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Increasing Female Academics in Science in the United States: An Examination of the Policy Process

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ABSTRACT

Women academics are an under-represented part of many science faculties at many colleges and universities in the United States. Efforts to improve the imbalance have been driven by institutional and national-level policies. This article highlights many of the policy efforts by considering the stages of policy process. The article also incorporates international differences in gender equity policy and shows how this issue can be an important part of the policy agenda in science faculties. Through an understanding of policy process, policy makers can find creative ways to grow the numbers of female science academics at universities around the country. This growth can help further expand the opportunities for future generations of female science academics.

KEYWORDS

gender equity; higher education policy; policy process; women in science; science academics

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INTRODUCTION

Women have been well represented in primary and secondary school teaching for several generations (Feistritzer, 2011). In stark contrast, the growth of female academics at universities around the United States (U.S.) has only marginally increased (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007) even though there has been astounding growth in the number of women pursuing higher education (Pryor et al., 2007). Presently, with only limited national policies on female employment issues (i.e. equal employment opportunities, maternity leave, and so forth), most U.S. universities have few clear incentives or mandates to hire female academics at levels that better reflect the gender makeup of their student body. This issue is even more obvious when considering the numbers of female university academics in the fields of science, technology, engineering, and mathematics (STEM) (Committee on the Guide to Recruiting and Advancing Women Scientists and Engineers in Academia, 2006). Presently, policies addressing female STEM academics in the U.S. need more attention.

Countries have handled the issue of gender equity somewhat differently. Many countries have approved strong family-friendly work policies that aid working mothers, like paid parental leave and subsidized childcare facilities (Brennan, 2007; Castles, 2003; Mayer & Tikka, 2008), programmes not nationally available in the U.S. Policies to promote and protect opportunities for women have even expanded to much of the developing world (Duflo, 2012). In some countries, government interest in aiding female academics in STEM fields has strengthened (Corporate Planning and Policy Directorate, 2010; Maes et al., 2012; Marginson et al., 2013; Science and Technology Committee, 2014). Though the U.S. spends more per student on education than in any other country (OECD, 2013), U.S. higher education institutions lag far behind their European counterparts in the implementation and development of policies to promote the employment of female academics in STEM fields (Marginson et al., 2013).

There are many who see a positive benefit to promoting gender diversity. According to a report from the United Kingdom (U.K.) House of Commons' Science and Technology Committee (2014), there is an industry incentive to promoting gender diversity in STEM 'if well managed' (p. 9). A highly trained and diverse staff of both male and female scientific researchers can help further the cause of many scientific endeavours. The report suggests that opportunities for women are a necessity because of the increased demands for scientists and engineers. Additionally, it suggests that women are an untapped resource that will need to be better utilized for continued economic growth in the country. This article focuses on the opportunities for physical science (noted as science) academics and the national institutional efforts made to improve the number of women in these fields in the U.S.

There have been many studies evaluating female STEM policies, and for this article, we seek to integrate the studies into an examination of policy development. This article analyses the history of the U.S. public policy overall for dealing with gender equity issues. The discussion focuses on how policy can be developed and applied to increase the numbers of female academics in science fields. Specifically, this article is organized around the stages of the policy process including: agenda setting, and the formulation, adoption, implementation, and evaluation of policy (Anderson, 2008). We integrate historical and theoretical perspectives into the discussion to highlight how gender equity among science academics has been addressed within the U.S. and abroad. We examine factors that affect policy at the local and national level. This article aims to direct attention to what has been achieved in order that future policymakers can continue to find ways to increase the numbers of female science academics.

SETTING THE AGENDA

For the issue of gender imbalance among science academics to gain prominence and for gender equity to become an active part of the higher education policy agenda, it needs to find support in the broader community. One method that explains how an issue can rise in prominence to become part of the policy agenda is the Multiple Streams Framework (MSF) (Kingdon, 1996; Zahariadis, 2007). The MSF is an approach to agenda setting that takes into account the timing of the situation and the policy actors that are involved. It has been applied to many types of policy analysis. According to this framework, there are three 'streams' or sets of factors and situations that must be in place for an issue to become part of a policy agenda: the problem stream, the politics stream, and the policy stream. These streams come together to bring an issue to political importance. We believe that this perspective describes how the gender imbalance has previously come to the forefront and how it can come to a position of prominence again.

The Problem Stream: Identifying the Gender Imbalance Problem

A policy problem is a 'condition or situation that produces needs or dissatisfaction among people and for which relief or redress by governmental action is sought' (Anderson, 2008, p. 82). For an issue to come to the forefront, it must be identified as a problem that needs resolution. Many gender equity problems requiring resolution in the context of the employment of U.S. science academics have been, and continue to be, identified. Recognizing these problems is critical for understanding how to be successful.

Firstly, research suggests that female students tend to have more negative attitudes towards science than male students do (Osborne, Simon, & Collins, 2003; Weinburgh, 1995). Although we know that many women pursue tertiary educational degree programmes in science (Pryor et al., 2007), the percentage of female students who leave science degree programmes is much higher than the percentage of male students who do so (Chen & Soldner, 2013). Additionally, research suggests that science academics of both genders exhibit a negative bias toward the work of female students studying in related fields (Moss-Racusin et al.,

2012). The female students' educational experiences may suggest some reasons for the gender imbalance in science faculties.

Furthermore, some academics see the role conflict that women face (i.e. between work and family) as a potential barrier against career development for U.S. female science academics (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007). It is difficult for female professionals to publicly address role conflict because women strive to gain the respect of peers in their work environment (Blair-Loy, 2001). Role conflict is a critical factor in the persistent gender imbalance in science faculties. There have been several local and national studies that identified role conflict as a significant issue to consider when examining the unequal representation of female science academics (Burrelli, 2008; Committee on Women Faculty in the School of Science, 1999; Division of Science Resources Statistics, 2004; National Research Council, 2010; Powell, 2007), yet the problem still persists. Some female scientists try to address it by working part-time as an academic, but Gornick (1983) notes that being part-time scientists will not help women develop as scientists in these roles because they cannot receive respective credit for their research and academic work. Many are just relegated to teaching classes with no potential for added opportunities.

Another major issue, though not always prima facie, is the problem of discrimination. Many times, women science academics have to deal with not being considered as academic equals by their male colleagues (cited by Female Science Professor, 2010). This questioning of ability by male scientists has been a consistent issue for female academics in a variety of STEM fields (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007).

Another problem that has been presented in previous reports is the insufficient number of female candidates in the academic pipeline (Faculty Committee, 2011). Departments have expressed an interest in hiring female academics in the sciences, but note that there are few strong candidates available (Powell, 2007). Fielding contrasts with medicine, which has seen an enormous increase in the numbers of women doctors (Jolliff et al., 2012), female science academic numbers have seen much smaller and inconsistent proportional increases (Powell, 2007). Other problems include low pay, unfriendly work conditions, and lack of female professional support (National Research Council, 2010).

Defining a problem is more than just an examination of previous studies; it is part of a 'political game'. For a problem to achieve prominence in the political realm, it must be highly visible, have a political sponsor, and have viable solutions (Portz, 1996). Zahariadis (2007) suggests problems need political manipulation in order to provide clarity to the overall community about an outstanding issue. In 1999, a group of female science faculty members approached the Dean of the School of Science at Massachusetts Institute of Technology (MIT) about feeling underrepresented in the department. As a result, the Dean developed a committee to investigate the academics' concerns and provide help to build an initiative to target gender imbalance. This committee helped the university develop viable

solutions to promote the employment of female science academics (Faculty Committee, 2011).

Advocates do not always clearly define a social problem, and often there are competing definitions of a controversial problem (Hilgartner & Bosk, 1988). Potential issues have to be presented in ways that feature successful related actions, in what Zahariadis (2007) calls 'feedback'. The spillover from the related action weighs heavily on the immediacy that an institution takes when defining the problem. This feedback provides results that policy makers can use to develop understanding of a problem and of how it affects people. The work at MIT acted as a triggering mechanism by bringing attention to the issue of the unequal numbers of women academics in science fields. Researchers have cited this study as a reason for the U.S. legislature recommending a national study on women in science, engineering, and mathematics (National Research Council, 2010).

The Politics Stream: Role of Politics

The politics stream includes three distinct elements: the national mood, advocacy group campaigns, and administrative or legislative turnover (Zahariadis, 2007, p. 73). The national mood on women in science has developed through news media coverage and advocacy group support. Today, even children's toys are emphasizing women in STEM fields. Two noteworthy examples of toys are a 'fossil hunting' version of Arklu's Lottie doll and the GoldieBlox brand of engineering toys for girls. Toys like these have been helping to address gendered norms even among young children. Early reports draw attention to the challenging issues faced by female academics (Sandler & Hall, 1986). Even with the present climate of promoting diversity, many issues faced by women in science are still part of the national discussion (Harmon, 2009; Pappas, 2013); however, the need to address the issues has failed to significantly affect the national mood because the general public does not see gender diversity as an important component in the development of national science objectives (National Center for Science and Engineering Statistics, 2012).

Advocacy groups play a significant role in developing the politics stream. Groups like the Association for Women in Science and the American Association of University Women advocate policies that promote female science academics in the U.S. Other associations around the world advocate for similar promotion of issues facing women scientists in their respective nations including the Indian Women Scientists' Association, the Society of Japanese Women Scientists, and the European Platform of Women Scientists. These organizations can be strong advocates for policy improvements. For example, in the U.K., a significant advocacy group, the Campaign for Science and Engineering, publically came out with a position paper supporting the House of Commons work, which provided much needed support for the findings (Campaign for Science and Engineering, 2014). Group support like this is important for developing an infrastructure of opportunities for women in laboratories and universities across the country.

Legislative turnover affects the political prominence of an issue. In the U.S. in 2007, Senator Ron Wyden, as the incoming chair of the Subcommittee on Science, Technology and Space, took the opportunity to hold hearings on the employment of

women in science and technology (Redden, 2007). During that same year, in the U.S. Congress, Representative Eddie Bernice Johnson introduced the Gender Bias Elimination Act to aid the careers of female STEM academics ('Legislation', 2008). At that time, there was a period of large congressional turnover (Brandon, 2006), so this bill got no further than a committee. However, this push to introduce legislation highlights the growing concern of female STEM academics at that time.

One of the national foci of interest during this time period of political attention has been the U.S. National Science Foundation's (NSF) ADVANCE programme which started in 2001 to promote female academics in STEM fields (information at: www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383). These grants provide national funds to promote the employment of female academics in science and related programmes. The programme was further expanded to more university campuses during this period of political interest (information available at: www.nsf.gov/crssprgm/advance/awards.jsp). Hundreds of university reports have come from the expansion of these programmes (available at: http://www.portal.advance.vt.edu/index.php/categories/program/advance-reports). These programmes are still helping influence changes at many colleges and universities across the country.

The link between political interest and action has also been noted in reports for other countries as well (Corporate Planning and Policy Directorate, 2010; Maes et al., 2012; Marginson et al., 2013; Science and Technology Committee, 2014). An increased interest in gender issues, when coupled with the identification of the problem in previous research, presents an ideal opportunity to address the problem in what Zahariadis (2007) and Kingdon (1996) call a 'window' for policy development. The U.K. Science and Technology Committee (2014) notes that there is presently an excellent opportunity to tackle gender bias in academics and develop a fairer community for all. This perspective is shared by many international scholars including some in the U.S.

The Policy Stream: Policies that Address Gender Imbalance

The policy stream is the 'soup of ideas' that competes to gain acceptance by the general public (Zahariadis, 2007). These ideas are formed by a mixture of public sentiment and structured policy. In the U.K., sex discrimination was made illegal in 1975, yet sex discrimination at universities is still a hot topic (Toynbee, 2013). In another example, Australia outlawed sex discrimination in 1984, yet Halliday (1998) notes that indirect discrimination still exists in the hiring and work assignments of female university academics in Australia. Formal and informal policies come together to provide a backdrop for any future policy action.

In the U.S., two major historical pieces of legislation are noted as important factors that have been driving the policy discussions on gender imbalance in U.S. higher education: Title VII of the Civil Rights and Title IX of the Education Amendments. Title VII of the Civil Rights Act of 1964 (Pub. L. 88–352, 78 Stat. 241) prohibits discrimination in employment based on race, religion, creed, sex, or national origin. Furthermore, Title IX of the Education Amendments of 1972 (Pub. L. 92 318, 86 Stat. 235) states: 'No person in the United States shall, on the basis of sex, be

excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education programme receiving federal financial assistance'. These legislative measures provide guidance in what steps are necessary to provide full opportunities for all citizens, particularly in higher education. These enactments provide the quintessential guidelines of what U.S. policy toward gender equity in higher education should be. Though it is often challenged (The Margaret Fund of NWLC, 2013), the legislation acts as a standard for the promotion of equal opportunities at U.S. universities.

Family-friendly policies can differ by higher education institution. Many American colleges and universities offer employees services to accommodate academics' families. These policies include programs like providing paid leave for parents who have a child, excluding time after a birth from the 'tenure clock' that academics have before they are reviewed for academic tenure, and providing on-site facilities for childcare. The University of Michigan offers priority in job placement for married couples, so that both spouses can pursue careers at the university (Office of the Provost, n.d.). These policies have been in place at many universities for over 40 years. Recent research, however, has suggested that present policies may be ineffectual. Manchester et al. (2013) found that faculty members who use the university policy to stop the tenure clock experienced a wage penalty because it is seen as a signal that the academic lacks commitment to the institution.

The Policy Entrepreneur

The MSF suggests that the success of policy creation depends heavily on the effectiveness of a policy entrepreneur (Kingdon, 1996; Mintrom, 1997; Zahariadis, 2007). Policy entrepreneurs are people who help guide problems through the agenda setting process. These entrepreneurs must broker support from potential backers in order to be effective (Mintrom, 1997). Several university leaders in the U.S. have used their political and administrative resource people to promote gender equity in higher education faculties. For example, Robert Birgeneau, the former Dean of the School of Science at MIT, set in motion administrative policy shifts at MIT to address the concerns of female science academics. Other individuals such as Donna Shalala, President of the University of Miami, and Gretchen Ritter, Vice Provost of the University of Texas, are examples of people who have spoken out on the issue. Some consider U.S. Representative Patsy Mink to be the champion of the Title IX legislation (Simpson, 2002). A policy entrepreneur does not always have to be a major university or legislative figure. Sometimes, mid-level personnel can effectively bring an issue to the forefront. Dupen (1993) gives an example of two mid-level university administrators who developed child care programmes to support female academics and staff at Stanford University. Overall, policy entrepreneurs, at any level, work to coordinate the policies, politics, and problems in order to help effect the change needed to address a difficult issue.

FORMULATING POLICY

Once policy makers frame a policy and garner support for addressing an issue, they must formulate a policy. Policy formulation is significantly impacted by the current national attitude and climate. There are two general alternatives for policy makers. They can adopt drastic changes or incremental changes (Jones & Baumgartner,

2012; Jones, True, & Baumgartner, 1997). Each one of these alternatives has both potential drawbacks and benefits for policy implementation.

Drastic Changes

Sometimes, bursts of legislative changes interrupt the perceived stability in policy formulation (Jones & Baumgartner, 2012; True et al., 2007). In the early 1970s, U.S. college and university officials developed and implemented initiatives to increase opportunities and support for women in response to the Title IX legislation (Valentin, 1997). The legislation interrupted the status quo and altered the way colleges and universities conducted business, particularly in the realm of intercollegiate athletics and student financial aid. When drastic events happen, they assign added attention to an issue (Jones & Baumgartner, 2012). This shift in attention is not temporary, but rather, it becomes a long-term paradigm movement (Jones, 1994). Institutions of higher education historically pursue conservative policies to avoid any backlash from state legislatures and other financial backers (Bok, 2013). When punctuated changes affect university policy, these types of institutions can become unsettled by such shifts. Some of the policy changes from Title IX are still unsettling to many people in the field even 40 years later (The Margaret Fund of NWLC, 2013).

Presently, there have been no dramatic events leading to drastic national changes in the ways U.S. higher education institutions seek to overcome gender imbalance within their science faculty ranks. Most science departments have focused solely on scientific research progress rather than on social progress (Sharobeam & Howard, 2002). However, these types of dominating policy issues may lose influence over time (True et al., 2007). Though impactful national legislation to correct the gender imbalance in science faculties has yet to occur, college and university administrators have begun to make progress on the issue (Dupen, 1993; Faculty Committee, 2011; Johnson & Stafford, 1974). Though no recent national attention has focused on this issue in the U.S., meaningful legislation to address gender equity in academic hires occurred in Norway in 1995 when the parliament passed the University Act. This act made hiring women academics and researchers a priority for universities. That legislation has acted as a catalyst for the growth in employment of female science academics in the country (Helsinki Group on Women and Science, 2001).

Incremental Changes

Oftentimes, changes in policy are not immediate, they occur incrementally in a way that researchers describe as 'subdued volatility' (Jones et al., 1997; True et al., 2007). In this view, policy makers address issues through building consensus among decision makers (Wildavsky, 1992). Policy makers seek to make a policy change in small steps to avoid disagreements. This approach leads to continued incremental adjustments without long term plans to address the problem, which is sometimes the case with issues of gender at universities. Some colleges and universities have instituted small policy shifts to promote the recruitment and retention of female scientists by offering family benefits, developing mentoring programmes for female academics to interact and share, and assigning to administrators the responsibility of investigating women's issues on campus.

These types of small changes affect department and university cultures in and out of classes. In the MIT case, the administration identified the issue of gender imbalance in the science departments and formed a committee to investigate it. Based on the results of the institution's investigation, officials proposed a series of changes that would take place over a series of years (Committee on Women Faculty in the School of Science, 1999).

Other examples of incremental changes that lead to long-term goals include university programmes set up on campuses all over the country through U.S. NSF ADVANCE grants (A list of grantees and related programme initiatives can be found at: www.portal.advance.vt.edu/). Public university administrators use ADVANCE grants to hire experts and adopt appropriate policies to encourage women in the STEM fields. Many of these grantees have instituted a series of campus-specific, local programmes and services to promote opportunities for academics in STEM fields. Many of the programmes involve building up data on the gender equity issues in STEM on campus and helping new female science faculty members adjust to life as an academic.

Many times, these support programmes provide some framework for discussing gender issues in science faculties; however, Halliday (1998) notes that a lot of biased practices against female academics are hidden and hard to identify or track. For example, giving a male academic a higher level course to teach than those which a female colleague is offered does not immediately draw red flags from administrators (Sandler & Hall, 1986). Many times, even with programmes to address the issues, women can feel like outsiders (Toren, 2000). She references a 'culture of science' at Israeli universities that excludes women. However, incremental policy shifts are the first steps if the development of long-term policy follows. Soon after Toren's work about Israeli universities came out, the Israeli government commissioned the Council for the Advancement of Women in Science and Technology to help address the issues of female science academics at a national level (Snider, 2014). In the U.S., higher education institutions have shifted policies in incremental levels for years, yet many university administrations have still not developed long-term solutions to address gender imbalance issues in their science and technology faculties.

ADOPTING POLICY

Once policymakers have considered options, they decide which alternative policy solutions will best address the public issue. Policy adoption is a function of internal determinants and a diffusion of previous policies from surrounding institutions. As policy makers learn about the successes and failures of other institutions pursuing similar measures, pressure builds to find answers (Rogers, 2003). The internal determinants include many of the same factors that affect policy formulation. At MIT, the administration adopted many of the policy recommendations that a committee on the issue had proposed, including increasing the number of female academic administrators, hiring more female science academics, and developing mentoring programmes for junior faculty (Faculty Committee, 2011). After a similar review, Duke University adopted expanded child care options to help support young

female academics (Mathot, 2005). Additionally, the political environment is critical for successful policy adoption. Some European governments have adopted more nationwide policies for equal opportunities for female academics and introduced monitoring mechanisms to assess implementation because of the strong political support for the issue (Maes et al., 2012).

Research suggests that policies adopted for improving female representation in science faculties have made an impact at many colleges and universities (Burrelli, 2008; Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007; Faculty Committee, 2011), though some researchers debate the magnitude of the impact (Powell, 2007). Furthermore, the gender equity progress that has already happened reveals the implications of successful diffusion. Other institutions, faculties, and departments have used the policies of MIT and other early adopters as a framework for their own policy development (Ceci & Williams, 2011; Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007; Faculty Committee, 2011) (Other reports from early adopters can be found at: wff.yale.edu/resources/reports-other-universities-status-women-family-life.) Berry and Berry (1990) refer to this type of response action with similar policy adoptions by similar institutions as 'regional' diffusion of policy.

IMPLEMENTING POLICY

After policymakers develop policy alternatives and reach a decision on what to do, they must determine how to effectively implement a policy. In assessing implementation, the literature offers two basic implementation approaches, which are top-down and bottom-up. Both approaches have proponents and detractors (Berman & McLaughlin, 1976; Hanf, 1982; Hjern & Porter, 1981; Mazmanian & Sabatier, 1983). Some researchers try to blend the two perspectives of policy implementation (Matland, 1995; Sabatier, 1986). Overall, the two approaches provide different viewpoints of how the implementation process takes place.

In the top-down method of implementation, government officials determine the objectives and select the appropriate policy (Sabatier, 1986). This approach is mainly a linear model that focuses on the actions of top-level politicians or administrators and the dissemination of the policy to lower-level bureaucrats (Buse, Mays, & Walt, 2005; Matland, 1995). The top-down approach emphasizes the rational design of the policy (Schofield, 2001) and recognizes the starting point as policy acceptance, and the significant actors for the approach are the people central to the legislation (Mazmanian & Sabatier, 1983). This latter approach to implementation presents a clear division between the formulation and implementation of a policy (Buse et al., 2005). For successful top-down implementation, the policy must be workable, with clear objectives, and must utilize skilful personnel as implementers (Mazmanian & Sabatier, 1983; Sabatier, 1986).

In the case of the Title IX legislation, the U.S. federal government enacted a top-down policy that covers all educational institutions that receive federal funding, including money distributed through financial aid (Office for Civil Rights, 1998). The legislation clarified the federal government expectations of the role that educational

institutions must take in promoting gender equity (Valentin, 1997). In the present political environment at colleges and universities, there is not a strong interest in imposing new top-down, affirmative action-style policies (Smolla, 2013). There is a great deal of uncertainty about what the implementation of gender equity policies in university departments of science would mean to the people involved (Sheridan, Fine, & Handelsman, 2010). This is mainly because there is no strict compliance mechanism in place. Unlike universities in Norway, U.S. universities are not required to implement action plans to ensure gender equity compliance (though oversight exists). This lack of a formal implementation mechanism can lead to uncertainty about what should be done.

Many times policy implementers manage gender issues in not-so-formal, local-level approaches. Unlike Title IX, these types of policy approaches are bottom-up in nature because the policies focus on the local implementers' perspective (Hjern & Porter, 1981). Bottom-up policy implementation focuses on how low-level bureaucrats respond to their relevant constituent communities (DeLeon & DeLeon, 2002). In the Stanford University example, multiple groups of students, academics, and administrators worked to develop local childcare for employees on campus (Dupen, 1993). As the approaches gained acceptance, the childcare programmes became integrated into the university's programmes. Now, more than 40 years later, the child are programme has become an effective tool to assist young families, particularly for mothers who work at or attend graduate school at the university (WorkLife Office, 2013).

The bottom-up approach focuses on how target groups such as science faculties interpret a policy. Regularly, local conditions affect participants, including implementers and target groups. Bottom-up policy implementation can happen in cases where department heads may consider a female academic's needs such as providing additional time for tenure review even though this is not a part of the formal policy. Though some researchers note bottom-up adaptions of 'family-friendly' tenure policies may lead to more women academics not achieving full professor rank because of what some call a 'leaky' pipeline of female academics (Etzkowitz et al., 1994), some small changes can have lasting effects on long-lasting impacts on the norms in science.

Under certain conditions, actors such as local advocates and administrators form coalitions to analyse micro-level policy situations (Matland, 1995; Sabatier, 1986). Community programs have been instrumental in bringing about change in some areas. In the Boston, Massachusetts area, the Advancing Women in the Enterprise of Science and Technology (WEST) group has been a local networking forum for professional women in the area over the last 15 years (WEST, n.d.). Two undergraduate Harvard University students started the Scientista Foundation, now a multi-campus organization, to encourage pre-professional women in STEM majors (Scientista Foundation, 2015). In 1987, Anita Borg started a digital forum for women computer scientists that has now developed into an institute to support women in the field (Anita Borg Institute, n.d.). Sometimes, however, there seems to be a gap connecting the role of grassroots community organizing and the role of professional associations. The American Society for Engineering Education has

sought to alleviate that disconnection by co-sponsoring a series of workshops to generate ideas that focus on local changes to address gender issues in the present academic environment for engineering (ASEE, 2013).

EVALUATING PROGRAMMES AND EFFORTS

There is always an opportunity to evaluate a programme's efforts to effect its intended outcome. Evaluation is critical for future policy development (Anderson, 2008). U.S. organisations such as the American Physical Society (Committee on the Status of Women in Physics, 2007), the Association of American Medical Colleges (Jolliff et al., 2012), and the U.S. NSF (Burrelli, 2008) have published national reports on the effectiveness of programmes created to generate science faculty opportunities for women. Universities including MIT (Faculty Committee, 2011), University of Wisconsin (Sheridan et al., 2010), and Johns Hopkins (Committee on Faculty Development and Gender, 2005) have also published reports on university-specific efforts to improve gender equity in science departments. Additionally, all U.S. universities with ADVANCE grants post updates on their efforts to improve female faculty representation in STEM fields. Most of the findings suggest that there is progress, but a lot of work is left to be done.

Though the outputs of some gender equity programme studies may not always show optimal progress on the issue, some long-term changes have improved female participation in science fields (Tyler-Wood et al., 2012). Some researchers suggest that the development of female participation in science faculties has been minimal, even after the implementation of programmes intended to address the issue have been evaluated (Division of Science Resources Statistics, 2004; Faculty Committee, 2011). Even without strong increases in the recruitment of female science academics, the policy directorates will bring attention to the issue, which will lead to long-term changes in the field (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007; Committee on the Guide to Recruiting and Advancing Women Scientists and Engineers in Academia, 2006; Sheridan et al., 2010).

In one example of a follow-up study, researchers at MIT noted that, even after a concerted effort to increase the number of female academics in science and engineering, their attempt to address the gender imbalance was not wholly successful 'in large part because of the small number of women in the pipeline' (Faculty Committee, 2011, p. 9). Other studies report contrary findings. Powell (2007) suggests that the number of women in graduate science programmes is on the rise. Furthermore, according to Powell, the problem is not an issue of the pipeline of PhD's, but rather it is the need to have programmes that promote the development and sustained investment of women and minorities in graduate programmes in science. Additionally, Burrelli (2008) notes there are gains in female faculty member employment in the sciences, but many of the gains in female hiring rates have been highest among unmarried women without children. Sometimes, programmes intended to promote employment of female faculty may not work as expected. Problems identified in the evaluation process can lead to policy changes and future policy development.

CONCLUSION

'This nation can no longer afford the underperformance of our academic institutions in attracting the best and brightest minds to the science and engineering enterprise' (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2007, p. 217). Anti-discrimination laws aimed at protecting women have been present in most developed countries for almost 40 years. Yet, issues are still not resolved as to how equal treatment can be universally applied. As Hochschild and Machung (2003) note, 'Can we do more than this? The answer depends on how we make history happen' (p. 280). Many European universities, through the League of European Research Universities, have taken large steps to promote gender equity in external as well as internal policy decisions (Maes et al., 2012). These steps have not been based on regulatory law; they have been based on a sincere interest in opening opportunities for women in academia. It is our hope that universities in the U.S. and elsewhere will take initiatives to improve opportunities for female science academics. Having a faculty that reflects the makeup of the student body will do wonders for helping students find academic success guidance (Lagowski & Wick, 1995).

There is a great deal of potential for U.S. colleges and universities to increase the representation of women in science departments. This article identifies the methods and approaches used to aid female science academics in the U.S. As policymakers continue to develop and modify policies, opportunities for women in sciences will hopefully increase. Even though present policy shifts have not led to major regulatory changes as with Title IX or the Civil Rights Act; efforts do continue to make progress. Colleges and universities in the U.S. are more actively pursuing qualified women for faculty teaching positions and providing more opportunities for female scientists than at in any time in the past, but there is a need to expand on these initiatives. According to one woman scientist, 'Being a female science professor has meant sitting in committee meetings with men who believed that they were there because of their intellectual gifts and wisdom but that I was there because, again, there "had" to be at least one woman on the committee' (Female Science Professor, 2010). Cases in the U.S. such as at the MIT School of Science, the Stanford University child services programmes, and the work of the NSF ADVANCE grant programme have highlighted how the issue can become part of the agenda setting process in the U.S. and how it can lead to some policy change successes. In particular, the NSF ADVANCE programme has been cited as helping several public universities bring about institutional transformations that have helped female STEM academics be more successful in their roles (DeJonghe, Hacker, & Nemiro, 2015; Eppes, Milanovic, & Sanborn, 2010; Nemiro, Hacker, & Ferrel, 2009; Rosser, 2004). Future policymakers should continue to focus on the successes and find ways for programs and opportunities to develop more opportunities.

There are always differences of opinion about how to approach gender equity policies. There are several institutions who promote large-scale, comprehensive approaches to the issue. The World Economic Forum (2013) notes that many European countries have taken a proactive approach to eliminating the gender gap in employment through legislation and public policy. In the same regard, some

European universities have taken a more unified approach to addressing gender policy. The Gender Summit series (gender-summit.com) has worked to develop a dialogue on the issue and build cross-national improvements in opportunities for women in STEM fields around the world.

Unified approaches are, however, not always what is needed. The Australian Academy of Science published a 'best practices' statement which calls for non-uniform steps to happen at different institutions to promote gender equity for scientists (Dunstone & Williamson, 2012). Hilton (2013) goes further by suggesting a quota system be implemented to provide opportunities for female scientists. In an extreme view from the U.S., Donna Shalala suggested that national policymakers should expand the official interpretation of Title IX to incorporate federal oversight of higher educational faculty gender breakdown (as cited in Redden, 2007). Others have suggested a more tempered approach in the U.S. to gender equity concerns (Knutsen, 2012). The most effective approach will depend on the situation and an interpretation of what needs to be done.

This article presents examples of how the agenda of promoting opportunities for female science academics has progressed through the formulation, adoption, implementation, and evaluation stages. Agreeing with Asmar (1999), we do not believe that there is a need for a 'gendered agenda' targeting solely the employment of female science academics in higher education with little regard to academic workplace environment. It is known that female academics feel more dissatisfied with their work situation. We want to encourage schools and states to put more emphasis on making academics more representative of the diverse students who now study in STEM fields. We highlight a few of the historical successes on this issue and present the issue in an international context. Programmes at many academic institutions are developing and evolving to meet the growing interests and needs of female science academics. Modest increases in the numbers of female academics have led to important female-friendly changes in departmental policies (Etzkowitz et al., 1994). Yet, more work still needs to take place in order to increase the numbers female science academics.

To resolve the gender imbalance still present in the faculty ranks, the future development of effective policies on the national and local level are crucial. For a generation, there has been a concerted effort to help accommodate the increasing amount of female participation in the workforce within the U.S. Now, in efforts to attract top corporate female workers to join their ranks, many companies offer family-friendly benefits such as on-site childcare, flexible work hours, and easy access to medical care. European universities have taken steps to develop the best practices for promoting, hiring and developing women teachers and researchers in science faculties (European Commission, 2016). The social environment in many European higher education institutions is more supportive to female faculty than the environment at many comparable U.S. institutions (Mayer & Tikka, 2008). A large number of colleges and universities in the U.S. have not taken such active steps to attract top female science academics. However, the effort to improve this environment is growing in the U. S. Positive outcomes from early adopters of gender equity policy will help improve the opportunities for women in science fields

for future generations. The U.S. Chamber of Commerce recently released a report which suggests that the present expansion of STEM-related jobs in the economy far outpaces the growth of jobs in other areas. Without programs to encourage women to pursue STEM jobs, the national economy will not be able to meet its growth potential. Increasing the numbers of women in STEM jobs starts with developing policies that encourage female academics in STEM fields. The diffusion of these policies to other institutions will help with the expansion of positive gender equity opportunities around the country and internationally. By continuing to develop both local and national policy initiatives, science faculties can make sure the national economy is moving forward with more women in STEM fields.

REFERENCES

Anderson, J. E. (2008). *Public Policymaking.* Boston, MA: Houghton Mifflin Company.

Anita Borg Institute. (n.d.). *About Us.* Retrieved March 30, 2015 from http://anitaborg.org/about-us/

Asmar, C. (1999). Is there a gendered agenda in academia? The research experience of female and male PhD graduates in Australian universities. *Higher Education,* 38, 255-273.

ASEE. (2013). TUEE: *Transforming undergraduate education in engineering.* Retrieved March 30, from http://www.asee.org/TUEE_PhaseI_WorkshopReport.pdf

Berman, P., & McLaughlin, M. (1976). Implementation of ESEA Title I. *Teacher College Record,* 77, 397-451.

Berry, F. S., & Berry, W. D. (1990). State lottery adoptions as policy innovations: An event history analysis. *American Political Science Review*, 84, 395-415.

Blair-Loy, M. (2001). Cultural constructions of family schemas: The case of women finance executives. *Gender & Society*, 15(5), 687-709. doi: 10.1177/089124301015005004

Bok, D. (2013). *Higher education in America.* Princeton, NJ: Princeton University Press.

Brandon, H. (2006). Congressional turnover may have broad impact on 2007 farm bill. *Southeast Farm Press.* Retrieved July 16, 2014 from http://southeastfarmpress.com/congressional-turnover-may-have-broad-impact-2007-farm-bill

Brennan, D. (2007). Babies, budgets, and birthrates: Work/family policy in Australia 1996–2006. *Social Politics,* 14(1), 31-57.

Burrelli, J. (2008). Thirty-three years of women in S&E faculty positions. *InfoBrief* (Vol. NSF 08-308). Arlington, VA: National Science Foundation.

Buse, K., Mays, N., & Walt, G. (2005). *Making health policy.* New York: Open University Press.

Castles, F. G. (2003). The world turned upside down: Below replacement fertility, changing preferences and family-friendly public policy in 21 OECD countries. *Journal of European Social Policy,* 24(3), 209-227. doi: 10.1177/09589287030133001

Ceci, S. J., & Williams, W. M. (2011). Understanding current causes of women's underrepresentation in science. *Proceedings of the National Academy of Sciences,* 108(8), 3157-3162.

Chen, X., & Soldner, M. (2013). *STEM attrition: College students' paths into and out of STEM fields.* Washington, DC: U.S. Department of Education (NCES 2014-001).

Committee on Faculty Development and Gender. (2005). *Final report.* Baltimore, MD: Johns Hopkins University.

Committee on Maximizing the Potential of Women in Academic Science and Engineering. (2007). *Beyond bias and barriers: Fulfilling the potential of women in academic science and engineering.* Washington, DC: National Academies Press.

Committee on the Status of Women in Physics. (2007). *Gender equity: Strengthening the physics enterprise in universities and national laboratories.* College Park, MD: American Physical Society.

Committee on Women Faculty in the School of Science. (1999). *A study on the status of women faculty in science at MIT.* Cambridge, MA: Massachusetts Institute of Technology.

Committee on the Status of Women and Advancing Women Scientists and Engineers in Academia. (2006). *To recruit and advance: Women students and faculty in U.S. science and engineering.* Washington, DC: National Academies Press.

Corporate Planning and Policy Directorate. (2010*). Women in science and engineering in Canada.* Ontario: Natural Sciences and Engineering Research Council of Canada. Retrieved July 15, 2014 from http://www.nserc-crsng.gc.ca/_doc/Reports-Rapports/Women_Science_Engineering_e.pdf

DeJonghe, E. S., Hacker B. A., & Nemiro, J. E. (2015). The ADVANCE Associates Program: An Intervention for Retaining Women Faculty Members in STEM. *International Journal of Gender, Science and Technology, 7(3),* 393-400

DeLeon, P., & DeLeon, L. (2002). What ever happened to policy implementation? An alternative approach. *Journal of Public Administration Research and Theory*, 12(4), 467-492.

Division of Science Resources Statistics. (2004). *Gender Differences in the Careers of Academic Scientists and Engineers.* (Vol. NSF 04-323). Arlington, VA: National Science Foundation.

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature,* 50(4), 1051-1079.

Dupen, D. (1993). Stanford's children: A history of the university's child care network. *Sandstone and Tile*, 17, 3-14.

Dunstone, M., & Williamson, B. (2012). Gender equity: Current issues, best practice and new ideas. *Early and Mid Career Research Forum.* Canberra, Australia:

Australian Academy of Science. Retrieved July 15, 2014 from https://www.science.org.au/files/userfiles/support/position-statements/gender-equity-discussion-paper.pdf
Eppes, T., Milanovic, I., & Sanborn, J. (2010). Faculty gender Balance: Best practices for undergraduate institutions. *International Journal of Gender, Science and Technology, 2(3),* 453-463.

Etzkowitz, H., Kemelgor, C., Neuschatz, M., Uzzi, B., & Alonzo, J. (1994). The paradox of critical mass for women in science. *Science*, 266 (5182), 51-54.

European Commission. (2016). *Gender equality.* Retrieved May 16, 2016 from http://ec.europa.eu/research/swafs/index.cfm?pg=policy&lib=gender

Faculty Committee. (2011). *A Report on the status of women faculty in the schools of science and engineering at MIT, 2011.* Cambridge, MA: Massachusetts Institute of Technology Retrieved June 12, 2016 from http://web.mit.edu/faculty/reports/pdf/women_faculty.pdf Feistritzer, C. E. (2011). *Profile of teachers in the U.S. 2011*. Washington, D.C.: National Center for Education Information.

Female Science Professor. (2010). Why 'female' science professor? *The Chronicle of Higher Education.* Retrieved July 5, 2014 from http:// chronicle.com/article/Why-Female-Science/65922/

Gornick, V. (1983). *Women in science: Portraits from a world in transition.* New York; Simon and Schuster.

Halliday, S. (1998), *Winds of change: Indirect discrimination and the university culture.* Australian Human Rights Commission. Speech to the Culture of Universities International Conference, Sydney, Australia (15 July 1998). Retrieved July 5, 2014 from https://www.humanrights.gov.au/news/speeches/winds-change-indirect-discrimination-and-university-culture

Hanf, K. (1982). The implementation of regulatory policy: Enforcement as bargaining. *European Journal of Political Research*, 10, 159-172.

Harmon, K. (2009). Why aren't more women tenured science professors? *Scientific American.* Retrieved June 30, 2014 from http://www.scientificamerican.com/article.cfm?id=women-tenured-science-professors

Helsinki Group on Women and Science. (2001). *Women and science: Review of the situation in Norway.*
Retrieved June 12, 2016 from http://web.mit.edu/faculty/reports/pdf/women_faculty.pdf

Hilgartner, S., & Bosk, C. L. (1988). The rise and fall of social problems: A public arenas model. *American Journal of Sociology*, 94(1), 53-78. doi: 10.2307/2781022

Hilton, D. (2013). Australian science needs more female fellows. *Nature,* 497(7447). 7.

Hjern, B., & Porter, D. O. (1981). Implementation structures: A new unit of administrative analysis. *Organization Studies*, 2(3), 211-227.

Hochschild, A., & Machung, A. (2003). *The second shift: Working families and the revolution at home*. New York: Penguin Books.

Johnson, G. E., & Stafford, F. P. (1974). The earnings and promotion of women faculty. *The American Economic Review*, 64(6), 888-903. doi: 10.2307/1815240

Jolliff, L., Leadley, J., Coakley, E., & Sloane, R. A. (2012). *Women in U.S. academic medicine and science: Statistics and benchmarking report, 2011-2012*. Washington, D.C.: Association of American Medical Colleges.

Jones, B. D. (1994). *Reconceiving decision-making in democratic politics: Attention, choice, and public policy*. Chicago: University of Chicago Press.

Jones, B. D., & Baumgartner, F. R. (2012). From there to here: Punctuated equilibrium to the general punctuation thesis to a theory of government information processing. *The Policy Studies Journal*, 40(1), 1-19.

Jones, B. D., True, J. L., & Baumgartner, F. R. (1997). Does incrementalism stem from political consensus or from institutional gridlock? *American Journal of Political Science*, 41, 1319-1339.

Kingdon, J. (1996). *Agenda, alternatives, and public policies*. New York: Harper Collins.

Knutsen, E. (2012). When gender diversity doesn't work (and how to do it right). *Forbes.* Retrieved June 5, 2014 from http://www.forbes.com/sites/eliseknutsen/2012/10/12/when-gender-diversity-doesnt-work-and-how-to-do-it-right/

Lagowski, J. M., & Vick, J. W. (1995). Faculty as mentors. *New Directions for Teaching and Learning,* 1995(62), 79-85.

Legislation would boost support for women in science. (2008). *Issues in Science & Technology*, 24(2), 19.

Maes, K., Gvozdanovic, J., Buitendijk, S., Hallberg, I.R., & Mantilleri, B. (2012). *Women, research and universities: Excellence without gender bias.* Leuven, Belgium: League of European Research Universities. Retrieved June 15, 2014 from http://www.leru.org/files/publications/LERU_Paper_Women_universities_and_research.pdf

Manchester, C.F., Leslie, C.M., & Kramer, A. (2013). Is the clock still ticking? An evaluation of the consequences of stopping the tenure clock. *Industrial & Labor Relations Review,* 66(1), 3-31.

Margaret Fund of NWLC, The. (2013). *Title IX.* Retrieved June 15, 2014 from http://www.titleix.info/Default.aspx

Marginson, S., Tytler, R, Freeman, B and Roberts, K (2013). *STEM: Country comparisons*. Melbourne, Australia: Australian Council of Learned Academies. Retrieved June 3, 2014 from http://www.acola.org.au/PDF/SAF02Consultants/SAF02_STEM_%20FINAL.pdf

Mathot, J. (2005). Duke expands child care option. *Duke Today.* Retrieved June 28, 2014 from https://today.duke.edu/2005/09/childcare.html

Matland, R. E. (1995). Synthesizing the implementation literature: The ambiguity-conflict model of policy implementation. *Journal of Public Administration Research and Theory*, 5(1), 145-174.

Mayer, A. L., & Tikka, P. M. (2008). Family-friendly policies and gender bias in academia. *Journal of Higher Education Policy and Management,* 30, 363-374.

Mazmanian, D., & Sabatier, P. A. (1983). *Implementation and public policy*. Chicago: Scott Foresman and Co.

Mintrom, M. (1997). Policy entrepreneurs and the diffusion of innovation. *American Journal of Political Science*, 41, 738-770.

Mintrom, M., & Vergari, S. (1996). Advocacy coalitions, policy entrepreneurs, and policy change. *Policy Studies Journal*, 24, 420-434.

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences*, 109(41), 16474-16479.

National Center for Science and Engineering Statistics. (2012). *Science and engineering indicators 2012.* Retrieved June 5, 2014 from http://www.nsf.gov/statistics/seind12/c7/c7h.htm

National Research Council. (2010). *Gender differences at critical transitions in the careers of science, engineering, and mathematics faculty*. Washington, DC: National Academic Press.

Nemiro, J. E., Hacker, B., Ferrel, M. L., & Guthrie, R. (2009). Using appreciative inquiry as a tool to investigate transformational change in recruiting and developing Women Faculty in STEM Disciplines. *International Journal of Gender, Science, and Technology, 1(1),* 5-35.

OECD. (2013). *Education at a Glance 2013: OECD Indicators*. OECD Publishing. doi: 10.1787/eag-2013-en

Office for Civil Rights. (1998). Title IX and sex discrimination. In *U.S. Department of Education.* Retrieved June 15, 2014 from http://www2.ed.gov/about/offices/list/ocr/docs/tix_dis.html

Office of the Provost. (n.d.). *The Michigan difference: Family friendly.* University of Michigan. Retrieved April 1, 2015 from https://www.provost.umich.edu/faculty/family/

Olson, M. (1971). *The logic of collective action: Public good and the theory of groups*. Cambridge, MA: Harvard University Press.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079. doi: 10.1080/0950069032000032199

Pappas, S. (2013). Science gender gap: Five reasons women trail men in science. In *The Huffington Post.* Retrieved June 11, 2014 from http://www.huffingtonpost.com/2013/03/07/science-gender-gap-five-reasons-women-men_n_2827567.html

Pham, N.D., & Triantis, A.J. (2015). *Reaching the full potential of STEM for women and the U.S. economy.* Washington, DC: U.S. Chamber of Commerce Foundation, Center for Women in Business.

Portz, J. (1996). Problem definitions and policy agenda: Shaping the educational agenda in Boston. *Policy Studies Journal*, 27, 371-386.

Powell, K. (2007). Beyond the glass ceiling. *Nature*, 448, 98-100. doi: 10.1038/nj7149-098a

Pryor, J. H., Hurtado, S., Saenz, V. B., Santos, J. L., & Korn, W. S. (2007). *The American freshman: Forty year trends.* Los Angeles: Higher Education Research Institute UCLA.

Redden, E. (2007). Female faculty and the sciences. Retrieved June 4, 2014 from http://www.insidehighered.com/news/2007/10/18/womensci

Rosser, S. V. (2004). *The glass ceiling: Academic women scientists and the struggle to succeed.* New York: Routledge.

Rogers, E. M. (2003). *Diffusion of innovation.* New York: The Free Press.

Sabatier, P. A. (1986). Top-down and bottom-up approaches to implementation research: A critical analysis and suggested synthesis. *Journal of Public Policy*, 6(1), 21-48.

Sandler, B. R., & Hall, R. M. (1986). *The campus climate revisited: Chilly for women faculty, administrators, and graduate students.* Washington, DC: Project on the Status and Education of Women, Association of American Colleges. (ED282462)

Schofield, J. (2001). Time for a revival? Public policy implementation: A review of the literature and agenda for future research*. International Journal of Management Review,* 3(3), 245-263.

Science and Technology Committee (2014). *Women in scientific careers: Sixth report of session 2013-14.*United Kingdom: House of Commons. Retrieved July 5, 2014 from http://www.publications.parliament.uk/pa/cm201314/cmselect/cmsctech/701/701.pdf*.*

Scientista Foundation, The. (2015). *About Scientista.* Retrieved March 30, 2015 from http://www.scientistafoundation.com/about-us.html

Sharobeam, M. H. & Howard, K. (2002). Teaching demands versus research productivity: Faculty workload in predominantly undergraduate institutions. *Journal of College Science Teaching,* 31(7), 436-441). Sheridan, J., Fine, E., & Handelsman, J. (2010). *Fostering success for women in science and engineering.* Madison, WI: Women in Science & Engineering Leadership Institute University of Wisconsin.

Simpson, P. (2002). Mink's death leaves Title IX without its champion. *We-News*. Retrieved June 14, 2014 from http://womensenews.org/story/washington-outlookcongresswhite-house/021020/minks-death-leaves-title-ix-without-its-champion

Smolla, R. (2013). The legal future of affirmative action. *Inside Highered.* Retrieved from http://www.insidehighered.com/views/2013/06/27/essay-meaning-supreme-court-ruling-affirmative-action

Snider, L. (2014). Women in Israel: In science and technology. *Jewish Virtual Library.* Retrieved July 5, 2014 from www.jewishvirtuallibrary.org/jsource/Society_&_Culture/israeliwomenscientists.html

Toren, N. (2000). *Hurdles in the halls of science: The Israeli case.* Lanham, MD: Lexington Books.

Toynbee, P. (2013). British universities shouldn't condone this kind of gender segregation. *The Guardian.* Retrieved June 4, 2015 from http://www.theguardian.com/commentisfree/2013/nov/26/british-universities-gender-segregation-secular

True, J. L., Jones, B. D., & Baumgartner, F. R. (2007). Punctuated-equilibrium theory In P. A. Sabatier (Ed.), *Theories of the Policy Process* (pp. 144-187). Boulder, CO: Westview Press.

Tyler-Wood, T., Ellison, A., Lim, O., & Periathiruvadi, S. (2012). Bringing up girls in science (BUGS): The effectiveness of an afterschool environmental science program for increasing female students' interest in science careers. *Journal of Science Education and Technology,* 21(1), 46-55.

Valentin, I. (1997, August). Title IX: A Brief History. *WEEA Digest.*

Weinburgh, M. (1995). Gender differences in student attitudes toward science: A meta-analysis of the literature from 1970 to 1991. *Journal of Research in Science Teaching,* 32(4), 387-398. doi: 10.1002/tea.3660320407

Campaign for Science and Engineering. (2014). CaSE report – Improving diversity in STEM. Retrieved June 12, 2016 from http://www.sciencecampaign.org.uk/resource/ImprovingDiversityinSTEM2014.html

WEST: Advancing in the Enterprise of Science and Technology (n.d.). *About West.* Retrieved March 30, 2015 from http://www.westorg.org/news

Wildavsky, A. (1992). The New Politics of the Budgetary Process. Boston: Little, Brown.

WorkLife Office. (2013). About WorkLife. *Stanford University.* Retrieved June 14, 2014 from http://www.stanford.edu/dept/worklife/cgi-bin/drupal/about

World Economic Forum (2013). *The Global Gender Gap Report.* Retrieved March 30, 2015 from http://www3.weforum.org/docs/WEF_GenderGap_Report_2013.pdf

Zahariadis, N. (2007). The Multiple Streams Framework. In P. A. Sabatier (Ed.), *Policy Research Theories of the Policy Process* (pp. 65-92). Boulder, CO: Westview Press.