Dear Friends of NSF:

Just shy of one month prior to the end of World War II, Dr. Vannevar Bush—Director of the U.S. Office of Scientific Research and Development—sent President Harry Truman his ground-breaking report, *Science: The Endless Frontier*. That report provided the genesis for the Congressional establishment of the National Science Foundation (NSF) in 1950.

Dr. Bush’s report is also memorable for its trailblazing recommendation “…There must be plenty of men and women (our emphasis) trained in science and technology for upon them depend both the creation of new knowledge and its application to practical purposes.”

Since the late 1970s, various programs for women and girls have been present in the NSF portfolio. In 1991, a women’s program section was installed in the new NSF Division for Human Resource Development and, in 1993, the *Research on Gender in Science and Engineering* (GSE) program was underway. GSE focused on broadening the participation of girls and women in all fields of science and engineering by supporting research on gender and science, and the dissemination of promising practices to increase the inclusion and success of women and girls in science and engineering education.

The NSF ADVANCE program made its first awards in 2001. The program was a departure from earlier NSF programs for women and girls in that it introduced a focus on systemic change within academic institutions of higher education (IHE) in order to mitigate systemic inequities that impacted women’s participation and success in science, technology, engineering, and mathematics (STEM) academic careers. The contemporary ADVANCE program remains a major NSF-wide program with support from all directorates and executive offices at NSF. The objective of the current program, *ADVANCE: Organizational Change for Gender Equity in STEM Academic Professions*, is systemic change in the policies, procedures, and structures of IHEs to be more equitable and inclusive of diverse STEM faculty.

We invite you to read in these pages about the important projects and activities that have been funded under NSF ADVANCE. NSF acknowledges the hard work and dedication for gender equity in STEM by the hundreds of individuals who have spent thousands of hours designing and implementing NSF ADVANCE grants during the last 20 years. Their work has brought us closer to gender equity and fairness for STEM faculty in academic institutions. In closing, please celebrate the 20th anniversary of the ADVANCE program in 2021 by tagging your ADVANCE social media stories with #NSFADVANCE20.

Sincerely yours,

Dr. Diana Elder
Director
NSF Division of Human Resource Development
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In 1972, Title IX of the Higher Education Act prohibited discrimination based on sex.

In 1980, the Science and Technology Equal Opportunities Act (Public Law 96-516) declared that “...It is the policy of the United States that men and women have equal opportunity in education, training and employment in scientific and technical fields.” This Congressional declaration authorized the NSF to make awards that encourage the education, employment, and training of women in science and technology. Read more about this important legislative action at PL 96-516.

### Timeline of NSF Gender Focused Programs

<table>
<thead>
<tr>
<th>Year</th>
<th>Program Description</th>
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<tbody>
<tr>
<td>1982-1997</td>
<td>Visiting Professorships for Women in Science and Engineering program (VPW)</td>
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<tr>
<td>1985-1997</td>
<td>Research Opportunities for Women program (ROW)</td>
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<tr>
<td>1990-1997</td>
<td>Research Planning Grants (RPG) and Career Advancement Awards for Women Scientists and Engineers (CAA) programs</td>
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<tr>
<td>1991-1997</td>
<td>Faculty Awards for Women Scientists and Engineers program (FAW)</td>
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<tr>
<td>1993-2014</td>
<td>Program for Women and Girls (PWG), later re-named Research on Gender in Science and Engineering (GSE)</td>
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<tr>
<td>1997-2000</td>
<td>Professional Opportunities for Women in Research and Education (POWRE) which replaced VPW, ROW, RPG, CAA and FAW.</td>
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<tr>
<td>2000-present</td>
<td>ADVANCE: Organizational Change for Gender Equity in STEM Academic Professions (previously titled ADVANCE: Increasing the Participation and Advancement of Women in STEM Academic Careers)</td>
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The long-term goal of NSF’s ADVANCE program is addressing the systemic factors that result in gender inequity for STEM faculty. The program accomplishes this by supporting grant projects to make systemic and cultural changes in institutions of higher education, and within STEM disciplines by working with STEM professional societies. The types of grants supported by ADVANCE have changed over time as the NSF has learned what works from its grantees. After 20 years of funding the development and testing of systemic change strategies to build equity for STEM faculty, the ADVANCE program has begun to increase emphasis on scale-up and incorporating an intersectional lens into the systemic change and gender equity work supported by the program.

Here are two NSF-supported videos that are emblematic of the truly innovative work by ADVANCE project personnel:

- **The 2020 STEM for All Video** is a competition entry by Florida International University (ADVANCE Institutional Transformation award NSF-1629889) using interactive theater as a tool to build awareness and start difficult conversations about equity. [STEM for all video](#)

- Advance investigators at the University of Colorado, Boulder, have created and implemented a resource of evidence-based systemic change strategies called the [stratEGIC Toolkit](#). Watch project directors Sandra Laursen and Ann Austin describe their research in the [StratEGIC Video](#).
1. Equity for STEM faculty is critical since faculty are responsible for educating, training, and mentoring the next generation of STEM students and postdoctoral scholars. STEM faculty have significant influence over the interest, preparation, persistence, completion, and career choice of these future scientists and engineers.

2. The number of women obtaining science, technology, engineering, and mathematics (STEM) doctorate degrees has increased steadily in recent decades. However, women, especially women of color, continue to be underrepresented in STEM academic positions, especially at senior ranks and in leadership positions. Social and behavioral research indicates that the marginal participation and advancement of women in STEM is often a function of external systemic factors unrelated to their ability, interest, and technical skills. These include implicit and explicit bias; differential service and teaching workload, and less recognition and value of this work by organizations; underrepresentation of women, especially women of color in academic leadership and decision-making positions; differential effects of work and family demands; and the culture and climate of STEM organizations. For an overview of the related research see Stewart, Abigail J. and Valian, Virginia. (2018). An Inclusive Academy: Achieving Diversity and Excellence. MIT Press.

3. Many ADVANCE-developed institutional transformation strategies can be incorporated into ongoing institutional strategic planning efforts and implemented by existing administrative and institutional offices at little to no long-term cost. Read more about this from Laursen, Sandra and Austin, Ann E. (2020). Building Gender Equity in the Academy: Institutional Strategies for Change, Johns Hopkins Press. Steps toward systemic change include:

- **Review The Research**: Study the social science literature on organizational change, implicit/explicit bias, work-life issues, accumulated disadvantage, and related research.

- **Collect, Disaggregate, and Analyze Data**: Surveys and other faculty data enable institutions to identify systemic gender inequities.

- **Review and Revise Policies**: Equity issues are often embedded in written and unwritten policies, procedures, and practices such as faculty recruitment, tenure and promotion, and work-life programs.

- **Identify Strategies to Address Inequities**: Many strategies can be adopted with little modification.

- **Report Out to The Institutional Community**: Keep your faculty and administrators informed of institutional data, and policy and program revisions.

- **Establish Processes to Monitor & Revise**: Evaluate the impact of policy changes and revisions to continually monitor the effectiveness for all faculty.
By rejecting the notion that there is something wrong with the ability or interest of individuals who have not historically participated in STEM education and work, ADVANCE has moved the discussion of broadening participation in STEM from “fixing” individuals in STEM, to “fixing” STEM organizations.

ADVANCE has learned that systemic, organizational, and institutional change strategies have the potential for long-term impact on diversity, equity, and inclusion in STEM. For instance, about two-thirds of former ADVANCE Institutional Transformation grantees continue their work after the grant ends.

ADVANCE has learned that everyone needs to be involved in changing the culture and climate in STEM workplaces. Achieving diversity in STEM is not the responsibility of diverse individuals, but also the responsibility of all individuals in the larger STEM education and research domain.

In 20 years, the NSF ADVANCE program has supported 205 different institutions of higher education in 48 states, the District of Columbia, and the Commonwealth of Puerto Rico with an NSF investment of over $350 million. This portfolio includes 43 different minority-serving institutions (representing 20% of the ADVANCE portfolio).
The NSF ADVANCE focus on systemic change to address gender-based inequity has influenced other national and international efforts. Two important examples follow:

- **The STEM Equity Achievement (SEA Change) initiative led by the American Association for the Advancement of Science (AAAS):**

  The AAAS SEA Change project was catalyzed with ADVANCE grant support in 2016 (NSF award 1632847) and it pledged to build on lessons learned from previous ADVANCE investments about the importance of data collection and use of the data to identify and address diversity, equity, and inclusion issues in STEM. In 2018, NSF and the National Institutes of Health (NIH) supported the development of the infrastructure for the SEA Change project (NSF award 1841687). The SEA Change project incentivizes institutions to collect and report demographic data on students and faculty, as well as equity policies and programs in order to apply for bronze, silver, and gold level recognition from the AAAS SEA Change program. Read more about the [SEA Change project](#).
• **Canadian STEM Agencies Create an ADVANCE-like program:**

The Equity, Diversity, and Inclusion Institutional Capacity-Building Grant is a funding opportunity for Canadian post-secondary institutions started in 2019. It is designed to tackle challenges encountered by underrepresented groups in Canadian research institutions. Language from the ADVANCE program describing systemic inequities in STEM was included in the Canadian call for proposals. Learn more through [Canada STEM Agencies](#).
NSF ADVANCE grants have resulted in sustainable programs. Approximately two-thirds of Institutional Transformation grantee institutions continue to support and promote ADVANCE activities, and have expanded beyond gender equity and STEM departments. Some examples include:

• The University of California at Irvine:
  In 2006, the university institutionalized its UCI ADVANCE project and, in addition to gender, expanded the scope to include race, ethnicity, and disability. It continues to maintain a focus on faculty issues. Read more at UC Irvine.

• The University of Wisconsin–Madison:
  The university’s Women in Science and Engineering Leadership Institute, a research center that leads ADVANCE activities on campus, now offers its own grant programs, bookstore and resources, workshops, and lectures. Read more at UW Madison.
STORIES OF IMPACT

The University of Michigan–Ann Arbor:
The university’s ADVANCE program focuses on four areas relevant to the success of a diverse and excellent faculty: recruitment, retention, climate, and leadership development. The University’s ADVANCE program office manages the recruitment and training of the Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE) committee. Read more at U Michigan.

PROGRAM INFORMATION

NSF ADVANCE funding opportunities (www.nsf.gov/ADVANCE):

• INSTITUTIONAL TRANSFORMATION (IT) supports development of innovative organizational change strategies to enhance gender equity in STEM academics in non-profit institutions of higher education.

• ADAPTATION supports the adaptation and implementation of successful strategies to address systemic gender equity issues for STEM faculty within a non-profit institution of higher education or non-academic organization.

• CATALYST supports institutional self-assessment work to inform the development of a five-year STEM faculty equity strategic plan.

• PARTNERSHIP supports projects involving two or more non-profit organizations to undertake systemic change projects that have national or regional reach.
LOOKING FORWARD

ADVANCE building on 20 years

ADVANCE Resource Coordination Network
The ARC Network is open to everyone interested in gender equity in STEM. ARC is a community of scholars and practitioners interested in learning from each other and sharing lessons learned. One main component of the network is a library of resources developed by ADVANCE grantees and others. Learn more at www.equityinstem.org

Recognizing the Importance of Intersectional Thinking to Gender Equity
The NSF ADVANCE program recognizes that equity barriers are not identical for all STEM faculty; therefore, the program seeks to promote systemic change that considers the intersection of gender and other social identities, especially the intersection of race, ethnicity, and gender. Intersectionality was first framed in terms of employment discrimination by Kimberlé Crenshaw in 1991, and further developed by many scholars. NSF ADVANCE has required that an intersectional lens be used in all proposals since 2016.

AccessADVANCE is an NSF ADVANCE Partnership project (NSF award 2017017) that is designed to increase the participation and advancement in academic STEM careers by individuals who identify as women with disabilities. Faculty with disabilities in STEM fields are an understudied and often invisible population. This population is important because all faculty members could, at some point in their career, become disabled, either permanently or temporarily. Join the AccessADVANCE community of practice and gain access to resources and capacity-building institutes at U Washington Do-It.