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Testimony of Margaret Edith Layne, P.E.
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Before the House Committee on Education and Labor
Subcommittee on Higher Education, Life-Long Learning, and Competitiveness
Prepared for Hearing, "Building on the Success of 35 Years of Title IX"
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Mr. Chairman and Members of the Subcommittee:

Good morning. My name is Peggy Layne. I am a Past President of the Society of Women Engineers (SWE), and I am currently employed as the ADVANCE Program Director at Virginia Tech. ADVANCE is a National Science Foundation funded program to increase the number and success of women faculty in the sciences and engineering. I am speaking today on behalf of the Society of Women Engineers (SWE) and not on behalf of my employer or the National Science Foundation.

I want to thank the Subcommittee for providing me with this opportunity to discuss how Title IX relates to science, technology, engineering, and mathematics (referred to as STEM) fields, and the law's impact on STEM over the past thirty-five years. My comments will focus primarily on the discrimination that still exists in the academic STEM community today, and how Title IX can be used as a tool to increase the participation of women in engineering.

SWE is a 20,000 member educational and service organization that is committed to establishing engineering as a highly desirable career aspiration for women. Currently, women make up approximately 13% of the U.S. engineering workforce, or 200,000 engineers, which is up from 5.8% 25 years ago.[i] The proportion of women, however, has remained relatively flat for the past ten years, and women represent only 10.6% of the faculty in U.S. engineering schools today.[ii]

In January of 2005, Harvard president Lawrence Summers suggested that "intrinsic aptitude" might help to explain why few women reach the highest ranks of STEM careers in academia. While the ensuing media storm brought much needed attention to the under-representation of women in STEM, fascination with perceived differences in men's and women's brains unfortunately diverted attention from what evidence shows to be the all too real culprits: socialization and discrimination.

Women's participation in the STEM fields has increased considerably since Title IX was enacted. In 1972, women earned 28.8% of STEM bachelor's degrees, and by 2004, they earned 49.2%, with differing proportions within the individual STEM disciplines. Women's share of STEM doctorate degrees more than tripled over that time, with women earning only 11.1% of STEM-related doctorates in 1972, but 37.4% in 2004.[iii]

Overall, women now comprise nearly 60 percent of all undergraduate college students, and nearly half of all master's, doctoral, law and medical students.[iv] Women still remain under-represented in engineering and the physical sciences, however, earning only 20 percent of all

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bachelor's degrees granted in engineering and physics, and a decreasing share of bachelor's degrees in mathematics and computer science.[v] Although women's share of STEM degrees earned still lags men's, the number of women in STEM fields has steadily increased over the past 35 years, while the number of men earning STEM degrees has remained constant over the same period of time.[vi]

Despite this progress, stigmatizing and stereotyping behaviors regarding girls' abilities in STEM persist. Attrition along the pipeline still has much to do with a culture that presents obstacles to the success of women and girls. Although the obstacles are becoming more subtle than the overt discrimination of the past, girls continue to receive less attention in K-12 mathematics and science courses; undergraduate women transfer out of STEM fields before graduating because of unsupportive classroom environments characterized by lack of role models, a limited peer group, and outdated pedagogy; and women scientists and engineers earn less and advance more slowly than men in both academia and the private sector.[vii] And while some of these differences could result from personal choices, the culture of STEM fields too often creates circumstances that isolate and exclude girls and women, dissuading them from pursuing these careers.

The number of women earning engineering degrees in the United States increased dramatically following the passage of Title IX, from around 2% in 1975 to 15% in 1985.[viii] I witnessed that increase first hand as an engineering student in the late 1970s. When I earned my first engineering degree in 1980, I fully expected that increase to continue and for women engineers to no longer be an anomaly by the time I reached the midpoint of my career. If women's participation in engineering had continued to increase at that same rate for the last 25 years, I would not be speaking to you today. Women engineers would be commonplace in the workforce, and when I introduce myself, I would no longer be told that "you don't look like an engineer." When I found that 20 years into my engineering career women were still only 10% of the engineering workforce in the U.S., I decided to change career paths and work full time on this problem, so we would not be here talking about these same issues again twenty years from now.

I am now the ADVANCE Program Director at Virginia Tech, in Blacksburg, Virginia. Virginia Tech is the recipient of an ADVANCE Institutional Transformation grant from the National Science Foundation. The ADVANCE program is designed to support innovative and comprehensive programs for institution-wide change that promotes the increased participation and advancement of women scientists and engineers in academe. The ADVANCE program at Virginia Tech recognizes that there are structures, policies, and practices at academic institutions that inherently disadvantage women, and seeks to create a more equitable environment for women faculty.

At the university level, gains in women's attainment of bachelor's and doctoral degrees in STEM disciplines still have not translated into workplace parity – particularly in academia. Women represent fewer than one in five faculty members employed in computer science, mathematics, engineering and the physical sciences. In engineering in particular, women account for just over one in ten faculty members, and are concentrated in the more junior ranks of the faculty.[ix] At Virginia Tech, only six of the 138 faculty members holding the highest rank of professor in the College of Engineering are female, and we are not unusual in that regard. In fact, the American

Society for Engineering Education reported that in the fall of 2005 Virginia Tech had the third highest number of women in tenured and tenure track engineering faculty positions in the U.S.[x]

Through our research at Virginia Tech, we have found that while 94% of the male faculty believe that their department is supportive of the success of women faculty, only 75% of those women agree. Seventy-eight percent of male faculty, but only 41% of female faculty believe that faculty members are treated fairly regardless of gender. When it comes to balancing professional success with personal obligations, 75% of women believe that it is difficult to be promoted or earn tenure and have a personal life, compared with 55% of the men.

A female faculty member stated in a focus group that "Expectations at this university are built around men who have stay-at-home wives." In an interview, a male faculty member told us that the way women are treated in his department is a big issue. He said, "I am friends with many of the women. They tell me stories about what has been going on. I can scarcely believe what people say to them." These findings are again not unique to Virginia Tech, but are consistent with data reported by the American Association of University Professors in their report, *AAUP Faculty Gender Equity Indicators 2006*.[xi]

A National Academy of Sciences study further explores the issues that impede women's progress in STEM. The report, entitled *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*, points out that "both bias and structural barriers built into academic institutions and the occupation of professor limit many women's ability to be hired and promoted."[xii] The report notes that women faculty are slower to gain promotion than men, are less likely to reach the highest academic rank, and have lower salaries and are awarded less grant money than their male colleagues. In fact, as recently as the period from 2001 to 2003, female grant applicants received only 63% as much funding as male applicants at the National Institutes of Health (NIH).[xiii]

Sex discrimination also exists in academia with regard to laboratory space, compensation, access to grants, and leave policies. While not always deliberate, this discrimination can be undeniable. In the late 1990s, Dr. Nancy Hopkins, a professor of molecular biology at the Massachusetts Institute of Technology (MIT), requested an extra 200 square feet of lab space. When her request was denied and she learned her lab was actually 1,500 square feet smaller than those of her male counterparts, she realized that discrimination still existed and became an advocate at MIT for change.[xiv] Through Dr. Hopkins' efforts and those of many other individuals and committees, educational institutions are beginning to address these inequities. The accumulation of such small, lingering day-to-day inequities, however, ultimately results in a significant overall equity gap, as documented by Professor Virginia Valian in her book *Why So Slow? The Advancement of Women*.[xv]

In response to Professor Hopkins' findings, MIT took action to identify and address inequities and increase the hiring of women faculty, and those actions drew national attention in 2001, but last year when Professor Hopkins looked at the impact of those actions she saw that women had made progress for a few years but that progress stalled following the departure of a particular administrator.[xvi] MIT's experience emphasizes why continued attention to these issues is critical to removing the entrenched barriers to women's participation in science and engineering careers.

A 2004 GAO report requested by Senators Ron Wyden (D-OR) and Barbara Boxer (D-CA) revealed that many educational institutions cannot show compliance with the most basic requirements of Title IX. The report, entitled *Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX*, looked at Title IX compliance practices at three federal agencies that support significant basic research in the STEM disciplines: the National Science Foundation (NSF), Department of Energy (DOE), and National Aeronautics and Space Administration (NASA), as well as the Department of Education (DOEd).[xvii] The report pointed out that these agencies have not fulfilled their statutory obligations to ensure that grant recipients comply with Title IX. Furthermore, the report noted that grant recipients cannot prove compliance with even the most basic of Title IX requirements.[xviii] Moreover, because the responsibility for gathering compliance data rests with the individual granting agencies, there is no centralized way to determine whether a particular school has conducted the required self-assessment, and no cross-agency standard for what a self-assessment should look like. Instead, when granting funding, federal agencies tend to accept as proof of compliance the educational institution's own pro forma statement that merely attests to the fact that the educational institution complies with Title IX in all respects.[xix] Additionally, the report pointed out that female faculty and students do not file Title IX complaints against their institutions either because they believe Title IX applies only to athletics, or because they fear retribution.[xx]

In the wake of the GAO report, NSF and NASA began to conduct Title IX reviews of STEM departments at postsecondary institutions during 2006. While these selective reviews are a start and may uncover interesting information relevant to the institutions involved, more widespread and systematic reviews are needed to bring about change on the scale necessary to increase the percentage of women in STEM fields. In particular, such reviews should focus on the culture and climate of relevant STEM departments to understand whether women and men face different barriers to success.

Mr. Chairman and Members of this Subcommittee: In many ways, the story of women in STEM is a positive one. Women are making progress in STEM education and careers, although more slowly that we would like, and the societal and institutional factors that slow women's advancement can be overcome with continued attention and tools such as Title IX.

Title IX cannot (and should not) correct for the personal choices that lead women and girls to select certain fields of study. The law can and must, however, address barriers to pursuing educational programs that reflect individual interests and abilities. Proper enforcement of and compliance with the law will help to create conditions that allow women and girls the opportunity to succeed in STEM fields by eliminating conduct and practices that disadvantage students or employees on the basis of their gender.

The persistent discrimination against women and girls in STEM, coupled with widespread concerns about American competitiveness in the global marketplace, demonstrate that enforcement of Title IX in these fields is critical. Thus far, too little has been done to realize the promise of this law in the area of STEM. Therefore, we would like to recommend the following policy recommendations to you:

- Conduct oversight hearings and call for enhanced agency enforcement, particularly an increase in the number and frequency of compliance reviews conducted by the U.S. Department of Education's Office for Civil Rights to ensure that federally-funded education programs provide equal access and opportunity to all students. Then make those reviews available to the public to ensure transparency of process.
- Authorize and fund a comprehensive public education campaign to raise awareness of Title IX and the importance of gender equity in education among students, parents, teachers, and administrators.
- Increase funding for programs that focus on attracting and retaining women and girls to non-traditional and STEM careers and removing institutional barriers to their success.

Thank you again for the opportunity to present our views.

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[i] National Science Foundation, Division of Science Resources Statistics, *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2004*, NSF 04-317 (Arlington, VA, 2004).
[ii] Gibbons, Michael T. A Year in Numbers 2005, American Society for Engineering Education.
[iii] Commission on Professionals in Science and Technology. *Four Decades of STEM Degrees, 1966-2004: The Devil is in the Details. STEM Workforce Data Project: Report No. 6.* https://www.cpst.org/STEM/STEM6_Report.pdf.
[iv] Ibid
[v] National Science Foundation, Division of Science Resources Statistics, *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2004*, NSF 04-317 (Arlington, VA, 2004).
[vi] Ibid
[vii] National Academies of Science. *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering: 2006*, National Academies Press (Washington, D.C., 2006).
[viii] Commission on Professionals in Science and Technology. *Four Decades of STEM Degrees, 1966-2004: The Devil is in the Details. STEM Workforce Data Project: Report No. 6.* https://www.cpst.org/STEM/STEM6_Report.pdf.
[ix] Gibbons, Michael T. "A Year in Numbers 2005", American Society for Engineering Education.
[x] Gibbons, Michael T. "A Year in Numbers 2005", American Society for Engineering Education.
[xi] American Association of University Professors, *AAUP Gender Equity Indicators 2006.*
[xii] National Academies of Science. *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering: 2006*, National Academies Press (Washington, D.C., 2006).
[xiii] The Rand Corporation. *Gender Differences in Major External Federal Grant Programs: Technical Report* sponsored by NSF 2005.
[xiv] Rimer, Sarah. "For Women in Sciences, Slow Progress in Academia," *New York Times.* http://www.nytimes.com/2005/04/15/education/15women.html?ex=1271217600&en=e5322d3fd78dddf3&ei=5088&partner=rssnyt&emc=rss
[xv] Valian, Virginia. *Why So Slow? The Advancement of Women*, MIT Press: 1998.
[xvi] Hopkins, Nancy. "Women's Gains in Sciences at MIT Have Stalled, Study Finds." Chronicle of Higher Education, April 28, 2006
[xvii] U.S. G.A.O., *Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX*, GAO-04-639 (Washington, DC, 2004).
[xviii] Ibid
[xix] Ibid.
[xx] Ibid.