to the informal professional networks that are important to their professional success. They may feel as though their achievements and credentials are regarded as suspect by students and colleagues alike. There may be few people in their department with whom they can communicate about the particular challenges they face in establishing authority in the classroom, in responding to the needs and expectations of women and minority students, or in finding social connections with people from similar social backgrounds outside of the university. Women faculty (as well as many male faculty with substantial caregiving responsibilities) may sense that there is a lack of sympathy or support for their family responsibilities. Finally, if there are no senior women or minority faculty within their department (or administrators at their institution), then junior faculty

⁷ Please note that since the Gender Equity Task Force at UT Austin is still collecting and analyzing data, the applicability of the recommendations in this section for UT Austin have yet to be determined.

are more likely to feel professionally isolated, and to doubt whether their institution will ever promote and retain someone like them.

To address some of these climate concerns, several things are helpful.⁸ Universities should create strong mentorship programs that address concerns about intellectual community and social networks as well as professional development. They should also establish clear policies that promote a family friendly work environment for faculty. Where campus wide organizations for women and minority faculties exist, they should be supported and strengthened. Where they do not exist, they should be created. Support for interdisciplinary centers in racial, ethnic, or women's studies may also play a role in promoting intellectual community and social connection among women and minority faculty in a variety of fields. Finally, there should be forums, lectures, and workshops that promote frank and open discussions of climate issues on campus.

Professional Assessment and Rewards

The professional assessment and reward structures of universities often allow for unconscious or implicit bias to play a role in providing disparate opportunities and rewards for equally qualified male and female faculty. Like everyone in our society, academics employ information assessment shortcuts, or cognitive schemas, that filter information according to pre-existing understandings about how the world works. Such schemas include deeply rooted race and gender stereotypes.⁹ These schemas, or unconscious biases, play a greater role in influencing assessments if they remain implicit and unaddressed, if assessments are made in a largely subjective fashion, and if the group conducting the assessment is not itself socially diverse. Typical university procedures for faculty recruitment, assessments for salary recommendations, and promotions evaluation all rely on assessment processes that are largely subjective and that

⁸ Also see Jean Waltman and Carol Hollenshead, "Creating a Positive Departmental Climate: Principles for Best Practices," Prepared for NSF ADVANCE at the University of Michigan, available at - http://www.umich.edu/%7Eadvproj/BestPracticesReport_FINAL_Aug07.pdf

⁹ See V. Valian, *Why So Slow? The Advancement of Women* (Cambridge, MA: MIT Press, 1998).

may be conducted by a largely homogeneous group of evaluators. Further, the impact of these disparate assessments accumulate over time, so that over the course of their careers, women academics in under represented fields may perpetually receive slightly smaller rewards and slightly fewer opportunities, until a decade or two down the line when they make receive lower salaries, are less likely to have advanced to the rank of full professor, and have less lab space than their equally accomplished male counterparts.¹⁰

Universities can do several things to alleviate the impact of unconscious bias on professional assessments or rewards. They can mandate that assessments be conducted in an objective fashion, with clear criteria for professional achievement and productivity.¹¹ Where possible, professional assessments should be conducted blindly, without awareness of the race, ethnicity or gender of the person being evaluated. Yet, if a blind assessment is not possible (and there are often implicit indicators of race or gender in someone's professional record), then the assessors should be encouraged to be self-aware about the role that race and gender biases may play in their assessments. Self-awareness can decrease the influence that biases have on assessment. Finally, assessments should be conducted by diverse assessment teams. Universities should put in place procedures that insure the racial and gender diversity of faculty search committees, salary review committees, and promotion and tenure committees.

Work-Family Balance

The creation of family support policies at universities benefits the entire faculty and not just women. After the second world war, public and private social benefits programs were based on the presumption of a family structure that included a male breadwinner and a female caregiver. With the huge influx of women into the labor market, as well as changes in patterns of marriage,

¹⁰ J R Cole & B Singer, "A Theory of Limited Differences: Explaining the Productivity Puzzle in Science," in H. Zuckerman, JR Cole and J Bruer, eds. *The Outer Circle: Women in the Scientific Community*, (NY: Norton, 1991).

¹¹ Claudia Goldin & C. Rouse (2000), "Orchestrating Impartiality: The Impact of 'Blind' Auditions on Female Musicians," *American Economic Review*, 90: 715-741.

divorce, and childbearing, we no longer live in a society in which the breadwinner/caregiver model is applicable. But our employment policies and presumptions have yet to adjust to fact that most family caregivers are also paid employees, and that many caregivers have no other adult in the household to rely upon in sharing the duties of care and economic provision.¹² Within academia, our expectations about tenure, career trajectories and productivity, and the conduct of research and professional service to one's department and discipline, still presume that the fulltime faculty are unencumbered by family responsibilities or caregiving expectations for children, partners, or elderly parents. Those presumptions are clearly unrealistic, and they are particularly harmful to women faculty who are more likely to be limited by the professional careers of their spouses, and more likely to have primary caregiver responsibility for family members. Further, to a greater degree than ever before, younger academic men are likely to have substantial caregiving responsibilities for their children, and to have spouses who work fulltime. So both in the interest of gender equity, and in the interest of attracting men and women of talent into academic careers, universities must do more to support the family responsibilities of their faculty.

At the University of California at Berkeley, Drs. Mary Ann Mason and Marc Goulden have been national leaders in assessing the impact that work-family conflict has on the under representation of women in academia, and in recommending policies and piloting programs intended to address these issues.¹³ Most research universities now provide some childcare, unpaid childbearing leave, and stop-the-clock policies that extend the tenure clock for faculty with substantial caregiving responsibilities, as well as some assistance for dual career issues. In addition, Mason and Golden recommend that universities implement programs that create part-time tenured or tenure track options for faculty with substantial caregiving responsibilities, provide paid childbearing leave, provide emergency back-up childcare, assist spouses and

¹² Joan Williams, *Unbending Gender* (NY: Oxford University Press, 2000).

¹³ For more information on their research and on the Family Friendly Edge Project at UC Berkeley, go to - <http://ucfamilyedge.berkeley.edu/>

partners of faculty with employment relocation services, provide re-entry post-doctoral fellowships for faculty who have taken time off to focus on family care needs, and create policies that insure family friendly calendars and scheduling for faculty.

Absence of Senior Women

In recent years, many universities have increased their efforts to recruit women faculty at the assistant professor level. These efforts are important and should be continued. Yet institutions often become frustrated by the difficulties they face in retaining and promoting the junior women they have recruited. Not only does this difficulty represent a failed investment by the university in their efforts to cultivate faculty talent, it may also reinforce negative stereotypes about women faculty, by suggesting that junior women are less likely to stay in academia or to succeed in getting promoted to the tenured faculty. It is little surprise, then, that some senior male faculty wonder whether efforts to recruit junior women are worthwhile. What this perspective neglects, however, is the important role that senior faculty women play in creating institutional cultures in which junior faculty women are likely to succeed. The presence of women in the senior ranks has a large impact on the climate of a department and an institution, on the ability of institutions to provide mentoring that is supportive of diversity, on the role of implicit gender bias in faculty assessment and reward structures, on the service demands imposed on more junior faculty women, on the visibility of positive role models for junior faculty women and women students, and on the creation of a family friendly institutional culture within departments and colleges. For all of these reasons - and because the delay or departure of women faculty before they reach the senior ranks represents a loss of accumulated experience, insight, and potential innovations – more effort should be made to reward and retain women at or near the senior level.

In order to reward and retain women at or near the senior faculty level, universities should consider implementing some of the following policies and programs. They should fund efforts that result in more senior faculty women being hired. They should provide support for

eldercare responsibilities, which are more likely to fall to women at the mid-career stage. They should provide research assistance and leaves for associate level faculty who undertake substantive service or administrative positions, such as associate dean, center director, or faculty senate chair. In fields where there are fewer women, the desire for diverse representation in administrative and service roles often leads to greater service demands on women at an earlier career stage. Efforts should be made to decrease the impact that such demands have on the research productivity of mid-career women faculty. Since women faculty are less likely to seek outside offers as a means of raising their salaries, efforts should be made to provide equity related and productivity based salary adjustments without having to rely on outside offers. Finally, attention should be given to the way in which endowed professorships and chairs are awarded to internal faculty. To counteract the possible impact of implicit gender bias and the greater professional isolation of senior women faculty, the awarding of endowed positions to internal faculty should be overseen by a diverse panel of senior faculty from across the campus.

Accountability, Assessment, Continuity and Leadership

For each of the areas discussed above, attention has been given to efforts that universities can undertake to reduce the impact of institutional barriers to the advancement of women in under represented fields. This section concludes with additional suggestions of ways that universities nationally can promote the recruitment and retention of women in under represented fields.

Universities should implement procedures that promote *accountability* in their efforts to recruit and retain women faculty. Accountability means requiring colleges and departments to report on their recruitment, promotion and retention efforts regarding the identification of a diverse pool of applicants, the proportion of applicants by sex and race, the composition of search committees, and the composition of governance committees that make hiring, promotion, and salary recommendation decisions. Accountability also means requiring deans and department chairs in fields where there is substantial under representation to set goals for improving the

representation of women faculty, and then providing or withholding resources in relation to their progress in achieving those goals. If, for instance, a department proves to be stubbornly unwilling to recruit any women faculty over a number of years, then they should be restricted in their ability to hire new faculty. Finally, accountability should include the ability and willingness of a dean or a provost to intervene when policies and procedures implemented to promote the recruitment and retention of women are not followed. For instance, if participants in a faculty search fail to make a good faith effort to identify and solicit applications from qualified women candidates, then a dean or provost should be willing to stop the faculty search until the failure to follow these procedures is corrected. Without accountability, goals and policies may be rendered meaningless.

Universities should also assess their efforts to increase recruitment and retention of women in order to identify which efforts are most successful and which efforts are not. *Assessments* of programs and policies should be done following standard social science protocols that promote objective evaluations. Program evaluations should be published, so that they may be scrutinized within the university community and by academics elsewhere. Where assessments provide strong evidence of the success of a program or policy, increased support should be given to that policy, and the policy should be replicated by other departments and colleges within the university. Where programs or policies do not succeed, an analysis should be done to identify the reasons for their failure, in order to improve the university's efforts in this area.

Continuity is also important to the success of these efforts. All too often, in the wake of a particular report or in response to an outspoken faculty leader, universities make short term efforts to address gender equity concerns through one time efforts to correct disparities in salaries or promotion rates, or with short term initiatives intended to increase the number of junior women who are hired. But even in the case of successful programs, like the Target of Opportunity fund that was used to recruit women in under represented fields at UT Austin, when the program ends, so does progress in the recruitment and retention of women faculty. These efforts take sustained, continuous commitment to make a substantial difference. Not until the culture of an institution

has thoroughly changed and there is a proportionate number of women in the senior faculty and administration of our universities should we consider letting up in our efforts to recruit more women in academic science and engineering.

Finally, to succeed these efforts take *leadership* from the highest levels of the university. The universities that have made substantial gains in recruiting women faculty in under represented fields are the ones that have a president or a provost who is forthright, articulate, and visibly committed to the value of having a diverse and equitable faculty. Whenever searches are conducted for a new dean, provost, and president, strong candidates should have a record that verifies their commitment to faculty diversity and equity. Administrative leaders can help to set the tone for the entire institution. They can help to explain the value of equity and diversity to their senior faculty and department chairs. And they can hold deans and chairs accountable for their successes and failures in this area.

IV. Role of Federal Funding Agencies

The ADVANCE¹⁴ initiative has made a substantial difference in the representation of women in science and engineering at several leading universities such as the University of Michigan. The ADVANCE program ought to be expanded in several respects: the initiative should be broadened to include women in all under represented fields, particularly including the social sciences; the initiative ought to be aimed to increasing the proportion of minority faculty (along with women) in the STEM disciplines; and it ought to be broadened beyond individual universities. Regarding the last point, the PAID Awards clearly seek to have a broadening effect in encouraging the universities with successful ADVANCE programs to serve as models for universities elsewhere.

¹⁴ ADVANCE is an National Science Foundation program for “Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers.”

Including women from the social sciences in the ADVANCE grants is important for a number of reasons. Social scientists can provide the research needed to understand why women and minorities are under represented in academia. They can also play a crucial role in designing programs aimed at rectifying those difficulties. Since social science participation is important to the success of ADVANCE grants, and since women social scientists are more likely to undertake research that examines the effects of gender bias, it would be helpful to include social scientists in the ADVANCE program. Further, on their own merits, it is important to have a diverse social science faculty since social scientists help to understand how society operates, and their research helps to address social problems such as the under representation of groups in the economy, politics and education. Which social problems we choose to study will depend, in part, on who the social scientists are who conduct the research. Finally, the involvement of social scientists is important to changing the institutional culture of universities overall. Social science exists at something of a midway point between science and engineering on the one hand, and the fine arts and humanities on the other. Social scientists can play a crucial role in explaining the nature of this problem and formulating solutions regarding under representation to both the positivists in the sciences and engineering, and to the humanists in the arts and humanities.

Another way to increase the impact of these efforts is through Title IX enforcement.¹⁵ The Society of Women Engineers is among the groups now advocating for increased reliance on Title IX enforcement as a means of advancing women in academic science and engineering. In 2004, the GAO asked granting agencies to insure that grant recipients were in compliance with Title IX.¹⁶ What this might mean in practice and whether such compliance reviews are being conducted is not entirely clear. Last year, Senators Boxer and Wyden called for an amendment to the National Science Foundation Reauthorization Act that would require the NSF to conduct

¹⁵ Richard Zare, "Sex, Lies and Title IX: Federal Law Banning Sex Discrimination in School May do as Much for Academics as it has for Athletics," *Chemical & Engineering News*, Vol. 84 (May 15, 2006): 46-49.

¹⁶ GAO report 04-639: "Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need To Do More To Ensure Compliance with Title IX," www.gao.gov/new.items/d04639.pdf

compliance reviews as well. The original intent of Title IX was to insure equal education opportunity for both sexes. Yet relatively little has been done (outside of the arena of athletics) to make that mandate meaningful when it comes to addressing opportunities for academic achievement and advancement for women in traditionally male dominated fields. We now understand more clearly than ever before that the academic achievement of young women in math, engineering, and science depends on the presence of positive female role models as well as women peers in the class room. To support equal academic opportunities for these young women, we ought to use the leverage of federal education funding to mandate Title IX compliance within the faculty of our research universities. Creating equality of opportunity for women within the faculty will have a big effect in allowing a young woman to imagine herself as one of the great scientists or inventors of her generation.