

Athena SWAN and ADVANCE: effectiveness and lessons learned

Sue V Rosser, Sarah Barnard, Molly Carnes, Fehmidah Munir

Published in: *Lancet* 2019; 393; pages 604–08

Introduction

As educational attainment has increased globally in recent decades, women's participation in higher education (ie, university level or above) has also risen greatly. Although discoveries and practices within science, medicine, and global health have a tremendous effect on women, women's representation as researchers and leaders in these fields continues to lag. This Viewpoint discusses the current situation and interventions of two high income countries: the USA and the UK.

Increasing the pipeline of women receiving science, technology, engineering, and mathematics (STEM) degrees has not translated to comparable percentages of women in the STEM workforce in either the USA¹ or the UK.² Disaggregated US data show a higher attrition of women throughout their academic careers compared with men, resulting in lower proportions of full female professors—ranging from 10% in engineering to 38% in psychology.¹ Further, US universities awarding the majority of research doctoral degrees have fewer full female professors, as well as fewer women at the lower ranks of assistant and associate professors compared with less research intensive institutions. Similar trends are evident in the UK: in 2014–15, women represented 47% of all postgraduate research students and 45% of academic staff, but only 19% of professors in science, engineering, and technology, 23% of all professors, and 29% of senior academic management.² To address the underrepresentation of women, both the UK and the USA launched initiatives in the early 2000s to advance gender equity in STEM within academic institutions.

Description of Athena Scientific Women's Academic Network (SWAN)

Recognition of gender inequalities in academic sciences and related STEM disciplines in the UK created the context for the establishment of the Athena project's web-based resource,

SWAN, in the early 2000s.³ The network's success led to the formal creation of the Athena SWAN Charter, a project aiming to address the unequal representation of women and to encourage and recognise commitment to advancing the careers of women in STEM employment in both higher education and research.⁴ More recently, the charter widened its remit to include consideration of professional, support, and technical staff and to the academic disciplines outside of STEM.⁴ The charter is owned and managed by the Equality Challenge Unit (ECU) in London, UK, within the Advance Higher Education Academy, and institutions can become a member by submitting a letter of commitment to the ten principles of the charter. Institutions and their schools or departments can then submit documentation outlining how they have adopted these principles within their policies, practices, action plans, and culture, and the impact of this. Submission documents are analysed on gender disaggregated data and an associated action plan that builds on any issues identified from the data. Universities and departments are also expected to provide evidence of good practice in addressing gender inequalities that goes beyond standard legal requirements. Based on the submitted documents, the ECU can award recognition at bronze, silver or gold levels, with each representing different achievements in promoting and documenting gender equity. Awards can be given at institutional and department levels; no award is also possible. Gold award departments are those that demonstrate the SWAN initiative in mainstreaming gender and leadership.⁵ Between 2005 and 2017, the charter grew from ten original members to 140 institutions. Changes in UK higher education institutions towards greater recognition of gender inequalities were spurred by funding programmes (the National Institute for Health Research [NIHR] funding for Biomedical Research Centres and Patient Safety Translational Research Centres)⁶ and the 2011 announcement that funding from the NIHR would require the academic partners to have at least Athena SWAN silver status.

Increasingly, the ECU has been highlighting an intersectional perspective on the experiences of women in higher education, by running a gender equality charter mark and a race equality charter in addition to Athena SWAN. Athena SWAN has also gained visibility outside of the UK, with much interest in their approach to tackling gender inequalities, particularly in Ireland and Australia since 2015.⁵

Description of ADVANCE

In the USA, a 1997 workshop examined the National Science Foundation's (NSF) portfolio of programmes to enhance careers of faculty women.⁷ Analysis of qualitative and quantitative data led participants to recommend structural approaches to promote systemic change and gender equity, so as to increase the percentage of women in most STEM disciplines, especially in senior and leadership positions such as full professor, chair, dean, provost, and president. Building on this recommendation, NSF launched ADVANCE in 2001. The long-term goal of ADVANCE is to use competitive grant awards, currently with an applicant success rate of less than 10%,⁸ for the establishment of a productive and diverse academic workforce within STEM fields, including in STEM institutions and organisations that are structured to be equitable, that use research-based inclusive practices, and that have a culture and climate supportive of a diverse academic workforce.

Common characteristics of the Institutional Transformation grants initially awarded to nine institutions included gender-disaggregated data collection methods, mentoring schemes, implementation of work–life balance policies, and guidance for institutional leaders to ensure understanding of changes to policies and practices aimed at enhancing faculty careers for women in STEM. In addition, each grant included research providing a signature contribution to the burgeoning scholarship on gender equity and inclusive practices. Examples of contributions included how to train search committees, department chairs, and tenure and promotion committees to reduce the impact of cultural stereotypes on judgement and decision making (ie, implicit bias).

Because almost two-thirds of Institutional Transformation grants awarded from 2001 to 2018 have gone to research intensive institutions,⁸ solicitations subsequent to 2001 evolved to include Adaptation and Partnership tracks to ensure more inclusivity of academic institutional types, non-profit organisations, professional societies and faculty in addition to those on the tenure track. From 2001 to 2018, NSF provided more than US\$297 000 000 for ADVANCE to more than 17⁹ institutions of higher education (5.3% of all US institutions of higher education) and non-profit organisations in 47 US states.⁹

In response to the finding that ADVANCE privileged the experiences and needs of white women,¹⁰ NSF has acknowledged the role of intersectionality (emerging from feminist and critical race theory), and the effects of the overlap of race and ethnicity, class, religion, and other social identities (including gender) for women in STEM. The spectrum of gender and STEM workplace stigmas that relate to different physical and mental abilities, country of origin and education, and age are beginning to be recognised as important for understanding the experiences of women in STEM in various institutional contexts.

Effectiveness in forging systemic change and eliminating gender and institutional bias

Evaluating the overall effect of these initiatives on academic STEM in the UK and the USA has proven difficult. Certainly, ADVANCE has raised awareness of the issues of gender inequality and implicit bias, and there have been increases in the numbers of women being hired and in leadership positions. The 19 institutions awarded ADVANCE Institutional Transformation grants in the initial 2001 and 2003 cohorts exhibited an increase in women STEM faculty members from 16% to 24%, and an increase in new women hires in STEM roles from 25% to 35%, whereas the increase in the comparator institutions not awarded Institutional Transformation grants was only from 22% to 27%.¹¹ Women in STEM leadership roles increased from 10% to 16%.¹¹ The specific contribution of ADVANCE to increasing inclusivity remains problematic to separate from overall institutional, academic, and US pushes for inclusivity to have the faculty demographics more closely mirror the diversity of student demographics.

Research on Athena SWAN in the UK has explored the relationship between women's experiences at work and Athena SWAN status of the institution,¹² but attributing cause and effect to implementation of Athena SWAN policies is difficult because of the complexity of the issues. An econometric analysis of the effect of Athena SWAN found an increase in the number of women in academic medicine, but no evidence that this was linked to the introduction of Athena SWAN awards.¹³ Another evaluation of the Athena SWAN charter found evidence of a positive effect of Athena SWAN on the visibility, leadership skills, career development, and satisfaction of women working in STEM and medicine, as well as the

value of Athena SWAN as a driver in improving gender diversity.¹⁴ However, this study focused on the perceptions of impact rather than directly measured impact.

In the USA, different governmental and funding agencies have attempted to increase the proportion of women in STEM and medicine, as well as diversity in the workforce. Given their charters, they have taken different approaches and had different priorities and timelines for funding initiatives to address these issues. For example, the National Institutes of Health (NIH) has drawn attention to sex and gender in research content, with its focus on sex as a biological variable and on mandates to include women in clinical trials,¹⁵ whereas NSF has focused its attention on gender in science-based educational and institutional structures.¹⁶ Some scientists involved in the NSF ADVANCE programme were also NIH funded. Inspired by ADVANCE, they worked with senior NIH staff to help create the momentum for a onetime funding initiative from NIH that supported 14 sites to conduct research interventions that aimed to increase the participation and advancement of women in biomedical careers. In the UK, the NIHR funding of Biomedical Research Centres announcement is a major driver for institutional changes.⁶ In addition to other discipline specific schemes—for example, project Juno for physics disciplines and the WISE Campaign for science, technology, and engineering disciplines—the relationship of Athena SWAN to funding is still not clearly linked through the changes in the charter.¹⁷

Both Athena SWAN and ADVANCE acknowledge historical and institutional context as crucial factors for determining the effectiveness of particular strategies or approaches in eliminating bias and facilitating change. The case studies documenting effective change at particular institutions¹⁸ from ADVANCE projects include small numbers of individuals and multiple interventions, which makes effects of one change difficult to isolate and generalise to other institutions.¹⁹ The rationale for Adaptation awards in ADVANCE arose from the recognition that policies, practices, approaches, and even research that evolved at one institution might not be easily transferred to another with similar results without adaptation to the new institutional context and environment.

A 5 year, non-renewable grant, even one the size of the ADVANCE Institutional Transformation awards, can only establish a foundation for change and set a course

for sustainable institutional transformation. Elimination of implicit biases and deeply entrenched societal norms surrounding gender, race, and class through structural changes within institutions with such limited time and funding cannot be expected, although some of the immediate aims of the action research projects such as norm building and policy changes at a particular institution can be measured.¹⁹ For instance, a mixed methods study of the 54 academic institutions that received ADVANCE Institutional Transformation awards from the NSF since 2001 identified relevant recommendations for enhancing sustainability.¹⁵

Athena SWAN is not time-limited in the same way as ADVANCE, but does have renewal cycles. Based on their submission of data, activities, and future plans, schools, departments, and institutions are awarded a bronze, silver, or gold status for 3 to 5 years, which can be renewed. With no funding or grant attached to the award, time and resources come from the business plan of the institution, school or department, often resulting in women undertaking this work, which would otherwise be difficult to achieve without funding and is therefore reliant on goodwill and interest in the cause.

Lessons learned

Over 15 years of experiences in the USA and the UK have indicated a range of common lessons that can be learned in relation to the need for good quality gender disaggregated data, clear leadership, and effective policies that lead to disruption of systemic gender bias. We outline these lessons and also the probable future directions for Athena SWAN and ADVANCE, as summarised in the panel.

Obtaining good-quality gender-disaggregated data is essential for measuring institutional change. Baseline data, common definitions of terms, and so-called cleansed data (incorrect, incomplete, improperly formatted, or duplicated data amended or removed) are required metrics against which implemented changes can be measured. Being crucial for a range of reasons, these data provide evidence of gender inequalities used to inform and persuade key actors to support and provide budgets for actions. Naming the problem and specifying the issues in particular contexts underpins much of the progress to date, allowing

institutions to develop targeted action plans. Data also allows benchmarking, longitudinal tracking of progress, and evaluation of initiatives, although comparisons across institutions have been infrequent and qualitative studies that offer rich descriptive findings are not generalisable.⁸

Women's leadership roles and other key involvements with ADVANCE and Athena SWAN have yielded both negative and positive results for their own career trajectories. For some, it has provided an opportunity to demonstrate or develop administrative skills and improve visibility within their own or other institutions, providing a pathway for advancement to administrative leadership. For others, the large time commitment and service duties have slowed or halted their research trajectory. Appropriate leadership commensurate with the level and scope of the systemic change sought is crucial to the success and institutionalisation of the change in the UK and the USA.

Few men have been as deeply involved in seeking ADVANCE grants, although they have implemented the projects and benefited from policies, practices, and resulting changes; in the UK, women are more likely to undertake a disproportionately higher amount of Athena SWAN work.²⁰ To have sustainable, systemic change, men in STEM must also be involved. 79–90% of institutions awarded ADVANCE Institutional Transformation grants addressed policy changes in the following areas: recruitment (90%), hiring (95%), research support (79%), tenure criteria (90%), standards of promotion to full professor (79%), and work–life balance (79%).¹¹ Introducing new policies only goes so far in addressing gender issues because the implementation and sustainability of such changes and policies depend on the current senior management team, which can change frequently; 38% of administrators who served as ADVANCE principal investigators left their institution.¹⁵ Once in place, policies become difficult to eliminate, whether they have negative or positive consequences. For US and UK institutions, perception and monitoring of gender equality policies and practices partially depends on the individual and collective beliefs of the senior management team, coupled with sufficient representation of women within the management team who feel comfortable and secure in challenging individual beliefs that go against equality and diversity. If institution-wide change is desired, then there is a need to have a balanced representation of women in management, and for the provost (USA), pro-vice-chancellor

(UK) or president to be highly invested in the project or, in some cases, in taking on a leadership role.

Future trends

Trends for both ADVANCE and Athena SWAN have been shifts from a focus on tenured or tenure-track women in major research institutions to the inclusivity of all higher education institutional types, as well as non-profit and professional organisations. Similarly, there is an expansion beyond gender, and a look at intersectionalities, such as sexuality, race and ethnicity, disability, and age, that influence women's experiences in STEM. These trends will probably continue. However, an inherent contradiction exists between ideas that underpin action: the understanding of how to conceptualise and achieve gender equality can vary markedly depending on whether institutions engaging with Athena SWAN and ADVANCE and the individual initiatives themselves are trying to radically alter societal gender dynamics to be fairer, or to support women in decisions that reproduce gender inequalities and ADVANCE Institutional Transformation projects that embarked on multi-level system approaches have had the most enduring impact, as opposed to those that took a so-called change the women approach.²¹ These tensions could hamper the effectiveness of Athena SWAN and ADVANCE in increasing the representation of women at the highest levels of science. As ADVANCE and Athena SWAN gain international recognition, their approaches and frameworks could be used as models for others to adapt and adopt (Sage in Australia exemplifies this). These successes in other related programmes facilitate the growing interest in and legitimisation of actions that address gender inequalities in societies globally.

Contributors

FM and SB wrote sections related to Athena SWAN and provided feedback and small edits to the overall piece. MC wrote sections related to the NSF ADVANCE programme and provided feedback and small edits to the overall piece. SVR wrote sections related to the NSF ADVANCE programme and the effectiveness of the programmes and lessons learned, as well as editing the overall piece.

Declaration of interests

MC reports National Institutes of Health grant R35GM122557. FM and SB report funding from Advance Higher Education Academy. SVR reports National Science Foundation grant 1608269. All of these are outside of the submitted work.

Acknowledgments

SVR thanks the National Science Foundation programme officer Jessie DeAro for providing URLs relevant to the work on ADVANCE.

Lessons learned from Athena Scientific Women's Academic Network (SWAN) and ADVANCE

High quality data

- High quality data are essential for measuring institutional change
- Baseline data before intervention is required for benchmarking
- Team should agree on common definitions
- Data should be disaggregated and any incorrect, incomplete, improperly formatted, or duplicated data amended or removed
- Data should include both quantitative and qualitative metrics

Appropriate leadership

- Leadership must be commensurate with the desired level and scope of systemic change
- The president, provost (USA) or pro-vice-chancellor (UK) must be invested and possibly hold a leadership role in ADVANCE and Athena SWAN work
- Women leaders might experience positive and negative effects on their career
- Men in science, technology, engineering and mathematics (STEM) should become more involved for long-term sustainability

Implementation and sustainability of policy changes

- Policy changes depend on the senior management team
- Recruitment, hiring, research support, tenure and promotion criteria, and work-life balance represent frequent focuses of policy change
- Once in place, even negative policies might be difficult to eliminate
- Women should be represented on the senior management team and willing to challenge individual beliefs that go against diversity

Future trends

- Future trends include intersectionalities beyond gender and inclusivity of institutional types
- Race and ethnicity, sexual orientation, disabilities, age, and other factors are now recognised as being intersectional with gender in shaping women's experiences in STEM
- A shift in focus to include women beyond the tenured and tenure-track women
- All higher educational institution types, as well as non-profit organisations and scientific professional societies, are now recognised as eligible for ADVANCE

References

- 1 National Science Foundation. Women, minorities, and persons with disabilities in S&E: data tables. 2018. <https://www.nsf.gov/statistics/2017/nsf17310/data.cfm> (accessed Nov 19, 2018).
- 2 Higher Education Statistics Agency. Higher Education Statistics for the UK 2014/15. Aug 11, 2016. <https://www.hesa.ac.uk/data-and-analysis/publications/highereducation-2014-15> (accessed Jan 9, 2019).
- 3 Phipps A. Women in science, engineering, and technology: UK initiatives from the 1970s to the 2000s. Stoke: Trentham Books, 2008.
- 4 Equality Challenge Unit. Athena SWAN Charter 2015. <http://www.ecu.ac.uk/equality-charters/athena-swan/> (accessed Jan 9, 2019).
- 5 Barnard S. The Athena SWAN Charter: promoting commitment to gender equality in higher education institutions in the UK. In: White K, O'Connor P, eds. Gendered success in higher education: global perspectives. London: Palgrave Macmillan, 2017: 155–74.
- 6 Advance Higher Education. History of Athena SWAN (pre May 2015). <https://www.ecu.ac.uk/equality-charters/athena-swan/aboutathena-swan/history-of-athena-swan/> (accessed Jan 9, 2019).
- 7 Rosser S, Zieseniss M. Final report on professional opportunities for women in research and education (POWRE) workshop. Gainesville: Center for Women's Studies and Gender Research, 1998.
- 8 Zippel K, Ferree M. Organizational interventions and the creation of gendered knowledge: US universities and NSF ADVANCE. *Gen Work Organ* 2018; published online Sept 17. <https://doi.org/10.1111/gwao.12290>.
- 9 National Science Foundation. ADVANCE: increasing the participation and advancement of women in academic science, technology, engineering and mathematic careers. 2017. <https://www.nsf.gov/ehr/Materials/ADVANCEBrochure.pdf> (accessed July 9, 2018).
- 10 Torres L. Lost in the numbers: gender equity discourse and women of color in science, technology, engineering, and mathematics (STEM). *Int J Sci Soc* 2012; **3**: 157–74.
- 11 Case Western Reserve University. Annual Plenary 2018 Presentations. 2018. <https://case.edu/ideal-n/presentations-andpublications/annualplenary-2018-presentations> (accessed July 9, 2018).

12. Barnard S, Arnold J, Bosley S, Munir F. Onwards and upwards? Tracking women's careers in higher education: year 2 report. March, 2018. <https://www.lfhe.ac.uk/en/programmes-events/equality-and-diversity/aurora/the-longitudinal-study/> (accessed Jan 9, 2019).
- 13 Gregory-Smith I. Sheffield economic research paper series 2015: the impact of Athena SWAN in UK medical schools. March, 2015. https://www.sheffield.ac.uk/polopoly_fs/1.449704!/file/paper_2015010.pdf (accessed Dec 5, 2018).
- 14 Munir F, Mason C, McDermott H, Morris J, Bagilhole B, Nevill M. Advancing women's careers in science, technology, engineering, mathematics and medicine: evaluating the effectiveness and impact of the Athena SWAN charter. London: Equality Challenge Unit, 2013.
- 15 Furst-Holloway S, Hardcastle V, Douglas H, Page E. Sustaining ADVANCE programs: a correlational study. Cincinnati: University of Cincinnati, Leadership, Empowerment, and Advancement for Women STEM Faculty (LEAF), 2018.
- 16 Rosser SV. Breaking into the lab: engineering progress for women in science. New York: NYU Press, 2012.
- 17 Gregory-Smith I. Positive actions towards gender equality: evidence from the Athena SWAN Charter in UK medical schools. *Br J Ind Relat* 2018; **56**: 463–83.
- 18 Sturm S. The architecture of inclusion: advancing workplace equity in higher education. *Harv J Law Gend* 2006; **29**: 247–334.
- 19 Nielsen J, Marschke R, Sheff E, Rankin P. Vital variables and gender equity in academe: confessions from a feminist empiricist project. *Signs* 2005; **31**: 1–28.
- 20 Caffrey L, Wyatt D, Fudge N, Mattingley H, Williamson C, McKeivitt C. Gender equity programmes in academic medicine: a realist evaluation approach to Athena SWAN processes. *BMJ Open* 2016; **6**: e012090.
- 21 Morimoto S, Zajicek A, Hunt V, Lisnic R. Beyond binders full of women: NSF ADVANCE and initiatives for institutional transformation. *Sociol Spectr* 2013; **33**: 397–415.