

Institutional Transformation:
An Analysis of Change Initiatives at NSF ADVANCE Institutions

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Dissertation research submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Educational Leadership and Policy Studies

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June 26, 2006
Blacksburg, Virginia

Keywords: Higher Education; Women in Science and Engineering;
ADVANCE; Institutional Transformation

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ABSTRACT

The purpose of this study was to examine how institutional culture promoted or impeded the implementation of round one and two NSF ADVANCE initiatives designed to improve academic climates for women in science and engineering. This study was conducted in two phases. In phase one, 35 participants from 18 institutions were interviewed to answer three research questions. Participants identified a policy, process, or program designed to improve academic cultures for women in science and engineering fields. Participants also identified strategies that promoted the implementation of these efforts, and discussed factors that impeded these efforts. In phase two, site visits were conducted at two institutions to answer a fourth research question. How did institutional culture shape the design and implementation of faculty search processes?

Policies, processes, and programs were implemented by participants at the institutional, departmental, and individual levels and included family friendly and dual career policies at the institutional level, improved departmental faculty search and climate improvement processes, and mentoring programs and training for department heads at the individual level.

Communication and leadership strategies were key to the successful implementation of policies, processes, and programs designed to achieve institutional transformation.

Communication strategies involved shaping change messages to reach varied audiences often with the argument that change efforts would improve the climate for everyone not just women faculty members. Administrative and faculty leaders from multiple levels proved important to change efforts.

Institutional culture shaped initiatives to improve faculty search processes. Faculty leaders in both settings used data to persuade faculty members of the need for change. At one site, data that included national availability information was critical to advancing the change agenda. At the other site, social science data that illustrated gender bias was persuasive. Faculty members who were effective as change agents were those who were credible with their peers in that setting.

ACKNOWLEDGEMENTS

Completing this degree has taken the support and confidence of several villages in several states. The initial inspiration for pursuing a doctorate came from beloved mentors who inspired me and encouraged me to launch this journey during our time together in the mid 1990's at the annual meetings of the National Association for Women in Education (NAWE). Kathy Brooks and Sabrina Chapman gave me good advice and guidance for which I am grateful.

My colleagues at Duke University were constant cheerleaders and helped me sustain my commitment to completing coursework while serving the university in several different capacities. Jehanne Gheith, Stephanie Sieburth, Jean O'Barr, Donna Lisker, Shannon Johnson, and David Malone are some of the folks who knew I could get this done, even when I thought I couldn't. Jean, you've been there since the very beginning, oh those many years ago on the steps of the auditorium in Raleigh.

Marie Weil at the University of North Carolina at Chapel Hill got me started—converted me from a practical-thinking administrator to a theorizing doctoral student. I am indebted to my professors and colleagues at UNC who helped me navigate statistics and research course work.

For their patience and understanding all the years I would disappear during Women's ACC Basketball championships to study and write, I am grateful to Martha Davidson, Stephanie Dalrymple, and Brenda Campbell. They would come fetch me from various corners of the Greensboro Coliseum when the important games would start.

My friends and colleagues at Virginia Tech are without comparison. Pat Hyer, fairy godmother to me and the VT Women's Center is the most solid and supportive mentor a person could ask for. I could not have completed this work without her personal support and her support of the Women's Center. My colleagues at the VT Women's Center – Penny, Christine, Anna,

Jessie, Danielle, and those who have worked with me to foment revolution – you are free to send up a cheer. But beware, this means I will have time and inclination to find us more work to do!

My VT family includes Ken Smith, Rodd Hall, Tom Brown, Deb Morgan, Linda Woodard, Frances Keene, and others who have eaten lunches and dinners and drunk wine with me at critical moments. Denise Collins – thank you for being there always – whether at 5 a.m. for working out or for evening reality checks by phone and for showing up at the most opportune time. You might never come to visit me again.

Elizabeth Creamer, chair of my committee, has worked closely with me for the years it has taken me to complete this project. I am indebted for the guidance, time, investment, and continued confidence you have had in my work. My current and past committee members, Don Creamer, Joan Hirt, Pat Hyer, and Jean O’Barr have served as sounding boards and provided expert advice that has contributed significantly to these efforts.

My parents Sallie and Frank, and brothers Larry and Rich have been constant supporters and have tolerated lapses in birthdays and other important occasions from their distracted favorite daughter and sister. My extended family Doryce Scharman, and Deb and Bob Hunter have been extremely supportive and I am thankful for their interest in and pride in my accomplishments.

To my partner of 21 years, Liz, I cannot begin to acknowledge the importance of your support. The completion of this degree is as much your project as mine. I promise not to move us too many more times as soon as you think our lives have settled down.

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CHAPTER ONE

Introduction

The future of American higher education lies in its ability to successfully respond to significant pressures from external and internal sources (Birnbaum, 1988; Kezar, 2001). The adaptability of colleges and universities with their varied missions and commitments to education, research, and outreach is being challenged to meet the demands of stakeholders who see higher education as critical to achieving national and international economic and political goals. How higher education responds to demands for change will test the ability of institutions to remain true to long-held academic values while creating new ways to get the job done. Successful change efforts in higher education have taken many forms and are often the result of the synergy of external and internal institutional pressures. For example, the passage of federal legislation such as the G.I. Bill and the Higher Education Amendments which provided financial aid and increased access to higher education for a wide variety of students have had a significant impact on higher education (Altbach, 1999). Other changes to higher education include the enrollment of female students due to economic pressures and changing societal expectations regarding the education of women (Geiger, 1999). The enrollment of women and minorities has pressed institutions to examine policies and alter practices impacting a variety of organizational dimensions including student admissions and employment practices. As the demands on higher education have changed, institutions have adapted and, in some cases, successfully altered the ways in which they engage in the educational enterprise.

Understanding institutional responses to pressures for change helps leaders shape the implementation of organizational change efforts on campuses. While embracing a demand to change in some cases, colleges and universities have, in other instances, resisted pressures to

alter their practices. For example, many colleges and universities have resisted implementing accountability efforts that require tracking outcome measures because the effort is perceived as violating institutional autonomy, a value held dear by the academy (Berdahl & McConnell, 1999; Zumeta, 2001). In addition to experiencing external demands for change as an intrusion on autonomy, initiatives such as federally mandated affirmative action efforts, enrollment requirements, and mandated teacher education programs are perceived as unfunded mandates that place an unnecessary bureaucratic burden on financially strapped institutions (Berdahl & McConnell; Zumeta).

In fulfilling an important societal role, institutions of higher education are challenged to respond to economic, social, and political pressures. The manner in which colleges and universities respond to pressures and opt to engage in organizational change is an important area of study. Understanding how higher education can be responsive to its environment is important if we are to maintain and enhance the quality of the educational enterprise. Higher education's commitment to society is crucial in its "functions that include such essential educational legacies as the cultivation of citizenship, the preservation of cultural heritage(s), and the formation of individual character and critical habits of mind, as well as economic development functions" (Gumport, 2001, p. 87). Higher education's social contract places it at the center of national and international efforts where advanced education and research are key to economic, political, and societal goals.

Higher education is central to the national research agenda and the advancement of science and engineering fields (National Science Foundation [NSF], 2002). Research universities receive significant federal financial support for research and development in the physical sciences, medicine, defense, biomedical research, and other science, technology, and engineering

fields (Gladieux & King, 1999). In 2001-2002, the top 100 research institutions in the U.S. received approximately 22 billion dollars in federal grants for scientific research and development (*The Chronicle of Higher Education Almanac*, 2004) accounting for over 80% of all federal research and development dollars (Gladieux & King). Colleges and universities provide the education and research necessary for strong scientific communities that can contribute to and compete on a global scale.

Higher education is key to advancing science and engineering research and to the education of the scholars and researchers necessary to compete globally. To be competitive, the science and engineering fields must attract, retain, and educate women and men committed to advancing research in a variety of disciplines. The advancement of science in a global context is strengthened by having a diversity of scholars with varying experiences, opinions, and approaches to the achievement of scientific research (NSF, 2002; Rosser, 2004).

Women are underrepresented in the science, technology, and engineering workforce. Within the academy, the under-representation of women in science and engineering fields is a challenge that requires institutional change (NSF, 2002; Rosser, 2004). Higher education must advance policies and practices that recruit, retain, and promote women in the sciences and engineering if the status quo is to be changed and more women are to be brought into the engineering, science, and technology workforce. It is important to understand how colleges and universities engage in transformational change to improve the climate for women scientists and engineers if we are to eliminate the barriers that keep committed women from participating in scientific progress.

A Challenge Requiring Institutional Transformation: Increasing Women Faculty Members in Science and Engineering

Transforming higher education to address the absence of women in academic science and engineering fields requires understanding the history and conditions that shape the current problem. Examinations of the problem include understanding the history of women in American higher education, the current demographics of women scientists and engineers, and understanding some of the explanations scholars have offered for understanding the problem.

Women and Science and Engineering Fields in Higher Education

The history of women's secondary education in the U.S. provides context for understanding the challenges facing women academic scientists and engineers. Segregated by sex and by class, the founding colleges of American higher education provided few opportunities for girls and women (Tidball, Smith, Tidball, & Wolf-Wendell, 1999). With a few notable exceptions that include the founding of women's colleges in the mid-1800s, education options for girls and women were very limited. Girls were believed to be mentally and physically inferior to their male counterparts and female students were taught sciences under the auspices of learning about their bodies and to prepare them for bearing and raising children. At women's colleges, physical education was required for all students as a way to mitigate concerns about the physical fitness of students for the rigors of academic study (Tidball et al., 1999).

A shift occurred in the education of women in the U.S. when land-grant institutions were founded in the late 19th century and many of them admitted women from the onset. However, women enrolled in college at much lower rates than their male peers and few studied the sciences or engineering. As late as 1956, only 10% of women in coeducational institutions majored in the sciences and less than 20% majored in mathematics (Rayman & Stewart, 2000; Tidball et al.

1999). Few faculty members were women and the women's colleges provided the few opportunities for women faculty to teach and engage in scientific scholarship and research (Rosser, 2004).

With the passage of Title IX of the Education Amendments in 1972, the legal framework for equal access for women to all areas of education was established. In 1980, the Science and Engineering Equal Opportunities Act declared that it was U.S. policy for women and men to benefit equally from acquiring the skills in science, engineering, and mathematics and to contribute to the national expertise in science and engineering fields. Indeed, enrollments in science and engineering fields nearly doubled for women between the years of 1973 and 1983 (Rayman & Stewart, 2000), paving the way for women students, and eventually women faculty members, to join the ranks of their male peers in the sciences and engineering.

Current Demographics of Women in Science and Engineering Fields

In the fall of 2001, 56% of enrolled undergraduates and 57% of enrolled graduate students were women (*The Chronicle of Higher Education Almanac*, 2004). While the majority of students studying at colleges and universities are women, on some campuses and in many disciplines women students remain in the minority. This is particularly true of science and engineering fields.

In 1996, the most recent year for which figures are available, women earned 55% of bachelor's degrees in all fields and 47% of bachelor's degrees in science and engineering disciplines. Of degrees in the sciences and engineering, women earned 73% of the bachelor's degrees in psychology, 51% in social sciences, 50% in biological and agricultural sciences, 45.8% in mathematics, 37% in the physical sciences, 33% in earth, atmospheric, and ocean sciences, 27.6% in computer science, and 17.9% in engineering. Since 1996, the share of

bachelor's degrees awarded to women has increased in all science and engineering fields except for mathematics where the share has remained at approximately 47% and in computer science in which the share has dropped from 37% in 1984 to 28% in 1996 (NSF, 2000).

Overall, the number of women pursuing undergraduate and graduate degrees in science and engineering fields has increased. However, as women proceed from undergraduate to graduate study, the number of women who progress to the next level of study drops. Women earned 47% of bachelor's degrees in science and engineering fields in 1996 and received 39% of the master's degrees awarded in these fields in the same year. In 1997, women were awarded 54% of the doctorates in fields other than science and engineering, compared to 33% of the doctorates in science and engineering. Of the doctorates awarded to women in science and engineering in 1997, 30.9% were in biological and agricultural sciences, 26.4% in psychology, 17.8% in the social sciences, 9.5% in the physical sciences, 8.5% in engineering, 3% in mathematics, 2.3% in earth, atmospheric and ocean sciences, and 1.6% in computer science (NSF, 2000).

Women students are pursuing advanced degrees in science and engineering fields; however, they are not remaining in the academy as faculty employees (Rayman & Stewart, 2000). Vertical segregation occurs in the faculty ranks as the number of women who advance up the academic hierarchy drops and more women remain concentrated in the junior ranks. In all science and engineering disciplines, more women are employed as assistant professors than are employed as tenured faculty members. In 2001, in science, engineering, and technology fields, women comprised 44.8% of employees at the assistant professor rank, 36.8% of associate professors, and 22.7% of full professors. In 2001, 36% of female faculty members had tenure

compared to 56% of male faculty members who had tenure (*The Chronicle of Higher Education Almanac*, 2004).

The vertical segregation of women by academic rank is exacerbated in the sciences and engineering fields where women comprised 25% of the total doctoral scientists and engineers in academic institutions in 1997 (Rosser, 2004). Among all academic fields, science and engineering employ the fewest number of women. Six and one-half percent (6.5%) of engineering faculty employees are women, the physical sciences employ 13.3% women faculty members, computer sciences and math 14.2%, biology and life sciences 27.8%, the social sciences 28.3%, and 43.1% of academic employees in psychology are women (Rosser).

The diminishing numbers of women in each progressively senior academic rank leads to the use of a “leaky pipeline” metaphor when describing the professional ascension of women in academia (Rayman & Stewart, 2000). Fewer and fewer women are employed at all ranks in higher education as women choose employment in the corporate sector or opt out of the sciences altogether. Competition among institutions for women scientists and engineers can be fierce as colleges and universities engage in mentoring, recruitment, and retention strategies to keep women “in the pipeline” and to progress to senior levels on the faculty.

What Explains the Underrepresentation of Women in Science and Engineering?

Various explanations have been offered for the underrepresentation of women in science and engineering fields including a male-dominated curriculum and pedagogy, gender stereotyping, and the culture of science. Scholars in many fields have examined the persistence with which science and engineering have remained male-dominated. The curriculum and pedagogy in the sciences and engineering have been critiqued for being ethnocentric and scholars have suggested alternatives to address “a hegemonically biased discourse that can

discourage or deter the participation of certain groups of people, particularly women” (Phillips & Hausbeck, 2000, p.181).

Others have identified the problem as one associated with the socialization of girls and boys and how gender stereotyping and gender schemas result in shaping the academic and career goals of young adults and women (Jarvis, 1996; Miller, Rosser, Benigno, & Zieseniss, 2000; Valian, 1999). Gender schemas are psychological constructs by which women and men characterize the achievements, leadership, and other qualities of women and men (Valian). Gender schemas disproportionately affect women because they result in accumulated disadvantage for women and accumulated advantage for men. Traditional characteristics of leadership are more often attributed to men than they are women (Valian). Sex role stereotypes result in women students being attracted to the study of sciences that have social applications such as medicine (Miller et al.). Women are especially attracted to medical fields that help others and in which the physician plays a significant supportive role such as primary care, pediatrics, and psychiatry. Men prefer equipment and hardware-intensive disciplines such as physics, computer and information sciences, and mechanical and electrical engineering (Miller et al.).

The culture of science and engineering disciplines has also been described as being biased against women. In computer science, for example, the widely held expectation that there is one way (the male way) to come to science shapes the expectations and assumptions of parents, teachers, and students themselves. As women begin their undergraduate computer science education and perceive that men go through the program with more experience, less effort, and more interest, too many women conclude that they do have to look “like him” in order to succeed. (Margolis, Fisher, & Miller, 2000, p. 113)

A cultural perspective of science and engineering fields has prompted researchers to look at the various ways in which the cultures of institutions, departments, and disciplines result in the overt and subtle exclusion of women from full participation in science and engineering (Rosser, 2004). Analyzing institutional arrangements and changing the mechanisms of recruitment, promotion, and tenure as well as the support available throughout the career of women scientists and engineers is the focus of efforts by professional associations, institutions, and foundations (NSF, 2002; Rosser; Rayman & Stewart, 2000).

Changing Academic Cultures to Recruit and Retain Women

The NSF, professional associations, and other stakeholders are putting pressure on higher education to increase the recruitment and retention of women faculty members in science and engineering disciplines (Eisenhart & Finkel, 1998; Fox, 2000; NSF, 2002; Rosser, 2004). From both within and outside higher education, the advancement of women academics in engineering and the sciences is seen as essential to the success of the disciplines and necessary for recruiting young women scientists and engineers into both academic and non-academic careers (Eisenhart & Finkel; Rosser).

The dearth of women academics in science and engineering disciplines is a problem that has received a fair amount of attention over the years (Eisenhart & Finkel, 1998; Fox, 2000; NSF, 2004; Rosser, 2004). Previous research has focused on individual women scientists and the reasons for the choices they have made to remain in or abandon academic science and engineering. This research has drawn criticism as focusing on the individual, and her possible deficiencies, and not examining the societal and institutional contexts within which the individual scientist has attempted to succeed (Rosser). More recent efforts have focused on

studying institutional elements that contribute to the success or failure of women academic scientists.

The Massachusetts Institute of Technology (MIT) (Hopkins, Bailyn, Gibson, & Hammonds, 1999) released a study that documented the insufficient allocation of lab space, financial resources, graduate students, and other forms of institutional support that resulted in a poor working climate for women faculty members in the sciences and engineering. This landmark study led higher education leaders to highlight institutional barriers, not personal deficits, as contributing to a climate inhospitable to women scientists and engineers (Rosser, 2004).

In addition to institutional support in the form of resources, the problems faced by women faculty members in science and engineering are embedded in cultural understandings of gender that permeate institutional and disciplinary arenas and create barriers for women's success and advancement (Becher & Trowler, 2001; Rosser, 2004). Over the years women have gained access to science and engineering fields in larger numbers. However, biased academic climates and gender stereotypes that negatively impact women faculty members in science and engineering fields have become the focus of institutional change efforts such as those conducted at MIT. To effectively support and promote women scientists and engineers, the culture of the institution must be transformed (Eckel & Kezar, 2003; NSF, 2002; Schein, 1992).

Institutional Transformation in Higher Education

How colleges and universities implement and sustain institutional transformation is an emerging area of study (Birnbaum, 1988; Chaffee & Tierney, 1988; Eckel, Hill, & Green, 1998; Eckel & Kezar, 2003; Kezar, 2001; Peterson, 1991). Institutional transformation changes academic culture. As a form of organizational change, institutional transformation "(a) alters the

culture of the institution by changing underlying assumptions and overt institutional behaviors, processes and structures; (b) is deep and pervasive, affecting the whole institution; (c) is intentional; and (d) occurs over time” (Eckel & Kezar, p. 17). Transformative change is iterative, and while it is initiated within organizational units, it alters organizational culture throughout the institution (Eckel & Kezar). The goal of the NSFADVANCE initiative is to transform academic cultures for women in science and engineering fields by engaging leaders in improving institutional policies, processes, and programs.

Institutional transformation is distinct from other types of organizational change such as implementing an innovation, adapting current processes or structures, or engaging in strategic change that alters an institution’s markets (Eckel and Kezar, 2003). Institutional transformation is significant intentional change that permeates deeply into all levels of the organization and affects the institution across unit boundaries. Other forms of change vary in the breadth of their impact and may be confined to specific areas of the organization. For example, innovative change involves the implementation of a new process that requires employees to adopt new procedures and routines. Some institutional units, but not necessarily all of them, may adopt an innovation. An example of an organizational innovation is the adoption of a new post-tenure review process that is implemented by some, but not all, academic departments (Eckel & Kezar).

Another form of organizational change is adaptive change. Adaptation occurs when an organization responds to external forces in its environment (Bolman & Deal, 1984; Eckel & Kezar, 2003; Morgan, 1997). Organizations adjust as their environments change and require new or different approaches to achieve the same outcomes. Different units might adapt to different external pressures, and not all areas within the organization will experience the changes. For example, adaptive changes are new administrative processes that are created in responses to state

or federal legislation such as measuring institutional performance or implementing mandated teacher training programs (Eckel & Kezar).

Strategic change refers to alterations an institution makes to secure a competitive niche in a particular market (Eckel & Kezar, 2003). An example of a strategic change is the implementation of a new curriculum or a new degree program that attracts a particular audience of students. Recent strategic change efforts in higher education include offering classes through distance learning and increasing the number of degrees offered in health and medical services.

Distinct from innovative, adaptive, or strategic change, transformational change results in altering the organizational culture that permeates the institution. Transformational change is change that occurs at various organizational levels and involves individuals in altering their behavior and engaging in new organizational practices. Transformational change is intentional, occurs over time, and dramatically changes significant organizational structures and practices. (Eckel & Kezar, 2003).

The Unique Nature of Higher Education Institutions

Cultural models of higher education capture the unique nature of colleges and universities as organizations with a focus on the creation and dissemination of knowledge through teaching, learning, research, outreach, and service to society (Altbach, 1999; Bergquist, 1992; Gumport, 2001; Kuh & Whitt, 1988; Tierney, 1991). Kezar (2001) identifies thirteen unique characteristics of higher education that must be understood to effectively implement transformational institutional change:

- (a) interdependent organization; (b) relatively independent of environment; (c) unique culture of the academy; (d) institutional status; (e) values-driven; (f) multiple power and authority structures; (g) loosely coupled system; (h)

organized anarchical decision-making; (i) professional and administrative values; (j) shared governance; (k) employee commitment and tenure; (l) goal ambiguity; and (m) image and success. (p. vi)

As interdependent organizations, colleges and universities are entwined with numerous external constituencies that include federal, state, and local governments, accreditation agencies, professional and disciplinary associations, foundations, industry, and other important stakeholders. While highly interdependent, higher education institutions do function with a level of autonomy and independence due, in large part, to the absence of a national postsecondary regulatory body in the U.S.

The unique culture of the academy distinguishes higher education from other organizations. The cultures of the academy include the collegial, managerial, developmental, and negotiating (Bergquist, 1992) with a value placed on consensus and the absence of a single organized or rational structure (Kezar, 2001). Colleges and universities distinguish themselves as institutions because they have long-standing missions that are slow to change and are guided by deeply held values. Some values are uniform across disciplines, such as the value placed on academic freedom. Other values may be specific to a discipline or profession, such as the value placed on logic in mathematics or the value placed on efficiency in administrative cultures.

Weick (1991) describes higher education as loosely coupled with institutional relationships that are diffuse and not coordinated. Decision-making in colleges and universities is ambiguous and authority is held by a number of constituents including the faculty, administration, and governing boards. Within institutions there are generally faculty and administrative cultures with differing values. Faculty members value collegiality, autonomy, and peer review while administrators value hierarchy, efficiency, and coordination of activities.

Shared governance is a unique organizational feature of higher education with its emphasis on shared decision making and consensus building among institutional constituencies.

In higher education, faculty members remain at institutions for lengthy periods of time and employee turnover is minimal compared to other employment sectors. Higher education is characterized by having a variety of complex goals that result in goal ambiguity and an inconsistency between stated goals and actions. Resources, prestige, image, and success are very important to institutional identity (Altbach, 2001; Berdahl, Altbach, & Gumport, 1999; Bergquist, 1992).

All 13 of Kezar's (2001) cultural characteristics must be considered when planning for and implementing institutional transformation. To sustain institutional transformation, efforts such as those implemented by campus ADVANCE teams must take into account the unique nature of higher education and its institutional and academic cultures (Becher & Trowler, 2001; Bergquist, 1992; Birnbaum, 1988; Chaffee & Tierney, 1988; Eckel et al., 1998; Eckel & Kezar, 2003; Kezar, 2001; Peterson, 1991, Tierney, 1991).

The ADVANCE Institutional Transformation Initiative

The goal of the NSF ADVANCE Institutional Transformation grant program is to transform academic cultures to increase the participation of women in academic science and engineering fields. The 2002 NSF ADVANCE Institutional Transformation grant solicitation states that the purpose of the program is to:

provide flexibility to proposing institutions to define and implement effective approaches to increase the participation and advancement of women faculty members into the senior and leadership ranks of science and engineering, and to implement the changes necessary to institutionalize those approaches through changes to institutional policies and

practices. By supporting the groundwork necessary to transform institutional practices systemically, the Institutional Transformation Awards seek to create positive, sustainable, and permanent change in academic climates. (NSF, Program Description, para. 2)

In 2002, colleges and universities were invited to apply for multi-year awards totaling \$3 to \$4 million each. The process was highly competitive and proposals were evaluated on the intellectual merit of the proposed activity and its broader impact. The NSF evaluated proposals on additional criteria that measured the institutional viability of the proposed programs, the effectiveness of the institution's leadership team, and the proposed methods of assessment. To be awarded a grant, an institution had to articulate its plans to change its practices and transform its culture to strengthen the participation of women in the scholarship and administration of academic science and engineering fields.

ADVANCE change efforts require the participation of faculty and administrators from all levels of the institution and from a variety of disciplines (Rayman & Stewart, 2000). The NSF awarded grants to nine institutions in 2001 in the first round of funding, and awarded grants to 10 institutions in 2002, the second round of funding. The multi-year and multi-campus ADVANCE initiative provided an opportunity to examine how academic and institutional cultures promote or impede institutional transformation. ADVANCE institutions provide an opportunity to study how cultural models can be used as frameworks for institutional transformation in higher education.

Purpose of the Study

The purpose of this study was to analyze factors associated with institutional transformation efforts designed to improve the academic culture for women faculty members in engineering and sciences fields at first and second-round ADVANCE institutions. Study data

were collected in two phases. First, interviews were conducted with Co-PIs and key faculty members and administrators engaged in implementing ADVANCE initiatives at 18 of the 19 ADVANCE institutions prior to 2006. Second, site visits were conducted at two first-round ADVANCE institutions to examine the design and implementation of a specific initiative designed to improve faculty recruitment. This study examined four questions.

Research Questions

1. What policies, processes, and programs designed to improve academic cultures for women faculty members in engineering and science fields were implemented at first and second round NSF ADVANCE institutions?

2. What strategies used by ADVANCE institutions promoted the implementation of policies, processes, and programs designed to improve academic cultures for women faculty members in engineering and science fields?

3. How did other factors, such as the role of the National Science Foundation impede the implementation of policies, processes, and programs designed to improve academic cultures for women faculty members in engineering and science fields?

4. What does in-depth analysis of two ADVANCE initiatives reveal about the role of institutional and academic cultures in the successful implementation of institutional change in science and engineering fields?

These four questions guided interviews, site visits, and data analysis that examined change efforts designed to promote lasting and transformational change at institutions engaged in improving the climate for women faculty members in science and engineering fields.

Need for the Research

Institutions awarded an NSF ADVANCE grant were prime sites for studying institutional transformation. This nationwide, multi-institution effort provided an opportunity to examine and further understand the implementation of organizational change efforts designed to alter institutional culture and improve academic climates for women faculty members in engineering and science fields.

Findings from this study contribute to the literature on institutional transformation in higher education. Studying organizational change at ADVANCE institutions strengthens our understanding of how initiatives aimed at transformational change are implemented at the institutional, college, departmental, and individual levels in colleges and universities. The decentralized and loosely coupled nature of higher education often masks changes that take place within an institution, making in-depth study of change necessary to completely understand the nature of voluntary and intentional transformative institutional change (Kezar, 2001). In addition, institutional transformation research has examined institutions as a whole rather than exploring change efforts implemented simultaneously at the institutional, college, departmental, and individual levels.

The results of this study can be used to inform practice and help those implementing gender-based initiatives by offering insight into the forces that promote or impede the implementation of change strategies and the accomplishment of outcomes. This study provides information about change efforts that challenge and promote change in the practices and cultures at the institutional, college, departmental, and individual levels. The results of this study inform the institutional change work of faculty members and administrators as well as provide

information to external stakeholders such as foundations and policy makers interested in promoting the success of colleges and universities.

This research examines how institutional cultures impact a voluntary, and externally driven, change effort focused on addressing gender inequity for faculty women in science and engineering fields. It utilizes the strengths of cultural models to account for the unique organizational nature of higher education and how voluntary and intentional change is accomplished. This study captures the ways in which willing change agents engage their institutions at individual and organizational levels to achieve goals that further diversity and strengthen the scientific contributions made by female scholars in higher education.

CHAPTER TWO

Review of the Literature

The goal of the NSF ADVANCE Institutional Transformation effort is to transform academic culture to improve the climate for women faculty members in engineering and science fields. Institutional transformation is a planned change effort that requires understanding the unique characteristics of an institution and uncovering how the culture of the institution manifests itself so that strategic decisions can be made about how it can be changed.

Institutional Transformation in Higher Education

Understanding the context for institutional transformation in higher education requires knowledge of the unique organizational characteristics and qualities of colleges and universities, the nature of higher education cultures, and how culture manifests itself within the institution (Eckel et al., 1998; Schein, 1992). Colleges and universities have missions and goals that focus on the creation and transmission of knowledge through teaching, learning, research, and service to society (Altbach, 1999). Colleges and universities are unique in the manner in which they engage in the creation and dissemination of knowledge through research, teaching, outreach, and service, that distinguishes them from other organizations engaged in, for example, commerce or government (Baldrige, Curtis, Ecker, & Riley, 1991). Producing knowledge shapes disciplinary and departmental cultures and frames how organizational members participate in higher education institutions (Becher & Trowler, 2001).

Higher education is notorious for being resistant to change and not particularly nimble when engaged in change efforts (Duderstadt & Womack, 2003; Eckel et al., 1998; Freeland, 2001). American colleges and universities have adapted to significant changes in areas such as their demographics, the nature and sources of their funding, and in the increased use of

technology. These changes, however, have taken place very slowly and are adaptive and iterative in nature (Altbach, 1999; Bergquist, 1992; Eckel et al., 1998; Geiger, 1999).

Resistance to change may come from the fact that change efforts create disorganization and are experienced as irrational with unpredictable results (Bergquist, 1992; Morgan, 1997; Schein, 1992). Higher education culture values rationality and autonomy. Colleges and universities resist change because it violates the value placed on tradition, rationality, and predictability (Bergquist). Change is difficult to implement in colleges and universities due to the organized anarchy of institutional structures in which there are no clear lines of authority (Baldrige, 1991), and because institutional structures are loosely coupled (Weick, 1991) and operate parallel to one another with little apparent interrelationship.

Organized Anarchy

One of the explanations for resistance to change is the manner in which the units that comprise higher education institutions are organized. Organized anarchy (Baldrige et al., 1991) describes the structural nature of academic organizations. Five elements characterize the organized anarchy of institutions: (a) colleges and universities have multiple goals that can be difficult to state clearly, can be ambiguous, and are often contested internally and externally; (b) higher education is client serving and must accommodate clients who demand participation in organizational decision-making processes; (c) due to the varying needs of the clients of academic organizations, multiple and often unclear technologies are employed in the delivery of services; (d) colleges and universities employ highly professional workers who use multiple abilities in the course of doing their jobs, and who demand autonomy in their work; and (e) higher education institutions are impacted by their environment and balance a degree of organizational autonomy with the impact of external forces.

Organized anarchy (Baldrige, et al., 1991) captures the distinction between academic institutions and traditional hierarchical organizations. In an organized anarchy such as a college or university, faculty members and administrators have tremendous autonomy and little coordination from a central authority. Implementing change efforts within the context of organized anarchy requires the consideration of multiple organizational structures and constituencies with varying sources of authority and, at times, contradictory goals. Another organizational element evident in colleges and universities is loose coupling (Weick, 1991).

Loose Coupling

Loose coupling (Weick, 1991) describes how varied events, units, and functions of an institution simultaneously maintain autonomy from one another and intersect as components of the same organization. Loose coupling illustrates the manner in which elements of a complex organization might operate in relationship to one another in the absence of clearly related functions or organizational ties. For deep and pervasive institutional transformation to occur, change must take place across multiple loosely coupled organizational units, making change a significant challenge in the higher education context.

In colleges and universities, there may be no apparent direct relationship between the functions of the development office and the residence halls. However, as elements of a loosely coupled organization, the development office and the residence halls are part of the institutional fabric that together make up the organization as a whole. Loose coupling “intends to convey the image that coupled events are responsive, but that each event also preserves its own identity and some evidence of its physical or logical separateness” (Weick, 1991, p. 105). Loose coupling, in conjunction with organized anarchy, are organizational elements that make transformational change difficult and rare. The ambiguity of goals along with the autonomy of individuals and

organizational units provide unique challenges to implementing transformational change across an entire institution. The organizational context within which institutional transformation occurs is additionally illuminated when cultural perspectives unique to higher education are examined.

Cultural Elements of Higher Education Institutions

Institutional transformation is fundamentally about altering the culture of the institution. Institutional transformation changes “organizational structures and processes, leads to reorganized priorities, [and] affects organizational assumptions and ideologies” (Eckel & Kezar, 2003, p. 53). As a theoretical perspective, a cultural framework requires that for institutional transformation to occur, the elements of the cultures that exist within an institution must be exposed and understood. A successful change effort must be compatible with these cultural elements (Bergquist, 1992; Eckel & Kezar; Schein, 1992).

In a cultural context, values play a powerful role in shaping institutional behavior and culture (Kezar, 2001; Morgan, 1997; Schein, 1992). Values specific to higher education include academic freedom, autonomy, tradition, rationality, disciplinary divisions, equal access, service to society, shared governance, and the creation and dissemination of knowledge (Altbach, 1999; Austin, 1990; Becher & Trowler, 2001; Berdahl & McConnell, 1999; Bergquist, 1992; Chang, 2000; Gumport, 2001; O’Neil, 1999; Peterson & Spencer, 1991). These values and the ways in which they are expressed permeate institutional culture and are regarded as immutable (Kuh & Whitt, 1988). Intentional change efforts that violate institutional values can result in resistance and outright rejection of efforts to implement change (Bergquist, 1992).

A cultural perspective of transformational change requires that the goals of the change effort account for the unique nature of colleges and universities and their distinct institutional cultures (Chaffee & Tierney, 1988; Eckel & Kezar, 2003; Morgan, 1997; Schein, 1992). A

cultural perspective of institutional transformation is predicated upon understanding how culture shapes and influences organizational life and the experiences of organizational members (Kezar, 2001; Kuh & Whitt, 1988; Peterson, 1991; Tierney, 1991).

Institutional Culture

Culture is a critical dimension of any organization. In higher education, institutional cultures are the persistent patterns of norms, values, practices, beliefs, and assumptions that shape the behavior of individuals and groups in a college or university and provide a frame of reference within which to interpret the meaning of events and actions on and off the campus. (Kuh & Whitt, 1988, p. iv)

Culture weaves together multiple organizational elements that connect the individual organizational member to other members and to the institution itself. Culture is difficult to discern and to change because its roots lie in subconscious beliefs and attitudes that manifest themselves behaviorally in individuals and in observable ways in the practices of organizations (Bergquist, 1992; Bolman & Deal, 1984; Chaffee & Tierney, 1988; Kezar, 2001; Morgan, 1997; Peterson & Spencer, 1991; Schein, 1992; Tierney, 1991).

Culture is socially constructed, interpretative, and subjective, is both process and product, and is about the creation of individual and shared meanings by organizational members using symbols and metaphors and engaging in organizationally shared rituals (Chaffee & Tierney, 1988; Eckel & Kezar, 2003; Kuh & Whitt, 1988; Morgan, 1997; Peterson & Spencer, 1991; Schein, 1992; Tierney, 1991). Culture is a powerful dimension of institutional life and provides academic organizations with continuity and stability while simultaneously shaping efforts to adapt, change, or transform the organization.

Three Levels of Culture

Understanding how culture manifests itself is essential to institutional transformation. Culture permeates all aspects of organizational life and has three levels that include artifacts, espoused values, and basic underlying assumptions (Schein, 1992). These three dimensions provide a framework by which to examine the culture of an organization and identify the changes required to culturally transform the institution.

Artifacts. Artifacts are products, tangible organizational structures, and processes (Schein, 1992). Artifacts are the visible elements of an organization's functions and provide structure to the behavior of organizational members. Artifacts include buildings and the configurations of offices, as well as other products that can be seen, heard, or felt such as manner of dress, level of formality among organizational members, language, technologies, documents, rituals, ceremonies, and forms of routine organizational expression (Schein). In an institutional change effort, artifacts are important to identify because they are the product of an organization's culture and are a way in which organizational members communicate with the external environment. As an element of intentional change efforts, artifacts can be examined for the cultural assumptions they portray and then altered to exemplify the new values embraced by the change effort. For example, at some institutions, the addition of spaces designated as lactation rooms is a change in how space is allocated and is a way for an institution to communicate that strives to be family-friendly.

Espoused values. Espoused values are the "strategies, goals, philosophies, espoused justifications [for] what is right or wrong, and what will work or not work" (Schein, 1992, p. 17). Espoused values evolve over time and become ingrained in the culture of the organization by providing a framework for making decisions and a sense of continuity for organizational

members. These values are difficult to change because they are linked to organizational heritage and history. Espoused values are identifiable in organizational artifacts because they are conscious and organizational members are able to identify them. For example, in engineering and science disciplines, the value placed on research activities is evidenced by the emphasis on securing large amounts of external funding to support research endeavors and the importance of securing patents and producing scholarly publications for successful promotion and tenure.

Espoused values are understood and experienced differently by organizational members and are a source of information for institutional transformation efforts (Chaffee & Tierney, 1988). For example, some women and minorities in the sciences experience the espoused academic value of objective and neutral peer review differently from their White male counterparts (Rosser, 2004). As a cultural artifact, a policy may outline what appear to be neutral and objective standards for promotion and tenure, but the policy's implementation may have disparate impact on different organizational members. Expectations of academic performance that do not account for varied professional trajectories can harbor hidden bias that has a negative impact on women and minorities in the promotion and tenure process. The policy is intended to be the manifestation of the academic values of neutrality and objectivity, however, in the aggregate, its implementation results in accumulated bias for women and minorities (Rosser; Valian, 1999).

Espoused values can be inconsistent, contradict one other, and be incongruent with an organization's artifacts. Institutions can espouse conflicting values such as a reward structure that places a premium on individual achievement while simultaneously promoting collaboration and interdisciplinary work. The importance placed on research production in the promotion and

tenure process can contradict an institution's stated commitment to equally valuing teaching, service, outreach, and research.

Underlying assumptions. Basic underlying assumptions are “unconscious, taken-for-granted beliefs, perceptions, thoughts, and feelings [and] are the ultimate source of values and action” (Schein, 1992, p. 17). These assumptions are deeply rooted in the psychology of organizational members and are difficult to change because of the desire by organizational members to maintain cognitive and emotional stability. Basic underlying assumptions provide organizational members with essential information regarding

the nature of time and space; human nature and human activities; the nature of truth and how one discovers it, the correct way for the individual and the group to relate to each other; the relative importance of work, family, and self-development; the proper role of men and women; and the nature of the family. (Schein, p. 26)

Underlying assumptions inform values and shape organizational artifacts. The subconscious nature of underlying assumptions make them difficult for organizational members to perceive and consequently difficult to expose and target for change (Schein, 1992). For example, many departmental and institutional structures are currently based on assumptions of traditional gender roles such that a faculty member is presumed to be male and have a female partner who takes care of home and family responsibilities. In the sciences and engineering, where the researcher is judged by the investment of time in a lab or research project, this expectation has a disparate impact on women who remain largely responsible for home and family responsibilities. A model created when all the academic scientists were men and had a wife at home is based on dated assumptions that must be exposed and challenged. Transforming institutional culture requires that opportunities be created to examine the ways in which

underlying assumptions shape values and manifest themselves in organizational artifacts and thus affect the experiences of organizational members.

The process of transforming an institution requires challenging and changing organizational culture. To change culture, artifacts, espoused values, and underlying assumptions must be identified and leaders must design alternatives that transform the culture and change the institution. In addition to these three levels of culture, understanding that there are various types of institutional cultures is important to the study of institutional transformation.

Four Academic Cultures

Understanding how culture is uniquely manifested in colleges and universities is critical for engaging in change that improves the climate for women faculty members in the sciences and engineering. Transformational change requires that extant cultures be challenged and new cultures be created that support the contributions of all institutional members. It is important to uncover how academic and institutional cultures have evolved and are experienced by women faculty members in order to successfully change the academic climates to better support women in higher education.

The four characterizations of academic cultures describe how institutional members make meaning of the purpose and functions of the organization (Bergquist, 1992). The experiences of individuals within the institution are shaped by the organization's culture and, in turn, will shape changes within the institution. The four cultures of the academy are: (a) the collegial culture; (b) the managerial culture; (c) the developmental culture; and (d) the negotiating culture (Bergquist).

Collegial culture. The collegial culture is shaped by values that place traditional notions of the role of faculty members at the center of the purpose of the institution. In the collegial culture, the purpose of education is the development of student values, character, and the

creation of societal leaders. The collegial culture emphasizes the role of the disciplines and departments; it also values research and scholarship, shared governance processes, rationality, and the generation, interpretation, and dissemination of knowledge (Bergquist, 1992). The collegial culture is embodied in traditional notions of the liberal arts college because of the tradition of the faculty member as sole teacher and scholar and the value of the liberal arts as teaching critical thinking and advancing the life of the mind. Value is placed on teaching, disciplinary scholarship, research, and the autonomy of faculty members.

Using the values of the collegial culture to create transformational change uses the important role of faculty members to challenge values and practices that impede the advancement of women in the academy. The strengths of the collegial culture such as the value placed on the creation of knowledge through the disciplines must be used in change efforts to shift cultural norms. In a collegial culture, advancing knowledge means embracing the contributions of all faculty members and, consequently, creating an environment in which diverse faculty members and multiple forms of research, including unconventional and interdisciplinary research, can thrive (Becher & Trowler, 2001).

Managerial culture. The second culture of the academy described by Bergquist (1992) is the managerial culture. The managerial culture embraces the accomplishment of clearly established goals and values hierarchy and efficiency. In the managerial culture, the purpose of education is to teach students specific skills and knowledge so they can be productive employees and citizens. The managerial culture “finds meaning in ... work directed toward specified goals and purposes ... [and] values fiscal responsibility and effective supervisory skills” (Bergquist, p. 5). The managerial culture is most often associated with Catholic schools, community colleges, and some comprehensive institutions, because of their heritage in educating the working class.

The managerial culture, embodied by an institution's administration, can be central to transformational change efforts because of the access of administrators to resources and their involvement in institutional governance structures. Because it values efficiency and "getting the job done" the managerial culture is amenable to change and supports the implementation of new technologies and operations. Unlike the collegial culture, in which discussion is valued and many individuals are invited to participate in most efforts, the managerial culture can overlook the importance of examining several angles of a proposal and impose change that fails for lack of buy-in from a variety of constituencies (Bergquist, 1992).

Developmental culture. Bergquist (1992) describes the third academic culture as the developmental culture. The focus of this culture is on student and faculty member development, curricular planning, and the use of institutional research to evaluate student success and institutional climate. The developmental culture "finds meaning ... [in] furthering the personal and professional growth of all members of the collegiate community ... [and it] values ... service to others" (Bergquist, p. 5). The developmental culture was evident in the 1970s and died down during the 1980s as the focus of institutional research efforts shifted from assessing student learning outcomes and faculty member development to capturing institutional demographics and tracking financial resources (Bergquist). An example of the developmental culture is the spate of student learning style assessment tools that were created in the early 1970s by institutions to guide efforts to improve the teaching by faculty members.

The developmental culture is important to consider in transformational change because of its focus on accommodating the learning and professional development goals of institutional members. Changing culture requires investigating values and underlying assumptions and providing individuals with information from which they can learn about varied institutional roles

and experiences. For example, the developmental culture might inform the creation of training for department heads on how to implement stop-the-tenure-clock policies without inadvertently disadvantaging any member of their department (Bergquist, 1992).

Negotiating culture. The fourth culture is the negotiating culture and it is characterized by a focus on institutional structures and the distribution of resources (Bergquist, 1992). This academic culture “finds meaning in ... the establishment of equitable and egalitarian policies and procedures ... [and] values confrontation and fair bargaining” (Bergquist, pp. 5-6). The negotiating culture examines issues of power and finds ways to implement structures that confront oppression and advance liberation. These dynamics are evidenced by unionization and collective bargaining efforts.

Because of its focus on power distribution, the negotiating culture has been helpful to institutional transformation efforts to improve the climate for women and minorities. A college or university where unions are part of the organization has an institutional vocabulary for discussing issues of inequities and social justice, and graduate students, housekeepers and grounds workers can be the beneficiaries of collective bargaining agreements (Bergquist, 1992). The negotiating culture may impact transformational change efforts negatively by using confrontational communication and not engaging institutional members in deliberations for building consensus about change.

In addition to characterizing an institution as a whole, the different academic cultures co-exist within the same organization. Within an institution one culture may be embraced by a particular institutional constituency and be at odds with another. For example, faculty members may operate within a collegial culture that values the tradition of peer review and scholarly autonomy. Within the same institution, administrators may function within a culture that values

hierarchy, a visible chain of authority and efficiency, while the custodial employees place value on the negotiating culture and their ability to bargain collectively. The values and assumptions associated with each academic culture provide ways to examine, expose, and target organizational values and structures for change. In combination with cultural artifacts, espoused values, and underlying assumptions, each cultural type can be mined for insight on how to plan for and approach institutional transformation (Bergquist, 1992; Schein, 1992).

An Institutional Culture Framework

When studying institutional transformation, multiple conceptual frameworks provide insight into how organizations work and what elements promote and impede change. Schein's (1992) model of organizational culture illustrates the interconnections between the individual and the organization by describing the role of unconscious beliefs and assumptions in organizational behavior,

In addition to Schein's (1992) model of organizational culture, the theoretical value of Bergquist's (1992) four academic cultures is enriched when viewed in conjunction with Tierney's (1991) institutional cultural framework (Eckel & Kezar, 2003). In addition to having an academic culture that is internal to the institution, Tierney's cultural framework expands the view of the institution and the context within which institutional transformation takes place. Combining Bergquist's four institutional cultures with Tierney's six cultural elements provides a rich set of descriptors for examining organizational culture.

Tierney (1991) outlines a cultural framework that is useful for thinking broadly about an institution and identifies how organizational members make meaning of institutional life. Understanding the experiences of organizational members is essential to examining institutional culture and creating efforts to change it. The six components of Tierney's institutional cultural

framework are: (a) the environment, (b) institutional mission, (c) socialization, (d) information, (e) strategy, and (f) leadership. Each element is interconnected and places the institution in relationship to its environment. The six elements of the cultural framework strengthen understandings of how institutional transformation can be planned and executed by offering specific dimensions through which to examine and address cultural artifacts, espoused values, and underlying assumptions.

Environment. How an institution defines and perceives its environment is important to understanding the culture of the institution (Tierney, 1991). Dimensions of the environment include the location of the institution, the demographics of the institution's setting, and its international, national, and regional stakeholders. An institution both engages in defining its environment and is defined by its environment. Whether the organization views the environment as hostile or friendly will play itself out in the culture of the institution and provides insight as to how the institution and its organizational members view themselves (Birnbaum, 1988; Chaffee & Tierney, 1988; Tierney). The environment and external stakeholders influence the ways in which the institution and its organizational members make meaning of the institution's purpose. As an element of an institution's culture, dimensions of the environment must be considered when implementing change. For example, whether an institution is located in a rural or urban setting will impact the university's ability to engage in services for the accompanying partner of a faculty hire. Partner hire services may be an institutional program important to enhancing the employment climate for women faculty members.

Institutional mission. The second element in the cultural framework is institutional mission (Tierney, 1991). Mission is an expression of the organization's values, and whether and how the mission is used for institutional decision making is an element of its culture (Chaffee &

Tierney, 1988). The mission may inform and guide programmatic decisions and articulates the institution's clientele. When the mission is aligned with the organization's espoused values and underlying assumptions, the mission unifies organizational members and units (Schein, 1992). Whether there is agreement among organizational members on the mission of the institution is an element of the culture of the institution as is whether and how the mission has changed over time (Chaffee & Tierney). Institutional transformation goals must be consistent with the mission and values of the organization to engender commitment by organizational members to the change efforts. If the goals of a change effort are perceived to diverge dramatically from the mission of the institution, the efforts will be resisted and dismissed as incongruent with the fundamental purpose of the organization.

Socialization. Socialization is the third component of Tierney's (1991) institutional culture framework. Welcoming newcomers and teaching them institutional processes is part of socializing new members to the organization and its culture. Socialization involves teaching members what it takes to succeed in the organization and how to avoid failing (Tierney). For faculty members, the socialization process might begin in undergraduate studies, but more often occurs and intensifies at the graduate and doctoral levels of study (Becher & Trowler, 2001). Socialization can be personal and informal using oral communications and social events or it can be characterized as impersonal and formal taking place through written communications and the exchange of documents in meetings and scheduled orientations (Chaffee & Tierney, 1988).

Within academic disciplines, socialization plays a significant role in acculturating new members to the epistemology, expectations, and nuances of their discipline (Becher & Trowler, 2001). Being socialized into a discipline involves adopting disciplinary ideology as well as a

“personal and professional identity, set of values, attitudes, taken-for-granted knowledge, and recurrent practices” (Becher & Trowler, p. 48).

The socialization process is a powerful mechanism through which institutional and disciplinary cultures are transmitted and maintained (Kuh & Whitt, 1988). Changing culture requires providing opportunities for organizational members to identify ways in which socialization practices perpetuate values and practices that may inadvertently exclude or disenfranchise new members, and replace them with socialization practices that benefit everyone. For example, a lone woman scientist, new to a department, may not benefit from professional and social situations because her male colleagues exclude her. Her absence from activities in which institutional and departmental politics may be discussed exclude her from knowledge that could benefit her understanding of decision-making processes and dynamics.

Information. Information is the fourth element in the cultural framework (Tierney, 1991). Organizational values are evident in how institutions manage information, what counts as information, who has information, and the kinds of information to which an individual has access. The formal and informal ways in which organizational members communicate, along with the technologies used to share information, constitute elements of the institution’s culture (Tierney). Institutional culture is evidenced by how and what institutional leaders communicate and by the mechanisms available and used to communicate different kinds of information by all organizational members (Tierney; Birnbaum, 1988). Other elements related to information include the existence of feedback loops by which organizational members both send and receive information and subsequently employ information to adjust, adapt, or change (Birnbaum; Schein, 1992). The intentional or unintentional distortion of information and the use of information to control organizational members (Schein) is also a part of institutional culture.

The use of information is important for understanding how transformational change efforts are implemented and whether the efforts are succeeding. Who has information, and the type of information they have, can be an important dimension of how the organization's culture is experienced. For example, women scientists frequently cite an absence of information regarding the processes for promotion and tenure as a problem in their departments (NSF, 2004; Rosser, 2004). Making departmental and institutional policies and procedures easily available and transparent is a goal of transformational change efforts to improve the climate for women and minorities.

Strategy. The fifth element in the cultural framework is strategy (Tierney, 1991). In this context, strategy is a process of questioning and decision-making (Chaffee & Tierney, 1988). What constitutes a "good" strategic decision and what happens when a "bad" decision is made are questions that provide insight into the institution's culture. Strategy can be linear, adaptive, or interpretive (Tierney). Formal decision-making processes that are goal-oriented and targeted would evidence linear strategy. Adaptive strategy is characterized by participation of multiple organizational members and adjusting decisions to accommodate the environment. Interpretive strategy uses metaphors and symbols to interpret institutional values and motivate organizational members (Chaffee & Tierney). How decisions get made and by whom are critical elements of an organization's strategy and will shape institutional culture. Increasing the involvement of women in organizational decision-making is part of institutional transformation efforts to improve the climate for women in science and engineering.

Leadership. Leadership is the last of the six elements in Tierney's (1991) cultural framework. Who leaders are, how they become leaders, and what organizational members expect of their leaders are questions that examine this dimension of organizational culture. Leaders are

distinguished from managers and other organizational members by their role in creating and shaping institutional culture (Schein, 1992). Leaders can be formal and informal and their roles might change depending on circumstances and the expectations of organizational members. The ways in which leaders act, interpret, communicate, and shape institutional culture illustrate the intersections of institutional culture and leadership (Chaffee & Tierney, 1988; Tierney). The implementation of change requires leadership at the highest levels of the organization (Eckel & Kezar, 2003). It also requires that the image of what constitutes a leader be altered so that it includes women and minorities.

The study of institutional transformation requires the use of multiple cultural models that provide a variety of constructs to capture the rich and complex nature of organizational culture and the strategies used for its change. The combined use of Bergquist's (1992) four academic cultures and Tierney's (1991) six components of a cultural framework provide a complex lens through which to interpret and understand culture and institutional transformation (Eckel & Kezar, 2003). An investigation of the NSF ADVANCE Institutional Transformation effort, with its focus on improving the climate for women academic engineers and scientists, calls for multiple cultural perspectives that account for the varied ways in which organizational members experience their institution and the diverse ways in which change efforts are implemented.

Women and Academic Cultures

Improvement of academic cultures for women requires acknowledging that there are aspects of academic life that are gendered and that it is important to work on addressing inequities within the academy. The gender equity agenda of the ADVANCE Institutional Transformation project challenges institutions to examine the ways in which women and men faculty members experience their professional lives differently in their roles as scientists and

engineers. The experiences of women in the academy, and in science and engineering fields, are distinct from the experiences of their male counterparts (Clark & Corcoran, 1997; Kohlstedt, 2004; Lindholm, 2003; Rosser, 2004; Valian, 1999). The absence of women in science and engineering fields is attributed to histories of exclusion and marginalization and to accumulated disadvantage within the hierarchies of higher education (Clark & Corcoran; Kohlstedt; Valian).

Institutional and disciplinary cultures are assumed to be culturally and gender neutral when, in fact, they are male-centered (Rosser, 2004). Drawing attention to the male-centeredness of the academy exposes issues of power, privilege, and discrimination that make male and female organizational members uncomfortable. Disciplinary cultures “have internal divisions of power, status, and labour organised on a basis which is not only meritocratic, ... [they] carry meanings, images, and tacit assumptions that often involve taken-for-granted ideas about gender identities. They are not culturally neutral: areas of study are widely held to embody beliefs about masculinity and femininity” (Becher & Trowler, pp. 54, 55-56).

The academy, and the sciences in particular, place high value on merit, neutrality, objectivity, and fairness. To suggest that women are at a disadvantage defies widely-held academic values. Cultural change in the sciences and engineering fields requires a discussion of power, privilege, and inequality and calls for examining the role scientific values play in shaping the disparate experiences women and men have within the academic hierarchy. The conflict between the espoused scientific values of neutrality and objectivity and the experiences of women with bias in science and engineering fields is highlighted by examining the ethos of science as described by Merton (1973).

There are fundamental scientific values that are held by academics regardless of their disciplinary training and orientation (Merton, 1973). The ethos of science is an “affectively toned

complex of values and norms which is held to be binding on the man of science” (Merton, p. 269). These values are (a) universalism, (b) communism, (c) disinterestedness, and (d) organized skepticism. These four elements of the ethos of science serve as normative structures that are “prescriptions, proscriptions, preferences, and permissions” (Merton, p. 269) in the pursuit of science. They form the underlying assumptions that shape science and engineering academic cultures.

The value of universalism is the belief that scientific claims of truth are “not to depend on the personal or social attributes of their protagonist; his race, nationality, religion, class, and personal qualities are as such irrelevant” (Merton, 1973, p. 270). Science is impersonal, detached, and an enterprise in which “objectivity precludes particularism” (Merton, p. 270). The assumption that science is impersonal and detached underlies the culture of science and its reward structure (Becher, 1987). The value of universalism shapes the manner in which members of the disciplines behave, conduct their work, and approach departmental and institutional norms, policies, and procedures.

Communism, disinterestedness, and organized skepticism are the three additional values by which scientific communities maintain objectivity and neutrality (Merton, 1973). Communism is the value placed on the common and public ownership of scientific findings and is demonstrated by the communication of research findings through publication. The disinterest of the researcher is managed by “the verifiability of results, [through] the exacting scrutiny of fellow experts ... [and] the activities of scientists are subject to rigorous policing” (Merton, p. 276). Organized skepticism, like disinterestedness, is “the temporary suspension of judgment and the detached scrutiny of beliefs in terms of empirical and logical criteria” (Merton, p. 277). The ethos of science permeates all disciplines and assumes that the pursuit of scientific knowledge is

impersonal, universalistic, and free of any particularism. According to Merton, science advances democratically on merit and without bias.

The gender equity goal of the ADVANCE change effort challenges the value of universalism and raises the specter of the “particular.” To implement policies, programs, and structures that overtly advance the careers of women engineers and scientists requires a shift in the ethos of science to acknowledge that women have experienced bias and that their professional lives are distinct from the experiences of their male counterparts. Institutional and disciplinary cultures value the scientific ethos and resist challenges to the belief that practices in science are neutral and objective, and that careers in science are advanced on merit regardless of the race, gender, or other demographic “particular” of the scientist.

The role that the “particular” plays in science and engineering cultures is evidenced by the Matthew effect and the disproportionate ways in which female and male faculty members accumulate advantage over the course of their careers. A reference to a biblical passage in which the faith of Matthew is continuously rewarded, the Matthew effect describes the manner by which success is rewarded with additional success, and accumulates over the course of one’s career. The experience of the Matthew effect is different for women and for men. Women experience cumulative disadvantage as a result of academic and professional steps that may not involve the “best” graduate program, less access to financial resources, fewer opportunities for mentoring from prestigious academics, less access to necessary lab resources, and exclusion from networks that provide sponsorship and exposure. A twist on the Matthew effect is the Salieri phenomenon (Clark & Corcoran, 1997).

The Salieri effect refers to musician Salieri who, as a court composer, kept Mozart from attaining full benefits and recognition for his accomplishments. While Salieri appeared to

sponsor Mozart, he controlled Mozart's exposure and his access to resources, salary, and other benefits because Mozart lacked the social graces Salieri believed were necessary for inclusion at the emperor's court. Mozart was grateful for Salieri's assistance, unaware that Salieri actually blocked his career and prevented him from gaining full advantage. Clark and Corcoran (1997) argue that the Salieri effect is in full play for women academics.

Women have made employment gains in engineering and science fields (Lomparis, 1997) but remain at the margins of full participation in terms of resources, prestige, and advancement in their disciplines. Individuals who appear to be working on their behalf may sponsor women academics, but full access to the resources and prestige of the academy as a whole remains controlled by men (Becher & Trowler, 2001; Clark & Corcoran, 1997; Rosser, 2004).

Research universities value and trade on elitism and prestige. They are engaged in competition for students and faculty members and pursue prestige on quantitative as well as qualitative dimensions (Becher & Trowler, 2001; Duderstadt & Womack, 2003). Elitism and prestige result in excluding women and minorities from full participation in higher education by endorsing selective practices designed to exclude and limit participants. Across all disciplines, women faculty members are more likely to be engaged in the less prestigious work activities at the lowest levels of disciplinary and institutional hierarchies (Becher & Trowler, 2001). Within the academic hierarchy, science and engineering fields are considered the most prestigious disciplines and employ the fewest women faculty members. Women are vertically segregated into areas of the academy with the least prestige and fewest resources. In science and engineering fields, the Matthew effect is in full force rewarding the prestigious and resource rich.

The Role of the NSF as an External Stakeholder in Institutional Transformation

In some ways the role of the NSF as an external stakeholder in the ADVANCE institutional transformation effort may promote change, and in some ways the role of the NSF may impede organizational change. Some literature might lead us to believe that the NSF's role in effecting change, as an external stakeholder, can only be minimal or might backfire altogether. American higher education enjoys the prestige of being considered the best in the world (Altbach, 1999; 2001) and the higher education community is not anxious to change how it does business. External stakeholders who suggest or demand change in higher education are perceived as uneducated critics who do not properly understand the value of the enterprise (Gumport, 2001; Johnstone, 2001). In this context, the NSF's ability to impact institutional change might be minimal.

Change that is directed from an external stakeholder may be met with resistance because of a perception that the change effort violates institutional autonomy. Institutions guard the manner in which they govern themselves, make decisions, allocate resources, determine curriculum, hire, grant tenure to, and fire personnel, teach, and conduct research (Berdahl & McConnell, 1999). As an external stakeholder, the NSF may be perceived as intruding on the autonomy of institutional decision-making when it suggests that institutions are not recruiting, hiring, and promoting sufficient numbers of women in the faculty ranks.

Resistance to change in higher education also stems from a history of unfunded, externally driven change efforts (Berdahl & McConnell, 1999; Bergquist, 1992). Efforts such as those associated with the accountability movement have been resisted because of the absence of funds to implement the necessary processes to support the required change (Berdahl &

McConnell). The NSF is mitigating this potential resistance to change by funding the ADVANCE effort and providing substantial resources to support these efforts.

Colleges and universities are highly interactive with the external constituencies that comprise their environment because of the nature of the social contract between higher education and society (Gumport, 2001). Higher education generates research, teaches students, and provides service to society in exchange for public resources. American higher education operates within a social context and is consequently both part of and the result of the process of responding and adapting to external political, economic, and social pressures (Berdahl, Altbach, & Gumport, 1999; Chaffee & Tierney, 1988; Kuh & Whitt, 1988). As a key player in the higher education environment, the NSF can promote change efforts in higher education because it provides funds and is a source of prestige for institutions.

Significant cultural change in higher education requires the assistance and persistence of external forces (Duderstadt, 2003; Eckel et al., 1998; Freeland, 2001). In particular, change that involves shifting institutional culture and addressing issues associated with the inclusion of minorities and women requires environmental pressure and the force of external constituents (Freeland).

The ADVANCE change effort operates over a five-year time frame and requires that institutions show change throughout the course of their award as well as construct plans for institutionalizing the change efforts after the grant award has expired. As an external stakeholder that is providing funds for the change effort, the NSF can require that institutions outline aggressive change strategies and can then hold institutions accountable for achieving their goals. Because it is external to the institution, and not a part of the day-to-day politics and institutional culture, the NSF can play a significant role in advocating for change and demanding results.

As resistant as higher education may be to change, the role of the NSF as an external stakeholder is strengthened by its prestige and by the funding it provides. For institutional transformation, outsiders can play critical roles in helping organizational members with new approaches and new ways of thinking. The ADVANCE Institutional Transformation grants are awarded to each campus as a Memorandum of Agreement that underscores the expectation of the NSF in collaborating closely with the institution and the mutual interest in implementing the change effort (A. Hogan, personal communication, November 16, 2004). We can expect that institutional leaders and ADVANCE team members engaged in campus change efforts will use the prestige of the NSF to bolster their efforts and gain esteem in the eyes of science and engineering colleagues and leaders at other institutions.

Summary

Institutional transformation is change that targets organizational culture. This review of relevant literature provides a context within which to identify and examine factors associated with transformational change to improve academic cultures for women in engineering and science. Of particular interest in this study are the roles played in organizational change by academic and institutional cultures and the ways they promote and impede institutional transformation. This study examined ADVANCE institutions and the manner in which they implemented voluntary institutional transformation efforts designed to improve gender equity in academic science and engineering fields. Findings from this study expand our knowledge of the strategies used to implement significant institutional change in higher education.

CHAPTER THREE

Methodology

Purpose of the Study

The purpose of this study was to analyze factors associated with institutional transformation efforts designed to improve the academic culture for women faculty members in engineering and sciences fields at ADVANCE institutions. A principal focus of this study was to examine the role of institutional and academic cultures in shaping the successful implementation of a change effort in science and engineering fields. Institutional cultures are the

persistent patterns of norms, values, practices, beliefs, and assumptions that shape the behavior of individuals and groups in a college or university and provide a frame of reference within which to interpret the meaning of events and actions on and off the campus. (Kuh & Whitt, 1988, p. iv)

Campus ADVANCE teams implemented a wide range of initiatives that used a variety of strategies to achieve long-lasting change. Four research questions guided the examination of these change efforts.

Research Questions

1. What policies, processes, and programs designed to improve academic cultures for women faculty members in engineering and science fields were implemented at first and second round NSF ADVANCE institutions?

2. What strategies used by ADVANCE institutions promoted the implementation of policies, processes, and programs designed to improve academic cultures for women faculty members in engineering and science fields? Strategies were the efforts employed by campus ADVANCE teams to implement change efforts.

3. How did other factors, such as the role of the National Science Foundation, impede the implementation of policies, processes, and programs designed to improve academic cultures for women faculty members in engineering and science fields?

4. What does in-depth analysis of two ADVANCE initiatives reveal about the role of institutional and academic cultures in the successful implementation of institutional change in science and engineering fields?

These four questions guided interviews, site visits, and data analysis that examined change efforts designed to promote lasting and transformational change at institutions engaged in improving the climate for women faculty members in academic science and engineering fields. Research questions were examined in two phases of study. Findings from each phase of the study are presented in chapters four and five.

Research questions one, two, and three were examined in phase one of the study. First, participants identified a policy, process, or program designed to improve academic cultures for women in science and engineering fields. Second, participants identified strategies that promoted the implementation of policies, processes, and programs. Third, participants identified factors that impeded the implementation of policies, processes, and programs. Research question four was examined in phase two of the study.

Individual telephone interviews were conducted with 35 Co-PIs, faculty members, and administrators responsible for the implementation of change initiatives at 18 ADVANCE institutions. These interviews were conducted with a co-investigator and, in addition to being analyzed for questions associated with this study, data were analyzed by other investigators for use in a national study endorsed by the first and second-round ADVANCE institutions. Partnering with the national study for the first phase of this research was essential to gaining

access to participants at the full complement of ADVANCE institutions. Participants were eager to contribute to a study that they felt would benefit their own efforts, but were cautious about committing too much time to participating in the study and over-extending members of their ADVANCE teams. Findings from these data are presented in chapter four.

In phase two of the study, site visits were conducted at two first-round ADVANCE institutions. These institutions implemented change efforts designed to improve faculty recruitment processes that provided an opportunity to examine research question four. Site visits were conducted to examine how institutional culture shaped the design and implementation of faculty search processes designed to increase the number of women hired into science and engineering fields. Findings from these data are presented in chapter five.

The NSF ADVANCE initiative uses the word *transformation* in the title of the grant program to describe the type of institutional change desired as a result of grant initiatives. In phase one of the study, the word *lasting* was used to prompt the participants to describe the degree to which they believed the initiative they had selected to discuss would result in significant change at their institution. The relatively short three and four year time frame within which these campus ADVANCE teams had implemented their change efforts precluded their ability to know whether the institution had been *transformed* due to the implementation of the ADVANCE efforts.

Participating Institutions

In 2001, the NSF funded nine institutions in the first round of the ADVANCE Institutional Transformation grant program and, in 2002, the NSF funded 10 institutions in the second round. At the time of this study, campus ADVANCE programs were either in their third or fourth year of implementing change efforts at their institutions.

The first round institutions were: The Georgia Institute of Technology; New Mexico State University; The University of Washington; The University of Puerto Rico, Humaçao; The University of Colorado, Boulder; The University of Michigan, Ann Arbor; The University of Wisconsin-Madison; The University of California-Irvine; and Hunter College. The second round institutions were: Case Western Reserve University, Columbia University, Kansas State University, University of Alabama-Birmingham, University of Texas-El Paso, Utah State University, University of Rhode Island, University of Montana, University of Maryland-Baltimore County, and Virginia Polytechnic Institute and State University. When reporting findings from this study, a pseudonym was assigned to and used for each participating institution.

Study Phase One: Interviews with Co-PIs, Key Faculty Members, and Administrators

A telephone conversation with the national grant administrator assisted in gaining endorsement for the study and in identifying study participants that had made progress on their proposed grant initiatives. The national grant administrator provided project history and context, information on national and institutional ADVANCE accomplishments, and helped identify ADVANCE project directors who could provide access to individuals involved in implementing grants on their campus.

Participants

Co-PIs from all 19 first and second round ADVANCE institutions were invited to participate in telephone interviews for this study. Co-PIs were asked to identify additional key faculty members and administrators who had served in a leadership role and could provide information about the change initiatives at their institutions.

All 19 ADVANCE institutions were randomly assigned, in two groups, to the two investigators. An introductory email was sent to Co-PIs by the investigator who was going to conduct the interview outlining the purpose of the study, inviting participation, and requesting times for scheduling the telephone interview (See Appendix A). Follow-up correspondence provided participants with IRB-approved consent forms, which were signed and returned to the investigator prior to the interview (See Appendix B).

Interviews

Co-investigators conducted one to two-hour individual telephone interviews with one to three Co-PIs and leaders at each participating institution using a semi-structured interview protocol (See Appendix C). The interview protocol was designed by the investigators responsible for leading the national benchmarking study and implemented by the two investigators conducting the individual telephone interviews. Research questions one, two, and three were used to guide the interview in which asked participants to initiatives implemented, strategies employed to implement the initiatives, and factors that impacted the implementation of initiatives. Research questions guided also data analysis and coding subsequent to the completion of verbatim field notes.

After a brief introduction, the interview protocol contained three questions:

This interview consists of questions about your experiences with the ADVANCE program at your institution. Specifically, I will be asking you about three aspects of your efforts to create lasting change at the level of the department, the college, or the institution as a whole:

1. things you tried that worked,
2. things you tried that did not work, and
3. things you tried, and that produced something that surprised you.

Interviews occurred over a three month period in the summer and early fall of 2005. Investigators agreed not to tape the interviews to diminish possible concerns with confidentiality by participants. Investigators took thorough notes during the course of the interviews and, whenever possible, took verbatim notes so that direct quotes could be attributed to the participants when coding and reporting the data. Field notes were prepared by both investigators. Investigators briefly discussed the format for the field notes and agreed to remove any information that would identify a participant. As expected, this resulted in differences in the depth and thoroughness of the field notes. Once the field notes were fleshed out and typed up, they were shared between the investigators. Pseudonyms were used for all institutions and participants.

Study Phase Two: Site Visits

Data collected on change initiatives and strategies during phase one of this study were used to guide the selection of two ADVANCE institutions for site visits. For this study, two institutions were needed at which the culture of the institution was clearly evident in the design and implementation of a key campus ADVANCE initiative. The role of institutional culture in promoting or impeding the implementation of change initiatives, as outlined in research question four, guided data collection during phase two of this study.

Throughout the course of interviews with participants in phase one, five institutions emerged as possible candidates for site visits. Conversations with Co-PIs and reviews of the ADVANCE websites at these institutions helped narrow the selection to two institutions. Web sites, annual and special reports, as well as news releases from both institutions were examined and provided information on change initiatives, organizational structures, results of assessment efforts, and successes. The similarities and contrasts between the two institutions provided a

unique opportunity to examine how each institution shaped a faculty recruitment effort to reflect unique features of their institutional culture.

Both of the institutions selected for site visits were funded in the first round of the ADVANCE grant and were in their fourth year of implementing a faculty recruitment program. At both institutions, the faculty recruitment effort was a central component of the efforts and most ADVANCE institutions. The stated goal of the faculty recruitment program at both institutions was to increase the number of women hired and promoted in engineering and science fields. In addition, the campus ADVANCE team at each institution designed and implemented the faculty recruitment effort using faculty members as recruitment specialists who were trained as leaders and change agents to alter the manner in which their faculty colleagues engaged in search processes. The similarity of the program goal and the use of faculty members as principal leaders in the change effort at both institutions provided an opportunity to compare and contrast the programs and examine the role of institutional culture in the design and implementation of the change initiative.

Additional criteria for selecting the two institutions for site visits included the fact that Co-PIs at both institutions identified their program as contributing to lasting change on their campus. In addition, when interviewing for phase one of this study, Co-PIs from several institutions identified these two programs as models of best practice. Both institutions had willing and cooperative project directors who had the authority to help broker access to participants and pull together individual and group interviews for purposes of the study. In addition, institutions selected for participation were willing to provide written and electronic documents.

Each site visit was conducted over two days in the fall of 2005. The purpose of the site visits was to examine the ADVANCE-initiated faculty recruitment program at each institution. Data were collected during a two-day site visit in which individual and group interviews were conducted with the faculty members who were the leaders and change agents in the faculty recruitment program. Co-PIs, key faculty members, and administrators were also interviewed, as time allowed, to provide supplemental information. IRB-approved informed consent forms were provided to all participants in individual interviews (see Appendix D) and for participants in group interviews (see Appendix E). Pseudonyms were assigned to all participants, and the two institutions, and were used when reporting findings from the site visits.

Interviews were scheduled with all of the faculty recruitment specialists available during the time of the site visit. Interviews were unstructured and lasted anywhere from one to three hours. At Urban University, faculty recruitment specialists were scheduled in 60 and 90 minute blocks of time either individually or in groups of two. At MidWestern University, the available faculty recruitment specialists were interviewed, as a committee, for two hours. Co-PIs at both institutions participated in individual interviews and supplemented the data provided by the faculty recruitment specialists. All interviews were conducted in an unstructured format. All interviews were audio taped and transcribed verbatim by the investigator.

The advantage of having participants discuss the particulars of one program was to provide in-depth description of the varied strategies used at multiple organizational levels to implement the change initiative. Participants discussed the change effort in depth and the focus of the interview provided opportunities to ask questions and probe the role that institutional culture played in the design and implementation of the faculty recruitment effort. The opportunity to experience the culture of the institution was informed by physically being on the

campus, seeing the physical location and layout of spaces, examining documents, and participating in informal as well as formal conversations. Information available on-site included brochures, handouts, and other materials made available in the waiting rooms and libraries of program offices. Accompanying program staff to meetings in departmental offices provided opportunities to witness interactions between ADVANCE staff members and faculty members. Interviews with faculty recruitment specialists, Co-PIs, and key faculty members and administrators were enriched by my first-hand experience of each institution.

Data Analysis

The goal of qualitative data analysis is to identify patterns and ways in which participants make meaning of their experiences to provide insight into the subject being studied (Denzin & Lincoln, 2000). In a manner consistent with qualitative methods, the interview and site visit data from each phase of this study were analyzed using an iterative process. Data were analyzed from extensive field notes collected during the interviews conducted with participants in phase one of this study. Data from phase two of the study were analyzed from verbatim transcriptions of interviews conducted during the site visits.

Data were coded using both inductive and deductive processes. A deductive process was employed on field notes and interview transcripts using codes developed from the study's research questions and literature on cultural models of organizational change. Codes included outcomes such as policies, processes, and programs, and also included strategies that impeded the implementation of change initiatives. Data were coded for ways in which institutional cultures promoted and impeded the implementation of efforts, and for the role of other factors identified as significant by study participants. A constant, iterative, and inductive process of review of field notes and interview transcripts identified themes that emerged beyond the scope

of the specific factors outlined in the research questions. These codes related to some of the unique features of the ADVANCE change initiative such as how the gender equity agenda influences specific strategies such as the selection of men to make presentations to their male colleagues regarding the value of increasing the number of women faculty members in their department.

Excel spreadsheets were used to organize data from field notes and interview transcripts. Quotes and key phrases were captured along with the corresponding code. A spreadsheet was created for each research question and for each code supported by quotes from participants.

Research question one asked participants to identify policies, processes, and programs implemented to create lasting institutional change. Data were examined for specific examples of initiatives implemented by participants and coded accordingly. Codes generated for institutional policies were: policy family friendly, policy dual career, and policy general. Codes generated for departmental processes were: departmental climate support, departmental recruitment and hiring. Codes developed to describe programs included: chair or department head training, faculty development mentoring, faculty development networking, and faculty development training. These codes were collapsed into the categories that are used in the tables in chapter four.

The second research question examined the strategies employed by participants to promote lasting institutional change. Strategies were identified with the following codes: persuasion education, persuasion engaged leadership, persuasion faculty-to-faculty, persuasion one-on-one. In the later stages of analysis, these codes were collapsed under the category communication. A second group of codes identified the position and role of leaders who were instrumental to the project (chancellor or president, administrative or faculty project leaders, etc.). These codes were combined into a leadership category. The third research question addressed factors that impeded

the implementation of change initiatives. Only two codes emerged for this question (NSF narrow focus and gender).

Data and codes were sorted using the Excel data sort function which provided the opportunity to analyze data in numerous ways. For example, codes could be sorted by institution, by participant, and by research question. Codes could also be numerically tabulated and resulted, for example, in identifying the number of times a particular code was mentioned by a participant.

Major codes emerged that captured initiatives implemented at various institutional and individual levels. Codes described institutional policies such as efforts to establish or improve family-friendly and dual-career policies, and department-level efforts such as search processes and initiatives to improve department climate. Efforts designed to target individuals included faculty mentoring programs and training for department heads and other academic leaders.

Additional codes were used to describe the strategies employed to implement change efforts and these were organized around communication and leadership strategies. Other major codes included preliminary indicators of lasting change such as a measurable increase in the number of women hired into faculty positions in science and engineering departments. Other factors that emerged as codes included gender and the role of the NSF in implementing the campus efforts.

Transcripts from the site visit interviews were analyzed and coded for themes related to how the culture of the institution shaped the faculty recruitment program. Research question four examines the role of institutional culture, and data from site visit interviews was coded accordingly. For example, participant responses that described the manner in which they persuaded their peers of the value of the change effort were coded according to the type of

information the change agent employed to be persuasive. Themes were identified and added as data were analyzed using a constant comparison method (Ryan & Bernard, 2000).

Trustworthiness

In qualitative research the words trustworthiness and authenticity are used to replace the concepts of internal and external validity from the quantitative tradition (Denzin & Lincoln, 2000). “Validity in qualitative research has to do with description and explanation and whether or not the explanation fits the description” (Janesick, 2000, p. 393). Two methods for establishing trustworthiness in case study research are triangulation and member checking (Stake, 1995).

Triangulation

Triangulation is a process of protocols the researcher can use “to gain the needed confirmation, to increase credence in the interpretation, [and] to demonstrate commonality of an assertion” (Stake, 1995, p. 112). This study employs data source triangulation, methodological triangulation, and investigator triangulation.

Data source triangulation involves seeing if what is observed, “carries the same meaning when found under different circumstances” (Stake, 1995, p. 113). The data from this study were subjected to triangulation from the outset of data collection. Paper and on-line documents were examined and questions were explored with study participants. In addition, interview data were screened for “dubious and contested description, data critical to an assertion, [and] key interpretations” (Stake, p. 112). These types of data were identified for triangulation with study participants and related documents.

Methodological triangulation increases confidence by reviewing data using different methods such as observation, interview, or document review (Stake, 1995). Every effort was made to triangulate data through observation, interviews, and the review of documents.

Documents, written field notes from campus visits, meetings and interviews, interview transcripts, and group interview transcripts were reviewed and examined for consistencies and discrepancies. Consistencies were noted as examples of shared meanings associated with the change effort. Discrepancies were noted and incorporated into subsequent interviews and communication with study participants.

Investigator triangulation requires having experts or researchers with different perspectives view the phenomenon and offer their interpretation (Stake, 1995). Data collected from study participants were reviewed with experts involved in ADVANCE efforts. Experts included the national ADVANCE program director, institutional ADVANCE program directors, assessment coordinators, administrators, and faculty members engaged in institutional change and transformation efforts.

Study Limitations

There are several limitations to this research. First, the scope of responses from each institution interviewed in phase one of the study were limited to one or two Co-PIs or project leaders and did not include interviews with beneficiaries of ADVANCE program efforts or those who are detractors of the ADVANCE efforts on their campus. Interviews with the Co-PIs focused on successes and participants had some difficulty identifying initiatives that had not gone well. Many of the Co-PIs who were interviewed for the study had authored the ADVANCE proposal for their institution and because they were immersed in the project, might not have had the perspective of a critical eye.

Participants had limited ability to discuss the institutional culture within which they were initiating change efforts. They lacked the critical eye of an outsider as well as the vocabulary to identify cultural elements of their own institution. Some participants answered questions about culture with phrases such as “top down” or “grassroots” and several participants articulated an understanding of the governance structure at their institution and its role in decision-making. However, many participants did not have ways to discuss institutional culture and how it manifested itself in the face of their ADVANCE efforts.

All participants in the individual interviews in phase one of this study were female. The limit this places on the study is in the perspectives that male Co-PIs could have brought to the interviews. Their understandings of successes, failures, and surprises as well as the impact of gender and other factors may have been different from their female colleagues. Respondents in interviews conducted during the site visits included about half women and half men at each site.

The programs in this study were in their third or fourth year of completing their ADVANCE grant goals. Within this time frame, it is impossible to determine that changes are long lasting, broad, deep, and truly transformational. Participants provided their best guess as to the prognosis about longevity of the initiatives they had implemented as part of their ADVANCE grant efforts.

While necessary for access to participants, the collaboration with the ADVANCE benchmarking study created several limitations to this study. First, ADVANCE team members at participating institutions had agreed to implement as well as be interviewed for the national benchmarks study. Participants were highly motivated to identify the successes of their ADVANCE program knowing that “best practices” were going to be shared by the campus ADVANCE programs with one another and with the national ADVANCE office. This meant

participants desired to put their best foot forward and focus on successes rather than perceived failures.

Collaborating with the benchmarking study required adjusting the interview questions in phase one of the study and this prevented in-depth exploration of some of the dimensions associated with this research. For example, asking participants questions about institutional culture, the role of gender, and the impact of the NSF were limited to occasions when the participant raised the issue and provided an opportunity to probe.

Collaborating with a co-investigator meant that I did not conduct and transcribe all the interviews in phase one. Field notes for 10 of the interviews were produced by the co-investigator. Analyzing notes written by another researcher limited my ability to review findings for nuances and data related to the specific research questions associated with this study. In addition, the notes provided were, at times, truncated and it was sometimes difficult for me to discern the meaning of statements made by some participants resulting in limited analysis of those interviews.

Data collection was limited to interviews regarding the faculty recruitment processes and did not examine other ADVANCE initiatives implemented at the institution. Site visit interviews were limited in length and time was constrained to interviews with individuals selected by the campus ADVANCE team. While the site visits were designed to highlight successful change interventions, this does not preclude the existence of conflict, dissent, and organizational challenges faced both on the campus and with external stakeholders such as the NSF and others.

CHAPTER FOUR

Interview Findings

Findings presented in this chapter are from 35 interviews conducted with participants from 18 institutions that received NSF ADVANCE Institutional Transformation awards. Findings will be reported in four sections. First, initiatives identified by participants as promoting lasting institutional change will be outlined. Second, leadership and communication strategies used by participants to implement change initiatives will be discussed. Section three will describe factors that impeded the implementation efforts aimed at lasting change. The fourth section will discuss preliminary indicators of lasting change.

As discussed in chapter three, findings emerged from analysis of data collected in interviews conducted by two investigators. At the onset of the interview process, investigators agreed to use consistent terminology when interviewing participants. Participants were asked to describe new structures, policies, or practices designed to create lasting change at the institutional, department, or college level that worked, did not work, and that were surprising. Participants were given the option to describe these new initiatives in the areas of recruitment, retention, advancement, and leadership. It is important to note that participants were guided to select among all their campus ADVANCE initiatives the one or two efforts that they believed contributed to lasting institutional change. Therefore, participants did not describe all the initiatives they believed to be successful that they implemented by their campus ADVANCE team. The findings presented here are limited to the one or two initiatives identified by participants as working to contribute to lasting institutional change, not working to promote lasting change, or that resulted in a surprise.

After the initial four interviews, the investigators decided to ask participants to describe initiatives that contributed to “lasting” change, rather than to ask participants about initiatives aimed at “transformative” change. While the NSF uses the words “institutional transformation” in the title of its grant program, the investigators determined that participants would find it easier to respond to questions with the word “lasting” rather than the word “transformative” for two reasons. First, participants did not have the benefit of having sufficient time pass between the implementation of an initiative and the time of the interview to gauge the transformative nature of the initiative. Second, in the first couple of interviews, the use of the word “transformative” appeared to have a chilling effect on the ability of participants to answer the questions. Participants paused, cautious to identify an initiative as “transformative,” either because they were unclear on the definition of the term, or they had not completed their on-campus assessment processes and felt it was premature to identify an initiative as “transformative.” Using the word “lasting” to describe the impact of a change effort was more comfortable for the participants and did not appear to cause participants pause in responding to questions about their initiatives.

In the context of these findings, the word “transformative” or “transformational” is used when referring to institutional change that is “deep, pervasive, intentional, and long-lasting” (Eckel & Kezar, 2003, p. 27). The words “lasting change” are used when discussing findings from interview data collected from study participants.

Tables 4.1, 4.2, and 4.3 outline the demographic characteristics of interview participants and their institutions.

Table 4.1

Characteristics of Participants (N=35)

Characteristic	n
Sex	
Female	35
Male	0
Role	
Administrator	18
Faculty member	17
Discipline	
Science	16
Social science	9
Humanities	4
Engineering	2
Computer science	2
Unknown	1
Co-principal investigator	
Yes	30
No	5

Table 4.2

Characteristics of Participating Institutions (N=18)

Characteristic	n
ADVANCE grantees	
2001-2002 Round 1 ADVANCE	9
2003-2004 Round 2 ADVANCE	9
Type of Institution	
Public	16
Private	2
Enrollment	
Under 15,000	4
15 – 25, 000	9
25 – 40,000+	5
Land grant institutions	6
Graduate Instruction Carnegie Classification	
Comprehensive Doctoral Med/Vet	11
Doctoral STEM Dominant	4
Other Carnegie Classification	3

Table 4.3

Participating Institutions by Pseudonym

Pseudonym	Enrollments	2000 Carnegie Classification - Graduate Instruction
City U	15-25,000	Comprehensive doctoral with medical/veterinary
Desert U	15,-25,000	Doctoral, STEM dominant
Eastern U	Under 15,000	n/a - Not classified by Carnegie
Geographic U	25-40,000+	Comprehensive doctoral with medical/veterinary
Land Grant U	25-40,000+	Doctoral, STEM dominant
Metro U	15-25,000	Postbaccalaureate comprehensive
Middle West U	15-25,000	Comprehensive doctoral with medical/veterinary
MidWestern U	25-40,000+	Comprehensive doctoral with medical/veterinary
Mountain U	15-25,000	Comprehensive doctoral, no medical/veterinary
Northern U	15-25,000	Comprehensive doctoral, no medical/veterinary
Quad U	Under 15,000	Comprehensive doctoral with medical/veterinary
Regional U	Under 15,000	Doctoral, STEM dominant
Rock U	25-40,000+	Comprehensive doctoral, no medical/veterinary
Snow U	15-25,000	Doctoral, STEM dominant
Southeastern U	15-25,000	Comprehensive doctoral, no medical/veterinary
Tradition U	25-40,000+	Comprehensive doctoral with medical/veterinary
Urban U	15-25,000	Comprehensive doctoral with medical/veterinary
Western U	Under 15,000	Doctoral, professional dominant

Section I: Initiatives Implemented to Promote Lasting Change

Participants described new policies, processes, or programs implemented to create lasting change at the department, college, or institutional level. Most ADVANCE programs simultaneously implemented change initiatives at organizational as well as individual levels. At the institutional level, ADVANCE programs initiated family-friendly and dual-career policies to assist in the recruitment and retention of women faculty members. At the departmental level, ADVANCE programs targeted recruitment and search processes for improvement. At the individual level, training programs helped department heads learn leadership skills, and faculty mentoring programs provided career development. Table 4.4 summarizes the initiatives identified by participants: policies at the institutional level, initiatives designed to improve departmental processes, and professional development programs for individuals.

Table 4.4

Change Initiative and Number of Institutions (N=18)

Initiative	n
Institutional policies	13
Dual-career	7
Family-friendly	6
Departmental processes	13
Faculty search processes	12
Improving departmental climates	7
Individual initiatives	17
Faculty mentoring	14
Department head training	8

Institutional Policies: Dual-Career and Family-Friendly Policies

The single most frequently identified policy change initiative was the implementation of institutional policies that were family-friendly and provided for dual-career hires. Participants from 13 institutions identified dual-career and family-friendly policy initiatives as significant to producing lasting change. A policy is a written statement about a procedure that is implemented uniformly across an institution and requires administrative action to put into practice.

Dual-career policies. Participants from seven institutions highlighted dual-career or partner-hire policies as important to promoting lasting change at their university. The ability of a department to work with a dual-career couple and provide both partners with employment, or assistance to secure employment, strengthens the ability of the department to successfully hire women faculty members. Dual-career policies have a significant impact on the likelihood of successfully hiring a woman in engineering or science because 62% of women scientists and engineers are married to men who are also scientists and engineers, frequently in the same field (Rosser, 2004).

At Northern University, a Co-PI who is an administrator in the social sciences and a specialist in work life and family issues identified the benefit of implementing a dual-career policy. “We are actively creating a dual-career policy for the university. Many of our applicants had dual-career situations and we have to pay a lot of attention to that. ... It is helpful in changing climate and sustaining ADVANCE efforts.”

At Snow University, a social science faculty member in a professional school, who is a Co-PI, described the importance of the implementation of a dual-career policy at her institution.

What has really worked at our institution are the dual-career placements. ... We had deans and others who had no idea that we would take care of a dual-career

hire. We have educated and talked about the issue. ... We hammered out a protocol ... so now dual-career placements are not ad-hoc and involve all the key players.

Developing dual-career policies and protocols elevated the importance of the policy from informal and ad-hoc to formal and institutionalized. ADVANCE institutions benefited from involving campus decision makers in creating and improving dual-career policies and making them accessible to deans, department heads, and faculty members involved in recruiting and hiring candidates.

Family-friendly policies. Participants from six institutions identified family-friendly policies as important to lasting institutional change. Campus ADVANCE programs implemented or enhanced family-friendly policies by providing mechanisms for accommodating child birth, child adoption, elder care, catastrophic illness, or care of a gravely ill family member. At Northern University, an administrator in the social sciences described the importance of ADVANCE assisting the university in providing family leave for faculty members.

ADVANCE has succeeded in helping the university address work life support.

It's very successful and it was the right time. We created a parental leave policy for the university faculty. Six weeks of paid parental leave for men and women.

You also get to use your sick time to care for family and relatives as needed. ...

We're embedding it in a larger policy review, revision, and policy-creation process for other work-life issues.

The existence of family-friendly policies is necessary, but not sufficient, for faculty members to manage the impact of family responsibilities on their careers. Changing attitudes so that faculty members use family-friendly policies without fear of reprisal from colleagues is an

important element of creating and sustaining a hospitable climate. Embedded in the culture of many departments is the belief that taking advantage of family-friendly policies results in diminished productivity and indicates that a faculty member is not serious about her or his research. At Southeastern University, a Co-PI who is an engineer articulated the result of the ADVANCE program's efforts to change attitudes regarding family leave.

The evidence is that we are making progress. ... In promotion and tenure meetings it is now *known* that you don't count the year against them. It's OK to use the modified duties process and it really isn't used against them. There is less bias now.

Changing attitudes towards the use of family-friendly policies was an important step for campus ADVANCE programs. Interventions designed to implement university policies and foster change at the departmental level were important to improving climates for women faculty members. It is at the department level that the lives of faculty members are impacted by the interpretation and implementation of institutional policies and departmental processes.

Departmental Processes: Improving Faculty Searches and Departmental Climates

The implementation of change initiatives at the departmental level was identified by the majority of ADVANCE institutions as important to promoting lasting institutional change. Because the academic department is the professional home for the faculty member and serves as an organizational intermediary through which university and college priorities and policies are interpreted and implemented, ADVANCE institutions developed a variety of initiatives that focused improvement on departmental level processes. Participants from 13 institutions identified interventions at the departmental level as important to promoting lasting change. Departmental processes are defined as procedures and activities shaped by institutional policies

that may vary by department or college, are adopted as practice, and may not require administrative action to enact.

Improving Faculty Searches. Participants from 11 institutions discussed improving faculty search processes as important to lasting institutional change. Faculty search efforts that were designed to intentionally reach out to female applicants increased the number of qualified women in applicant pools and, ultimately, resulted in more women being hired. ADVANCE teams helped search committees develop advertising and marketing procedures to attract women applicants, implemented mechanisms for the review and approval of applicant pools and candidate short lists, funded tenure track hires for women hires, and provided education on unintentional bias for search committee members.

Participants like a Co-PI from MidWestern University who is a social science faculty member reported success in recruitment and hiring.

The initial focus [of the campus ADVANCE team] was on recruitment. We looked at candidate pools and increased the number of women in the pools. ... A metric of success is that the rate of women employed went from 15% in 2001 to 40% this year [2005].

The campus ADVANCE program at Western University has worked with the administration of the university to devote significant resources to faculty recruitment. A science faculty member who is a Co-PI reported:

We have beefed-up the applicant pool and that has been very successful. And hiring has been successful too. ADVANCE supports half of our tenure track hires and the university supports the other half. These hires have been mostly women.

ADVANCE teams improved the recruitment of women faculty members by working closely with department heads and offering ideas for recruiting and providing resources to enhance offers to job candidates. The importance of collaborating with department heads was summed up by a Co-PI who is a science faculty member at Mountain University. “Department heads feel ADVANCE is instrumental in getting new women faculty. Start-up packages were matched at a 1:3 ratio up to 40K. This has made a big difference in the recruitment of women.” Campus ADVANCE programs provided their colleagues with assistance and monetary resources to improve search processes and increase the yield of women hires.

In addition to training and funds, some ADVANCE programs developed educational efforts to address bias in recruitment. Educational programs were developed to raise awareness of unconscious bias and the role that gender schemas play in shaping notions of a job candidate’s merit and qualifications. Success in educating search committees on bias was articulated by a participant from MidWestern University. “It was amazing. ... We had good success with opening colleagues’ eyes on things like unconscious bias and gender schemas.” In addition to creating educational programs, some ADVANCE programs worked with their university and implemented oversight processes to ensure the diversity of applicant pools and candidate lists.

Several ADVANCE programs created mechanisms and search procedures that required that the list of candidates produced by a committee be reviewed by the dean’s office or a faculty recruitment specialist trained by the campus ADVANCE team. At Urban University an administrator who is a social scientist and Co-PI discussed the importance of a review process for addressing the existence of bias in faculty searches.

Another surprise is the extent of the existence of a sub-rosa boy’s network. It’s cleverly covered up. ... It’s very easy to target who you want to hire and then you

wind up with that person and you're right where you started. ... [At Urban], no search can go forward without the signature of the [faculty recruitment specialist]. ... [And] before you interview anyone on campus, the [faculty recruitment specialist] and dean have to see your short list and the justification for why the person is on the short list. ... It's hard to do sub-rosa when you're doing that kind of review of the process.

Search processes are how departments and institutions select and invite members into their academic communities. ADVANCE programs worked to improve search processes at their institutions, provided education and logistical and financial support, raised the awareness of unconscious bias, and created mechanisms to ensure that applicant pools and lists of candidates were diverse and included women. In addition to improving search processes, campus ADVANCE programs developed retention initiatives that improved departmental climates.

Improving departmental climates. In addition to assisting with search processes to hire more women into science and engineering departments, ADVANCE programs created retention initiatives to improve academic climates and make departments more hospitable for women. Programs implemented to improve departmental climates included creating and funding professional development workshops, funding collaborative, cross-disciplinary research ventures among departments, and hiring consultants to work with department faculty to strengthen communication, address bias, and facilitate department improvement plans.

Improving departmental climates was discussed by participants at seven institutions as important to lasting change. An administrator at Northern University, who is a social scientist, described the importance of climate improvement efforts to lasting change.

Climate change is the key to the sustainability of all our ADVANCE efforts. It has worked well to create a series of climate workshops for departments. We went to over a dozen STEM departments and had full or half-day workshops and follow-ups to talk about climate for women and young faculty in general.

At Snow University, a social science faculty member and Co-PI described the success of their departmental interventions.

The other success we have had is our departmental change efforts. We worked with two sub-disciplines within the same department with senior and junior faculty. ... ADVANCE worked with the department and provided a consultant who conducted interviews and led a retreat. ... [The consultant produced] a summary of what people thought was working, not working, and what needed to be changed. ... The junior faculty had tenure fears because their discipline is so new, and the senior faculty worried that their discipline was disappearing. The retreat, and the willing department head, really built bridges between the two groups.

In addition to their work on institutional policies and departmental processes, ADVANCE teams created a variety of mentoring and leadership programs to educate their campus communities on pertinent issues, support women faculty members, and promote the goals of ADVANCE.

Individual Initiatives: Mentoring and Department Head Training

Participants from 17 institutions discussed initiatives implemented to support and promote the professional advancement of individuals as efforts that were important to promoting lasting change. The majority of campus ADVANCE programs engaged in mentoring activities

for junior faculty members and also designed training and education programs to support the professional development of department heads, most programs implemented both types of initiatives.

Mentoring. The majority of campus ADVANCE programs developed some form of a mentoring program to support and advance the professional development of faculty members. Mentoring activities included providing guidance on promotion and tenure processes, coaching junior colleagues on applying for grants, and giving people feedback on their scholarly dossiers. Participants at 14 institutions identified faculty mentoring programs as promoting lasting change. These programs provided opportunities for learning, networking, and community-building between and among faculty colleagues. Mentoring programs were designed to build confidence and provide faculty members with career coaching.

Mentoring programs involved activities that engaged junior and senior faculty members in sharing information about their careers and professional advancement. Individual and group mentoring programs invited senior faculty members to coach colleagues who were at earlier stages in their careers. Lecture series showcased the research and accomplishments of junior women faculty members and fostered professional connections on and off campus. Training and support programs were provided to women faculty members that prepared them to accept leadership roles in their departments, colleges, or professional societies.

Some participants described how the mentoring program increased the confidence of faculty members and department chairs. An administrator in the social sciences at Quad University described the impact of mentoring on both faculty members and department chairs.

We see real changes in the women faculty and chairs who are speaking up.

They're not hiding so much and are saying out loud "this isn't right and needs to

be changed.” Two years ago, women were coming in and crying, and saying “don’t tell anyone I came in here.” Now people are coming in and saying “this isn’t right and I want it changed.” Also, now chairs are supporting the women with their requests—for salaries and partner hires and things that improve women’s lives.

Some mentoring programs were designed to strengthen the research skills of junior women faculty members through the use of seed grants. A Co-PI at Snow University, who is a social science faculty member, described the mentoring that occurred as a benefit of providing funds for faculty members to collaborate across disciplines and across faculty ranks.

We instituted a departmental grant effort. Proposals had to include women scientists with national potential and the proposal had to have at least two disciplines represented. ... The 12 we funded really showed integrated collaboration between disciplines and faculty members. ... We saw a significant number of assistant professors included in the grants and it’s a great mentoring process. ... Part of the reason it worked is that people selected to work together along similar research interests.

Mentoring programs were implemented by the majority of campus ADVANCE programs to build the confidence of faculty members and to provide career guidance. In addition to faculty mentoring, department head training programs were developed to address the unique needs of departmental leaders.

Department head training. As part of the goal to create and sustain improved climates for women, many ADVANCE programs developed programs for department heads to support their leadership role and provide them with guidance on creating hospitable climates for women in

their departments. Department heads provide leadership to academic units within colleges and have responsibility for overseeing personnel decisions and implementing departmental policies and procedures. As leaders of academic units, department heads have a central role in recruiting and supporting the professional advancement of their faculty colleagues; they also have significant influence over departmental climate.

Eight participants identified department head training as important for improving the climate and promoting lasting change at their institution. ADVANCE programs provided training for department heads in a series of sessions or in workshops to address the administrative and human resource dimensions of their leadership role. A social scientist and faculty member who is Co-PI at Geographic University described how their program created an interest among their department chairs in improving departmental climates.

What has worked best for us is the group for chairs and the workshop for chairs.

... These guys didn't think they needed any help. ... There has been a transformation: ... more networking and becoming a peer group. ... We now have more chairs presenting to their chair colleagues ... and the focus is on how to make a healthy and good department. One chair talks about it as "chair school" and that the ADVANCE staff member is a "chairapist."

ADVANCE programs that provided department head training reported that the training improved climates because department heads had the opportunity to learn how to lead their units and implement best practices for supporting the career advancement of all of their faculty members. At Tradition University, a Co-PI who is a life scientist attributed the improvement in departmental climate to their department chair training program.

Our biggest success is the department chair climate training program. The chair training is really global on campus and will affect all departments, not just STEM.

... The reports back to institutional leadership are that the changes in departments are attributed to the training. We will see more change the more chairs we train.

Participants reported that department head training promoted lasting change by providing education on best practices that improve departmental climates for women. Additionally, department heads and chairs discovered the benefit of networking with one another and sharing institutional information and departmental best practices.

Section II: Leadership and Communication Strategies used to Implement Change Initiatives

ADVANCE programs engaged in a variety of strategies to persuade university constituencies to support grant goals and to communicate the benefits of the new policies, processes, and programs at their institution. Strategies that emerged from participant interviews were organized into two key themes. First, university leaders and respected faculty members were identified as individuals with the ability to influence opinion, persuade colleagues, and garner support for the ADVANCE change efforts. Second, education programs and carefully crafted communication messages were used by institutional leaders, faculty members, and campus ADVANCE teams to persuade their colleagues of the value of the ADVANCE goals.

Table 4.5 outlines the strategies used by ADVANCE teams.

Table 4.5

Strategies and Number of Institutions (N=18)

Strategy	n
Leadership	
Institutional leaders	12
Senior faculty members	6
Education and communication	
Education on bias	5
Strategic communication	5

Leadership: Institutional Leaders and Senior Faculty Members

Institutional leaders. Participants at 12 institutions discussed the importance of senior university administrators in communicating the importance of ADVANCE efforts. Presidents, chancellors, provosts, vice presidents, and deans created an environment that supported the goals of ADVANCE by communicating frequently about the educational value of diversity and the productivity possible in supportive college and department climates and by expressing support for the goals of ADVANCE. Senior administrators communicated and modeled institutional values and norms by articulating their commitment verbally in formal and informal settings and by underscoring the importance of ADVANCE endeavors. A co-PI from Snow University, who is a faculty member in a professional school, captured what many participants expressed about the important role university leaders play in supporting ADVANCE. “The leadership of the administration matters. Central leadership from the top is crucial. It’s amazing how much difference this makes—what the president says and does.”

The ability of leaders to generate interest and persuade people to be involved in change efforts was described by a Co-PI from MidWestern University.

Leadership is very important. They talk about it—[ADVANCE is] part of the official public discourse. People will get involved if they think it matters to the leadership. The informal conversations are what matter as well as the formal ones.

In addition to articulating their support and encouraging others to embrace change, institutional leaders assisted in implementing changes at the institutional level. Leaders who were involved in the efforts of their campus ADVANCE team, and to whom ADVANCE team members had access, were instrumental in achieving lasting change. A Co-PI from Urban University explained the value of access to university leaders by members of their ADVANCE team.

The way we structured the original grant proposal contributes to our success. It has helped to have a dean, and higher, involved. It provides access to procedures and other things that happen, and then you are not asking them for things from the outside. ... We have more access ... and these leaders have been absolutely key for ADVANCE and our efforts.

Being supportive of the ADVANCE efforts included having university leaders hold units accountable for progress on ADVANCE-related goals. Several participants described how provosts and deans monitored progress and improvements of ADVANCE initiatives within the departments and colleges. A Co-PI from Snow University described how academic leaders were held accountable for implementing departmental climate improvement efforts.

We have the provost involved in discussions and workshops with the deans who can then discuss with the department heads and then we'll involve the provost

again. So, each area will have a follow-up plan from the dean to the department head and then to the provost. This builds in accountability and sustainability at each step of the way—including resources and money.

Senior university administrators with influence such as presidents, chancellors, provosts, and deans served as spokespeople for the ADVANCE efforts, engendered enthusiasm, and secured resources to promote lasting change on their campus.

Senior faculty members. In addition to institutional leaders, the importance of respected faculty members as ambassadors for ADVANCE goals was discussed by participants from six institutions. Faculty members who had the respect of their colleagues had influence and persuaded their colleagues to employ best practices and pursue a new course of action. These faculty members tended to be tenured faculty members who had been at the institution for some time. Faculty members were frequently leaders in their professional societies and many of them were members of national academies. Many of these faculty leaders had chaired search committees and had served as leaders in their departments and colleges. ADVANCE teams benefited from the involvement of respected faculty members in faculty development programs, recruitment efforts, and in persuading colleagues to approve and implement new policies.

In some ADVANCE projects, faculty members worked closely with search committees to improve recruiting practices, including how to implement improved search processes, how to screen applicants, and how to engage candidates in successful campus visits. A Co-PI from MidWestern university expressed the value of employing faculty members in persuading their colleagues to change search processes.

The faculty model, outside of administration, is key to institutional transformation. Faculty-to-faculty work is faster ... [faculty recruitment

specialists] are full professors, senior faculty, who are well respected in science and engineering. This is key. ... What has helped is that it is a peer-to-peer training with and from the faculty.

A Co-PI from Urban University described the impact of using senior faculty members to educate search committee members on the problem of bias.

Presentations done by our faculty to search committees are important to comment on. They visit all search committees, they get readings and a pamphlet in addition to a presentation on bias and on good search processes. Because the committee hears their colleagues, senior women and men who are their peers, they *get* the literature on bias and share data on pipeline and job placement. It's a grassroots effort that works. It's not the dean or department head, but a colleague who is telling them how to do the search.

Campus ADVANCE teams used carefully selected and trained faculty members to raise consciousness among their colleagues and to promote the implementation of proactive recruitment strategies designed to diversify hiring pools. The choice of faculty members as ambassadors for the ADVANCE program helped promote lasting change. This particular strategy is the subject of additional discussion in chapter five.

Education and Communication

To create change, ADVANCE institutions used effective communication strategies targeted to an array of audiences and employed a variety of individuals and methods to address diverse constituencies. Several ADVANCE programs designed education efforts aimed at raising the awareness of unconscious bias. In addition, ADVANCE programs carefully crafted a variety of messages about the goals of ADVANCE to reach diverse audiences. Communication

strategies employed to persuade colleagues to implement or embrace change benefited from reflecting the cultural values and norms of the institution.

Education on bias. ADVANCE teams implemented education programs designed for search committee members and members of tenure and promotion committees. The purpose of the education was to raise awareness and to encourage individuals to change their behavior and institute procedures and policies that mitigated the impact of unconscious bias on women seeking employment, tenure, and promotion. A Co-PI from City University described the power of educating her colleagues on unconscious bias using an article that describes unconscious bias in letters of recommendation for medical faculty members.

I was surprised by the impact of the unconscious bias literature. ... I circulated the *Color of Glass* article and the whole committee got together and re-made their short list. ... The committee *got* it. They're going to re-visit how they do searches in the future.

Educating committees responsible for tenure and promotion decisions on the problem of unconscious bias had positive results. A Co-PI at Southeastern University described the impact and persuasiveness of bias education on members of several promotion and tenure committees.

We did lots of training for P&T committee members on bias before they got to real cases of P&T. ... At the first meeting, we have a discussion of at least two cases presented in a training tool before they discuss the real cases. This works because committee members are not emotionally attached to the cases. ... So issues have been brought out and we're better able to deal with it. It makes the committee stronger and raises awareness. They behave better.

Educating campus constituencies on the impact of unconscious bias on employment, tenure, and promotion decisions was an effective strategy for promoting lasting change. It promoted change at the individual level by raising consciousness of inequities. Another strategy used to promote the goals of ADVANCE was to communicate with a variety of different constituencies using language and messages tailored for particular audiences.

Strategic communication. A second strategy used to promote lasting change was to communicate the goals of the ADVANCE grant by using language in a variety of ways to highlight a particular focus of the change effort. Identified as “spin” by five participants, it involved accommodating an audience by strategically choosing language the audience would find palatable and encourage them to support the goals of ADVANCE.

ADVANCE teams calculated how best to communicate the need for and benefits of change efforts. This required knowledge of both the audience and the culture of the institution. In being intentional about how they communicated the goals of ADVANCE, participants such as a Co-PI at Western University described how her campus ADVANCE team strategically chose to avoid a focus on women and chose to communicate how ADVANCE achieves broad diversity goals. “[The] ‘spin’ is really important. We make sure we tell them that we are assisting the university to meet the diversity goals it has always had.” Other Co-PIs echoed the need to carefully craft messages about the goals of ADVANCE. At Snow University, a Co-PI described the department climate improvement efforts and how they convinced the faculty to participate. “The department head is supportive and we get gender in the back door. We work on [gender] equity by making it ALL better. We’ve had little backlash because of this.”

At Rock University, a scientist who is a Co-PI described the need to adjust the message about the goals of ADVANCE to garner the support of the new president of the institution. She

stated, “I coach people on what administrators and faculty want to hear. Our new president will require new arguments. That [our goals are] about workforce competitiveness and not justice and fairness.” These statements are indicative of the manner in which leaders of ADVANCE teams calculated the use of language to communicate effectively with their target audiences.

Successful communication strategies reflected institutional values and generated interest in the goals of ADVANCE and an investment in supporting the change efforts. Using influential individuals as ambassadors and crafting messages that spoke to the values of important stakeholders generated support for change efforts that were believed to benefit the entire university.

The previous two sections of this chapter have outlined initiatives and strategies that participants identified as promoting lasting change at their institution. This next section identifies two factors that participants described as being a challenge to fully implementing their ADVANCE efforts.

Section III: Factors that Impede Lasting Change: Gender Dynamics and Grant Restrictions

Participants were asked to discuss ADVANCE initiatives that did not work in their efforts to promote lasting change. Two factors, gender dynamics and restrictions placed on the populations to be served by the ADVANCE grant, were identified by participants. These factors generated challenges to the successful implementation of campus ADVANCE initiatives. Table 4.6 outlines the factors that impeded lasting change.

Table 4.6

Factors and Number of Institutions (N=18)

Factor	n
Gender	11
NSF and grant restrictions	8

Gender Dynamics

The NSF ADVANCE Institutional Transformation grant program is explicit in its goal to improve academic cultures for women faculty members in engineering and science fields. No participant mentioned how the focus on women by the ADVANCE grant *promoted* lasting change. However, participants from 11 institutions described ways in which the focus on gender *impeded* implementing change initiatives at their institution.

Participants from five institutions described how ADVANCE-related efforts were perceived by constituencies on their campus as unfairly advantaging women. A Co-PI at Snow University discussed the concerns she had heard on her campus about the focus of the grant on women. “We have pockets that are not supportive of women. ... [We] got private expressions of concerns about women getting extra and special attention and resources.” At Middle West University, a Co-PI who is a scientist described the resistance to unfairly advantaging women as a fear of feminizing the department.

The resistance came from a fear of looking like they were doing too much for women, a fear of feminizing the department or discipline. ... There is variability of leadership and buy-in sometimes from senior faculty. They wonder if this will advantage women.

Participants mentioned unexpected resistance to ADVANCE efforts from some women faculty members who perceived that the efforts of the grant excluded them or promoted financial or other resource discrepancies between junior and senior women faculty members. A Co-PI from Urban University expressed surprise at the resistance from senior women to the goals of ADVANCE. “One bad surprise ... is that the biggest backlash we have gotten is from women, mostly senior women. They feel we are not doing enough, that their life has not changed.”

Other participants described the absence of male faculty members in ADVANCE initiatives as a challenge to their success. An administrator at Tradition University expressed the difficulty of getting men involved in ADVANCE as impeding the goals of the grant. “The difficult thing is reaching men. ... Most men are not coming to anything [sponsored by ADVANCE] and feel no connection. ... It’s very difficult to get men involved.” The gendered aspects of the ADVANCE grant challenged institutions to come up with ways to prevent the focus on women from being an impediment to the success of the grant.

Gender dynamics played themselves out in multiple ways. A scientist and Co-PI at Rural University described how the ADVANCE team on her campus was challenged by the perception that there was “reverse” discrimination at her university.

I’ve been surprised at hearing how some people talk about women at the university. I’m surprised by the strength of the attitude that we have a lot of reverse discrimination going on—that people think that. It’s difficult to convince people that women are still discriminated against. ... Attitudes are not very liberal, especially when it comes to gender.

Campus ADVANCE programs responded to resistance and criticism in a variety of ways. One way, discussed under communication strategies, was to craft communications about the

goals of the ADVANCE program to avoid the focus on women and to “speak” to a variety of constituencies. Campus ADVANCE programs articulated their goals as being beneficial for everyone. Another way in which campus ADVANCE programs addressed resistance was to expand programs to include women and men and to invite men to serve as ambassadors for the goals of the program. A Co-PI from Southeastern University stated, “The provost has appointed male faculty members to roles important to the success of ADVANCE. Key male faculty members serve as cheerleaders and ambassadors. This has been another reason for our success.”

The NSF and Grant Restrictions

Participants from eight institutions discussed the ways in which the scope of the ADVANCE grant limited their ability to initiate lasting change. Participants mentioned wanting to address issues unique to racial and ethnic minority faculty members and feeling constrained by the limits of the grant and the expectations of the NSF. A Co-PI at Urban University described wanting to amplify the benefits of the grant to include minority faculty members and having this be denied by the granting agency.

One surprise related to the NSF is whether we can extend best practices into the area of ethnicity. For example ... we have three [faculty recruitment specialists trained] to help with the hiring processes for minorities. ADVANCE said we couldn't pay for it—this was a real surprise, and we did it anyway. There's less influence [for the campus grant], because it's on a smaller scope.

ADVANCE teams struggled to balance implementing wide-reaching changes that benefited all members of the university community with the emphasis by ADVANCE on women faculty members in engineering in science fields. A Co-PI from Southeastern University described constituents that felt excluded by the limits of the grant.

Some groups on our campus that are not NSF funded feel left out. Others that feel left out are non-tenure track faculty and graduate students, research scientists, and staff people. Because we targeted tenured and tenure track women ... our modified duties policy doesn't include those constituencies. We may have been able to do something different—I'm not sure what. We tried to be open to everyone.

Constituencies that perceived that they did not benefit from ADVANCE efforts included faculty women already employed at the institution who felt that an emphasis on recruitment efforts neglected them, mid-career faculty women, male faculty members, female and male graduate students, non tenure track women, research scientists, and instructors.

Overall, participants discussed the benefits of the grant efforts and expressed hope in the lasting impact of the ADVANCE efforts on their campus. From the interview data, five preliminary indicators of lasting change emerged.

Section IV: Five Preliminary Indicators of Institutional Change

In their descriptions of policies and programs that worked and did not work to promote lasting change, participants made reference to a number of indicators that reflected lasting institutional change. Participants discussed conditions they perceived necessary for sustaining change efforts that would result in improved academic climates for women faculty in engineering and science fields. Table 4.6 outlines these five preliminary indicators of lasting change.

Table 4.7

Preliminary Indicators and Number of Institutions (N=18)

Indicator	n
Increased number of women in science and engineering fields	15
Awareness of equity issues	12
Involvement of diverse constituencies	12
Committed senior administrative and faculty leadership	11
Institutionalization	11

Increased Number of Women in Science and Engineering Fields

Participants at 15 institutions identified a measurable increase in the number of women who were applicants, hired, and promoted in science and engineering fields as an indicator of success for their campus ADVANCE program and as contributing to lasting change. Participants believed the increase of women faculty members in science and engineering fields contributed to lasting change by diversifying the faculty profile and contributing to the ability of departments to recruit women. In addition, it was assumed that an increase in the number of women faculty members would change departmental practices that inhibited or excluded women, thus resulting in improved academic climates. A Co-PI at Southeastern University attributed the increase in women faculty members to the success of their ADVANCE grant. “When we started, there were only 13 or 18 ... full professors at our institution. Now there are 54! The ADVANCE grant made it possible for us to do this kind of thing in five years instead of in 10.”

In addition to increasing the number of women faculty members in departments, participants discussed the assumption that having women sit on committees and hold decision making positions would promote the expression of diverse ideas and promote the goal of

including more women in all faculty ranks. An administrator at Urban University described the positive impact of adding women to the promotions committee at her university.

Women are changing the face of the promotions committee. Last year there was only one woman, and there are 11 people on the committee. ... Now we have three women, I'm happy to say. ... If you want to see change, you have to change the committee.

For participants, the measurable increase of women in science and engineering fields was a clear indicator of lasting change. As a quantitative measure of success required by the grantor, it is not surprising that increases in women faculty hires emerged as a central indicator of lasting change because programs were required to track these data. Other indicators of lasting change were more difficult to measure however, and the second most frequently identified indicator of lasting change was an increase in the awareness of gender equity issues in academic engineering and science fields.

Awareness of Equity Issues

Participants identified changes in attitudes and improved climates for women as the result of educating their colleagues on issues of equity and unconscious bias. Campus ADVANCE programs implemented efforts designed to raise awareness of the problems of equity for women in science and engineering. Participants from 12 institutions associated these education and consciousness raising efforts with improved climates for women. Participants from seven institutions described the increased awareness of equity issues among university leaders as an indicator of lasting institutional change. Participants from five institutions reported that lasting institutional change was evidenced by improved attitudes by colleagues towards the use of

family-friendly policies or improved attitudes towards women in searches, promotion, and tenure.

In some cases, engaging faculty colleagues and administrators in discussions about bias resulted in improving departmental climate. A Co-PI at Urban University pointed to a change in climate when she observed, “the administration has changed the way we do business and has changed attitudes especially towards equity and diversity.” Education can improve departmental and university climates by raising the consciousness of faculty members who value fairness, are unaware of the impact of unconscious bias on their behavior, and make changes in the ways they approach departmental business such as the use of family-friendly policies, conducting faculty searches, and promotion and tenure decisions.

Climate changes are indicated by changes in practices and behaviors, such as an increase in the number of women and men taking advantage of family leave policies. A science faculty member at Midwestern University described the increase in the number of faculty members taking advantage of family-friendly policies without reprisal.

The modified duties policy was expanded beyond just a reduction in teaching load. So now it includes a reduction in research or clinical load too. It’s now also for women and for men, which is key in some departments where there is real stigma associated with modified duties. Dads are taking modified duties now.

Changes in climate that are the result of awareness of equity issues benefit all members of the university community. A third indicator of lasting change was the degree to which a wide variety and large number of campus constituents participated in campus ADVANCE programs and change efforts.

Involvement of Diverse Constituencies

Participants from 13 institutions identified the engagement of diverse cross-disciplinary university constituents in the ADVANCE efforts as an indicator of lasting institutional change. Some participants described how they engaged broad participation by including STEM and non-STEM fields in ADVANCE initiatives, being intentional about including men as partners in implementing ADVANCE efforts, and engaging the university community in ADVANCE programs.

STEM and non-STEM fields. Some ADVANCE programs intentionally included a variety of individuals and university units as proponents, ambassadors, and beneficiaries of ADVANCE related efforts. One ADVANCE program increased the investment by colleagues in the sustainability of their change efforts by reaching beyond STEM departments to engage faculty, staff, and students from a variety of disciplines in the ADVANCE program. From the outset of the grant program, Urban University implemented their change efforts in all the colleges across the university. For Urban University, as the Co-PI described, engaging the whole university in their change efforts was important to success and the sustainability of the ADVANCE goals.

Our original application said we were going to work with the schools eligible for NSF funding. The administration wound up including the humanities and arts and other colleges that are not eligible for NSF funding. Therefore we have seamless coverage across the campus.

A Co-PI from Regional University described the positive effects of STEM and non-STEM department participation in the use of diversity plans for faculty searches.

Each search must have a written diversity plan that includes advertising, where you're going to recruit, etc. This plan goes to the dean's office before the search is

initiated. This is for the whole university and not just STEM areas. It started at the time of the grant ... and this has had very positive effects.

Involving STEM and non-STEM departments in the benefits of the ADVANCE program was a strategy employed by campuses to increase the involvement of university constituents in change efforts. Another strategy was to be intentional about including male colleagues in implementing ADVANCE-related initiatives.

Including men. Several participants described the ways in which male colleagues were important to the ADVANCE efforts. Inviting male faculty colleagues to participate on ADVANCE-related committees and to engage their female and male colleagues in educational and training programs was a strategy some institutions used to broaden the appeal of the change effort. A co-PI from Southeastern University expressed the value of certain male leaders as “cheerleaders and ambassadors.”

The provost has appointed male faculty members to roles [that are] important to the success of ADVANCE. Key male faculty members serve as cheerleaders and ambassadors. This has been another reason for our success.

A Co-PI from Tradition University described the importance of the involvement of men in communicating the benefits of ADVANCE to their male colleagues.

Male leaders are playing an incredibly important role in institutional transformation. We’ve had amazing leadership from the provost and chancellor, probably crucial in affecting reception and institutionalization ... use of the bully pulpit and laying the groundwork.

Intentionally including male colleagues in change efforts was important to reducing resistance and to articulating a goal of excellence for all faculty members, not just female faculty

members. “We try to position what we are doing as being about making it better for everyone, not just women” (Co-PI, Regional University). Another participant expressed the value of including men and women in the benefits of a change effort this way: “Men and women are mentoring men and women. We’re educating everyone on change and leadership. It’s more inclusive and turns out to be a coup” (Co-PI, Mountain University).

University-wide participation. ADVANCE teams invited diverse university constituencies to be involved by engaging the campus community in speakers, events, and educational programs at which the goals of ADVANCE were discussed. The benefit of broad involvement was described by a Co-PI at Eastern University.

[W]e invite people from different departments and organizations within the university to ADVANCE programs. We get lots of people involved and keep them knowledgeable about ADVANCE. [It] keeps the whole university engaged with what’s going on. ... Bringing different folks together to support and discuss the issues and plans is an important strategy; ... they understand the problems better.

Another means to encourage the university community in participating in ADVANCE was to use town hall meetings open to all university members to discuss ADVANCE research and initiatives. Others used focus groups and university-wide committees with faculty, staff, and student representatives to lead policy changes and education efforts. Climate surveys and salary equity studies were conducted that included all departments, faculty members from all ranks, and staff. A Co-PI from Southeastern University described how getting broad feedback on ADVANCE programs benefited them: “We created a forum to discuss things and ADVANCE asked for people’s recommendations. We get lots of input from all levels and from all different

schools. It's not limited to ADVANCE people. ... We got better recommendations because of it."

Participants described the involvement of diverse university constituents in strengthening the support and enthusiasm for the campus ADVANCE efforts. This broad involvement helped to support institutionalization efforts.

Committed Senior Administrative and Faculty Leadership

In addition to being a strategy for implementing lasting change as discussed earlier in this chapter, participants from eleven institutions identified the importance of senior administrative and faculty leadership as a preliminary indicator of lasting institutional change. Participants from seven institutions discussed how senior administrative leaders were directly involved in the implementation of successful ADVANCE change efforts. Presidents, chancellors, provosts, and deans were mentioned most frequently as the university leaders most influential and important to supporting and sponsoring efforts to change the campus climate. A faculty member and Co-PI from Tradition University expressed the sentiments of many participants about the power of leaders to implement change.

We benefit from amazing leadership from our provost and chancellor. It's crucial in affecting the reception of our efforts and for institutionalization. They simply took the programs and said they would be done. They use the bully pulpit and lay the groundwork...the provost says there are climate issues in every department in the university and there are no exceptions...it's an outstanding lesson in the power of leadership.

As communicators and people with access to resources, senior leaders are important for

advancing institutional change. One of the roles leaders play is to assist in implementing changes at the policy and structural levels. Routing changes through governance and administrative processes requires the endorsement of leaders, as does the commitment to secure a policy or structural change effort by making it a permanent part of the organization's structures.

In addition to administrative leadership, participants discussed the manner in which the leadership of key faculty members was important to creating lasting change. Faculty members as leaders and change agents in a specific type of ADVANCE initiative is discussed in chapter five.

Institutionalization

Participants from 11 institutions identified the adoption of department, college, and university level policies such as family-friendly and dual-career policies and the creation of structures such as administrative positions as a key indicator of lasting change. The creation of institutional policies and structures that are permanent and designed to last beyond the NSF ADVANCE funding were important to creating lasting change. Securing resources to continue the change efforts initiated by ADVANCE was a clear indication that the university was committed to sustaining lasting institutional change.

Lasting changes institutionalized by the efforts of ADVANCE teams are tied to the degree to whether the ADVANCE team identified and addressed a valued institutional need. A Co-PI at Metro University described the significance of the ADVANCE program assisting in systematizing the collection and dissemination of data collection at her institution and, as a consequence, increased their competitiveness for external funding.

One area of success has been the institutionalizing of benchmarks both at the college and institutional levels. This is a big deal. ... Data is different in different offices like human resources, institutional research (IR), the deans' and provost's

offices. We had to identify the right databases and help people clean them up, enter data, and fix obvious mistakes. ... IR now handles it, and they will continue it after the NSF support stops. ... We persuaded the presidents of the college and institution to do this system-wide and it makes us more competitive for grants because we have the data to document ourselves. ... That's a real success.

In addition to institutionalizing structures, a Co-PI at Rock University described the importance of creating an administrative position focused on continuing the ADVANCE efforts.

The Co-PI has gone out of her way to make some permanent changes. For example, [the administration] has agreed to keep one position funded connected to the ADVANCE project grant. Because it is focused on long term change, I feel it will really have made a difference; ... one change leads to another.

Institutionalizing changes created by the ADVANCE programs is an indicator of the commitment of the institution to lasting change. All five preliminary indicators of lasting change were identified by participants as necessary for improving the climates for women in engineering and science on their campus.

The five preliminary indicators of lasting change describe ways that the ADVANCE teams found to secure resources to permanently embed policies and structures into the culture and practices of their institutions. Securing lasting change in the academic climates for women in engineering and science required sustaining the progress made by ADVANCE programs past the life of the funding.

Summary

Transformative change requires multiple strategies designed to alter organizational culture and that intervene at a variety of individual and organizational levels. ADVANCE teams

developed initiatives at institutional, departmental, and individual levels and engaged administrative and faculty leaders in communication strategies designed to educate the campus on the problem of bias and how the value of diversity benefits all members of the university community. The chance that these efforts will result in institutional transformation for women in engineering and science fields depends on the degree to which changes are deep, pervasive, and last over time.

The preliminary indicators of lasting change expressed by ADVANCE team members are consistent with the conditions necessary for creating organizational change. Increases in the number of women employed in academic science and engineering fields, an awareness of equity issues, involvement of diverse constituencies in change efforts, the involvement of committed senior administrative and faculty leadership, and the institutionalization of changes are necessary for change that alters institutional culture. Change efforts were implemented by campus ADVANCE programs in concert with multiple initiatives. While not all initiatives were successful, it is likely that the impact of the ADVANCE change efforts was strengthened by the implementation of multiple initiatives at the institutional, college, and individual levels. While many of the ADVANCE initiatives are worthy of attention, the faculty recruitment process was of central importance to the change efforts at two institutions and provided an opportunity to examine the important role of institutional and academic cultures in shaping transformative change. Chapter five analyzes the role of institutional culture in two ADVANCE-initiated faculty recruitment programs.

CHAPTER FIVE

Site Visit Findings

This chapter presents analyses of two ADVANCE initiatives that reveal the role of institutional and academic cultures in the successful implementation of institutional change in engineering and science fields. Interviews were conducted with faculty members and administrators during a site visit conducted at two institutions funded in the first round of the ADVANCE grant program. Interview data revealed ways in which institutional culture shaped the design and implementation of a faculty recruitment program at each institution. Findings reveal the strength and importance of institutional culture in shaping change efforts designed to increase the number of women hired into tenured faculty positions in engineering and science fields.

First, the criteria for selecting the two institutions for site visits will be described. Second, the institutions and the faculty recruitment program implemented by each campus ADVANCE program will be described. Third, findings from interviews conducted with participants who are faculty recruitment specialists will describe how they influenced change using their credibility, persuasiveness, and authority. Fourth, examples of the manner in which institutional cultures at each of the institutions promoted and impeded the implementation of a faculty recruitment program are presented. The chapter concludes with a discussion of how faculty recruitment processes, shaped by institutional cultures, are a mechanism by which ADVANCE institutions successfully increased the number of women in science and engineering fields.

Site Selection

Urban University and MidWestern University were selected for site visits after the first phase of data collection was completed for this study. These two institutions were selected based

upon their appropriateness for studying the ways in which culture promotes or impedes the implementation of a change effort. Both institutions implemented faculty recruitment programs with the same goal of increasing faculty women hires in engineering and science fields. Of interest, however, are the contrasts in the manner in which the recruitment efforts were designed and implemented at each institution.

Both Urban and MidWestern universities were awarded grants in the first round of the ADVANCE program. In 2005, both institutions were completing the fourth year of their five-year ADVANCE-supported efforts at the time of the site visits.. The faculty recruitment programs were prominent efforts of the campus ADVANCE programs at both institutions, and Co-PIs who participated in the benchmarking study at Urban and MidWestern universities identified their faculty recruitment specialist program as significantly contributing to lasting change on their campuses. An additional similarity is that both universities used faculty members with special training as leaders and change agents to advance the goal of improving faculty search processes at their institutions. Co-PIs from ADVANCE programs interviewed during phase one of this study referenced the work of these two schools as models of best practices and indicated ways in which the models and materials developed by these two ADVANCE programs had been useful in the efforts at their own institution.

Another reason for selecting these two institutions for further study was the degree to which the faculty recruitment programs incorporated a number of the initiatives implemented by the campus ADVANCE program into their improved search processes. Faculty recruitment efforts are the nexus through which institutional, college, and departmental priorities and commitments are communicated to potential new hires (Tierney, 1994). Through recruitment and hiring processes, new faculty members can be informed of family-friendly and dual-career

institutional policies, the strength of the departmental climate, and the programs that are in place to develop faculty members.

The ADVANCE programs at both institutions changed and improved institutional policies, strengthened departmental climates and processes, and created faculty development programs. The faculty recruitment specialists at each site communicated to on-campus constituencies and potential hires the improvements created by the ADVANCE program to improve climates for women scientists and engineers. The faculty recruitment efforts at these two institutions benefited from being a part of a synergy that was created by change efforts implemented at the institutional, departmental, and individual levels.

Faculty recruitment specialists and administrators at both campuses agreed to be interviewed individually, or as a group, to discuss their role as a faculty recruitment specialist in promoting change in the search processes at their university. Interviews were open ended and participants were asked to describe their work and how it promoted lasting change for women faculty members in engineering, science, and technology fields at their institution.

Two Efforts to Improve Faculty Recruitment

The culture of the institution is evident in the manner in which the campus ADVANCE programs at Urban and MidWestern universities designed and implemented changes to their faculty search processes. This section provides background on each university, outlines elements of its history and institutional culture, and describes the faculty recruitment specialist program implemented by the ADVANCE program at each school. Table 5.1 compares key elements of the faculty recruitment programs at each institution.

Table 5.1

Description of Faculty Recruitment Specialist Programs at Urban and MidWestern Universities

Characteristic	Urban University	MidWestern University
Faculty status	Senior faculty members	Senior faculty members
Number	15 faculty recruitment specialists	8 faculty recruitment specialists
Scope	10 colleges /whole university	3 colleges / medicine, engineering, and literature, science, and arts
Title	Assistant to the dean status within the college	No administrative title within colleges or university
Selection	Selected by college faculty, dean, and ADVANCE Co-PI	Invited by dean to serve on committee
Design	Individual faculty recruitment specialist works with single search committee	As a committee, work with groups of search committee chairs and members across departments
Role	Approve search plan, approve short list of candidates	Lead workshops to educate on best practices
Training	Trained as a group in continuously-held monthly meetings by ADVANCE program staff and university administrators	Educated selves as a committee, on gender bias research literature, meeting weekly over three months; continued to meet weekly
Other	Developed mentoring programs in college Served as informal ombudsperson in college	Met, as a committee, with deans and provost to discuss recruitment goals and problem areas

Urban University

Urban University is a relatively young, public, four-year institution founded in the early 1960s with enrollments in excess of 24,000. Its Carnegie classification is as a large, residential university at the undergraduate level and at the graduate levels it is classified as a comprehensive

doctoral institution with medical/veterinary instruction. Urban's campus is contemporary with large concrete and glass buildings, and meandering, open, green spaces. Urban employs over 7,000 people and is located in a metropolitan area of 180,000. Urban is part of a state-wide university system governed by one board and overseen by a state-wide higher education commission. Urban collaborates in a number of ways with numerous campuses in its region. Collaborations include research and joint degrees as well as a dual-career hiring program in which a number of universities participate.

Urban takes pride in its focus on research and scholarship in the sciences, medicine, and business. The institution promotes interdisciplinary endeavors through university institutes and centers designed to support research in telecommunications and information technology, genomics, and bioinformatics and innovative instructional programs in biomedical engineering, international studies, global cultures, arts, and technology. Urban extends its medical research and services to the surrounding communities and across the state. An institutional emphasis on the sciences, engineering, technology, and medicine is the backdrop against which the campus ADVANCE team implemented initiatives to improve the recruitment, retention, and advancement of women in science and engineering fields.

At the time of the site visit the Co-PI in the office of the president was the principal supervisor of the director of the ADVANCE program. The ADVANCE director was a faculty member from an ADVANCE institution in a different state, hired for a one-year to 18-month contract to complete Urban's ADVANCE grant obligations to the NSF and to institutionalize the faculty recruitment efforts. The director worked closely with the Co-PI located in the president's office. Grant decision-making occurred in monthly meetings that included, when possible, the three Co-PIs and the director.

The ADVANCE program at Urban implemented a number of initiatives to improve recruitment and retention of women faculty. The ADVANCE team at Urban created a database to track institution-wide equity indicators, established two five-year positions for senior faculty members to serve as university-wide leaders on gender equity issues, developed workshops and seminars, and established the faculty recruitment specialist program to focus on faculty search processes and implement faculty mentoring in the colleges. From the outset, the Co-PIs planned to create a cadre of faculty recruitment specialists who were:

senior faculty members appointed as a faculty assistant to the dean in their respective college. The [faculty recruitment specialist] participates in faculty recruiting by approving search strategies and raising awareness of best practices. Additionally they organize faculty development programs, with both formal and informal mentoring, as well as address individual issues raised by women faculty. (Urban University, 2005, faculty recruitment specialist job description)

At the inception of the campus ADVANCE program, the administration of the university demonstrated considerable commitment to the project by supplementing the NSF funding and implementing the faculty recruitment specialist role in all 10 of the colleges within the university, not just the colleges with science and engineering departments. Faculty recruitment specialists received an additional \$15,000 per year, received a \$5,000 budget, and were given the authority to access personnel records and discuss personnel matters with the dean and the administration.

The ability of the faculty recruitment specialist to influence change in the colleges was enhanced by their endorsement by both the faculty members and administration of the college. In the first year of the faculty recruitment program, the faculty of each college elected one

colleague as a faculty recruitment specialist. Individuals elected by their faculty peers were post-tenure women and men with on-going research and teaching responsibilities who had experience leading search committees and had demonstrated a commitment to recruiting excellent faculty members in their departments. After the first year of the program, faculty members, deans, and faculty recruitment specialists recommended a change in the selection process such that a slate of faculty recruitment specialists was elected by the faculty in each college and given to the dean who made the selection of one or, in some cases, two faculty members who would serve in the recruitment specialist role. The dean's selection was then approved by the Co-PIs on the ADVANCE grant, one of whom had an administrative role in the president's office with responsibilities for faculty hiring. In addition, duration of the term of the faculty recruitment specialist's contract was extended from two to three years, and the larger colleges secured the resources to have two faculty recruitment specialists serving simultaneously.

At the time of the site visit, there were 15 faculty recruitment specialists in the 10 colleges at Urban University. I interviewed 10 people, six women and four men. The site visit occurred during a break between academic terms at Urban and many faculty members were not available for interviews. A staff member from the campus ADVANCE program arranged the interviews based on the availability of the faculty recruitment specialists and tried to ensure I interviewed faculty recruitment specialists from as many of the colleges as possible. Interviews were conducted with seven faculty recruitment specialists from six colleges. Two faculty recruitment specialists did not attend their scheduled interview appointment. Two participants were administrators with responsibilities related to the ADVANCE grant and one participant was a retired faculty member. Table 5.2 outlines selected characteristics of site interview participants from Urban University.

Table 5.2

Urban University Site Visit Participants (N=10)

Pseudonym	College/Unit	Discipline	Role
Samuel	Professional College	Social Scientist	Faculty Recruitment Specialist
Phyllis	Social Ecology	Social Scientist	Faculty Recruitment Specialist
Lawrence	Computer Science	Engineering and Computer Science	Faculty Recruitment Specialist
Martha	Physical Sciences	Physical Scientist	Faculty Recruitment Specialist
Steven	Engineering	Engineering	Faculty Recruitment Specialist
Theresa	Computer Science	Engineering and Computer Science	Faculty Recruitment Specialist
Susan	Physical Sciences	Life and Physical scientist	Faculty Recruitment Specialist
William	President's Office	Life Sciences	Co-PI, Administrator
Wendy	President's Office	Social Scientist	Administrator
Dorothy	Retired	Life scientist	Representative to the Faculty Senate

At Urban University, the faculty recruitment specialists from all the colleges meet as a group and receive training and share information on university hiring processes, issues of diversity and discrimination, and faculty mentoring. At the time of the site visit, the faculty recruitment specialists met as a group once a month and their training was conducted by ADVANCE program staff members, the administrators responsible for various aspects of the university hiring processes, and by consultants and faculty members with specific areas of

expertise. Faculty recruitment specialists were invited to attend workshops sponsored by the campus ADVANCE program on topics such as negotiating skills and bias in hiring processes.

Each college operates its own process and the number of searches conducted by each college varies by the size of the college and by the number of vacancies to be filled. In each college, the faculty recruitment specialist, in collaboration with the dean, and second faculty recruitment specialist (if there was one), determined which search committees the faculty recruitment specialist would focus on and assist. Overall, each faculty recruitment specialist worked with approximately five to 10 search committees, sometimes more, at varying degrees of intensity depending on the needs of the search committee.

Faculty recruitment specialists at Urban played a variety of roles in the search process. To advocate for improved search processes, faculty recruitment specialists met with college search committees, provided training on fair search processes, and assisted the committee in devising their advertisement and recruitment strategies. The faculty recruitment specialist consulted with the search committee and guided the progress of the search as applicants were identified as candidates for a position. The search committee was given materials about how to conduct open and equitable faculty searches and brochures for job candidates that explained Urban's family-friendly and dual-career policies.

Once the search was launched and the committee identified potential candidates, the faculty recruitment specialist approved the pool of candidates and, along with the search committee chair, dean, and university administrator responsible for faculty hires, approved the "short" list of candidates for on-campus interviews. When questions arose related to recruitment and search processes, the faculty recruitment specialist resolved problems with the college dean and the university administrator who is a Co-PI on the campus ADVANCE grant. No search

proceeded without the approval of the faculty recruitment specialist whose job it was to ensure that candidate pools included qualified women.

The ADVANCE program at Urban University reported significant success in the recruitment of women faculty members and attributed this success to the faculty recruitment specialist program along with improvements to institutional policies and the programs created to train department heads and raise awareness of equity issues on campus. In 2005, the Urban campus ADVANCE program report outlined the increase in women hired. In 2001-2002, 80 faculty members were hired and 27.5% were women. In 2005-2006 (reporting faculty appointments through July of 2005) there were 44 faculty members hired and 57% were women. (Urban University, 2005, ADVANCE program report).

William, an administrator in the president's office who oversees faculty hiring for the university and is a Co-PI on the ADVANCE grant, credited the increase in the percentage of women hired to the faculty recruitment specialists.

The [faculty recruitment specialists] have definitely made change on our campus.

... We have some data pre-[faculty recruitment specialists] and we have some post-[faculty recruitment specialists] data too. The indications are that it is working. Particularly in biological sciences and life sciences.

Evidence of Urban's commitment to sustaining long-term change is the administration's investment in institutionalizing the faculty recruitment program after the termination of the ADVANCE grant funding. The plan for faculty recruitment specialists at Urban University was for the administration to collaborate with the colleges to secure funding for the program. Smaller colleges would share the services of one faculty recruitment specialist, while larger colleges

would employ one dedicated exclusively to their college. The administrative “home” for the faculty recruitment program had not been decided.

MidWestern University

MidWestern University is a large, public, four year university with three campuses, enrollments in excess of 51,000, and over 5,500 faculty employees and frequently ranks among the handful of most prestigious public universities in the U.S. The main university campus houses 19 colleges and schools, a sizeable medical center, and is classified by Carnegie as primarily residential, with comprehensive doctoral and medical instruction, and is located in a community with a population of 114,000. MidWestern’s main campus was established in the mid-1800s and is traditional in its appearance, with brick buildings organized around quadrangles. The three campuses that comprise MidWestern University are under the jurisdiction of one governing board that is elected statewide.

The prominence of the social sciences is a unique feature of this large, public research-focused university. MidWestern takes pride in interdisciplinary research and scholarship with strengths in the social sciences and humanities as well as strengths in the science, engineering, and technology fields. The social sciences are prominent in the academic portfolio of the university with several institutes and initiatives that have, at their core, social science research.

Another unique feature of the culture at MidWestern is its institutional history of embracing diversity and addressing issues of social justice within the university and in higher education in general. The president of MidWestern, in a speech delivered in 2004, honored and reaffirmed the university’s commitment to diversity by celebrating the important role the institution played in a Supreme Court decision regarding diversity in higher education.

Participants referenced this unique institutional commitment as an important and influential cultural backdrop for the campus ADVANCE initiatives at MidWestern.

At the time of the site visit, the ADVANCE program was administered by, and reported to, the university institute for the study of gender, a prominent academic program with well-established research and scholarly ties to units across the institution including the colleges with departments of science, engineering, technology, and medicine. The ADVANCE initiatives implemented at MidWestern included faculty career coaching, a research grant program for women scientists and engineers, departmental climate improvement efforts, and creating a network of women scientists and engineers. A program designed to improve faculty recruitment and search processes in science and engineering fields was a central feature to their efforts to achieve lasting change.

MidWestern used slightly different strategies than those used by Urban to achieve ADVANCE program goals. Like Urban, MidWestern implemented efforts that provided career support and mentoring and developed workshops and seminars. In contrast to Urban, MidWestern's activities focused on improving climates within specific departments, and partnered with theatre and social science entities on campus to implement department change activities. Another difference between the efforts at MidWestern and those at Urban was the scope of the faculty recruitment specialist program. MidWestern limited the scope of the faculty recruitment program to the three colleges with the highest number of employees who were scientists and engineers, while Urban implemented their faculty recruitment program in all the colleges in the university.

At MidWestern, the campus ADVANCE program created a faculty recruitment committee comprised of senior faculty members in the sciences and engineering. Members of the

faculty recruitment committee were full professors nominated by the dean of their college because they were respected by their faculty colleagues and had expressed concern about diversity in their fields. Members of the faculty recruitment committee were compensated \$20,000 per year in recognition of their time commitment to the project.

As reported on the MidWestern University ADVANCE program website, the purpose of the faculty recruitment committee is to:

provide information and advice about practices that will maximize the likelihood that well-qualified female and minority candidates for faculty positions will be identified, and, if selected for offers, recruited, retained, and promoted at [MidWestern University]. The committee leads workshops for faculty and administrators involved in hiring. It also works with departments by meeting with chairs, faculty search committees, and other department members involved with recruitment and retention.

Once the initial eight members of the faculty recruitment committee at MidWestern were identified by the deans of the colleges of medicine, engineering, and liberal arts and sciences, the group spent a summer meeting weekly while they read and discussed social science literature on gender and bias and the problems of recruitment and retention of women faculty members in the sciences and engineering. This intensive study was not done by the faculty recruitment specialists at Urban University. The faculty recruitment committee at MidWestern researched and prepared PowerPoint presentations, informational materials, and a manual for search committees to use in their recruitment and hiring efforts.

During the first year of the faculty recruitment committee's work, presentations were made to 26 search committees in the three colleges specified in the MidWestern ADVANCE

grant program. These colleges were engineering, medicine, and the college of literature, science, and arts. Each presentation was offered to search committee chairs and departments by a male and female team of faculty recruitment committee members and included a PowerPoint presentation, handouts, and discussion. Since the first year, the faculty recruitment committee has researched additional topics to include in their educational efforts, and presentations address work-life balance issues as well as the challenges experienced by faculty members who are ethnic and racial minorities. In the second year of the program, the faculty recruitment committee redesigned its presentation so that it is longer, more interactive, and is offered to larger departmental and college-wide faculty groups.

The campus ADVANCE program at MidWestern has evidence that the faculty recruitment committee has had a significant impact on making faculty aware of the issues of unconscious bias, accumulated disadvantage, and how to improve search processes. The activities of the faculty recruitment committee, in conjunction with other campus ADVANCE efforts, resulted in an increase in the number of women scientists and engineers hired into faculty positions. Comparing the two years prior to the work of the faculty recruitment committee and the two years after the implementation of the faculty recruitment committee, the increases in the number of women hired are statistically significant. In the two years prior, 13% and 15% of the hires were women; in the two years subsequent to the implementation of the faculty recruitment committee, the number of women hired increased to 37% and 39% in the science and engineering departments respectively (MidWestern, 2005, ADVANCE program report). Like Urban, MidWestern experienced a significant increase in the percentage of women faculty members hired after the implementation of the campus ADVANCE program. As the faculty recruitment program at MidWestern University entered its final year, the move was to

institutionalize the effort through university support and by implementing the program in the 19 colleges across the institution.

At the time of the site visit at MidWestern, there were eight faculty recruitment specialists and a convener who is a member of the group and is a Co-PI on the campus ADVANCE grant. I interviewed nine people associated with the faculty recruitment program as a group. In this group interview, seven participants were faculty recruitment specialists, one was the convener/Co-PI, and one was a program administrator who is a doctoral student. There were five women and four men in the group interview. I also conducted individual interviews with the convener/Co-PI, and an interview with the doctoral student/program administrator and the ADVANCE grant evaluation director. Table 5.3 outlines selected characteristics of site visit interview participants from MidWestern University.

Table 5.3

MidWestern University Site Visit Participants (N=10)

Pseudonym	College/Unit	Discipline	Role
Michael	LSA*	Mathematics	Faculty Recruitment Specialist
Theresa	LSA	Chemistry	Faculty Recruitment Specialist
Juan	Engineering	Materials Science	Faculty Recruitment Specialist
Anna	Engineering	Electrical Engineering and Computer Science	Faculty Recruitment Specialist
Greg	LSA	Ecology and Evolutionary Biology	Faculty Recruitment Specialist
Anthony	LSA	Geological Sciences	Faculty Recruitment Specialist
Zoila	LSA	Molecular, Cellular, Developmental Biology	Faculty Recruitment Specialist, Co-PI
Sarah	LSA	Psychology and Women's Studies	Convener, Co-PI
Linda	Administration	Social Scientist	Program Administrator
Brenda	Administration	Social Scientist	Program Administrator

* College of literature, science, and arts

The Role of Institutional Culture in Creating Lasting Change

The unique cultures of Urban and MidWestern universities shaped the design and implementation of the faculty recruitment program at each university. Findings reported in this section provide a cross-case analysis of interview data from participants involved in the faculty recruitment specialist programs at these two institutions.

Institutional culture is evident in three principal elements of the faculty recruiting programs implemented at Urban and MidWestern. First, reflecting the centrality of the faculty in the academic cultures at both institutions, faculty members who were credible and influential in that setting were selected as leaders and change agents to improve faculty search processes in departments and colleges. Second, faculty recruitment specialists persuaded their colleagues to change search processes using data and information in ways that are relevant to and reflective of the institutional culture. Third, the manner in which authority and accountability for improved search processes were manifested at each institution was shaped by the institutional culture within which the change effort was implemented.

Credibility: Faculty Leaders and Grassroots Work

Although the role of the faculty recruitment specialist in working with search processes and committees was quite different at each institution, the academic cultures at both Urban University and MidWestern University promoted the value of respected faculty members as leaders and change agents. Participants at both institutions described the importance of the credibility of faculty recruitment specialists on their ability to exert influence. William, a life scientist, is a Co-PI at Urban University who is an administrator and senior faculty member. He described the positive impact of the faculty recruitment specialists at Urban and the importance,

within the context of Urban's institutional culture, of being sensitive to the academic culture of the college.

They've been well-received by [the search committees]. This is because it is colleagues helping colleagues ... they know the culture of the college. This is critically important. ... Our model, the [faculty recruitment specialist] model, is a model that concentrates on where the action takes place, at the departmental level. You have to change the people coming into the place, the new hires, that's where the change is going to happen.

In discussing his credibility and ability to influence change in his college, Steven, an engineer in his third year as a faculty recruitment specialist at Urban also emphasized the value of understanding college and disciplinary cultures to making change. "The problems and cultures within different colleges are quite different. So, knowing what the local culture is, both within your college, as well as within your field or fields generally, is a big advantage."

Respected faculty leaders are credible and effective because they understand how the academic culture of their departments and colleges work and are individuals who will be listened to by their colleagues. The credibility of the faculty recruitment specialist was promoted because each college had one of its own faculty members assigned as a faculty recruitment specialist. Martha is a physical scientist at Urban and a full professor in her second year as a faculty recruitment specialist. Martha described the importance for faculty recruitment specialists to work within their college in order to be credible and to be heard by colleagues.

When you are in the college, you have more clout. The people who you want to listen to you, will actually have a better chance of listening if they actually respect

you and know you, than if it's just some nameless person that they've never met from across campus.

At Urban, the faculty-driven nature of the academic culture within the colleges was evidenced in the design of the faculty recruitment program. The importance of employing faculty members to implement changes in faculty-driven academic cultures within colleges is expressed by a faculty recruitment specialist at Urban. Samuel is a professor in a professional college at Urban University who was in his second year as a faculty recruitment specialist. From his perspective, changing the culture requires changing faculty attitudes.

I think the college and the university are faculty-driven. The dean obviously has a lot of influence and a lot of power. But, changing the dean, and keeping the same faculty in place, the culture doesn't change, the policies don't change. Very little changes.

Participants at MidWestern University had similar descriptions of the ability of faculty recruitment specialists to influence change because of their credibility as respected faculty members and their ability to work at the grassroots level. Sarah, a social scientist who is a faculty member and in her fourth year as a Co-PI on the ADVANCE grant, described the credibility of the faculty recruitment specialists as stemming from their academic credentials.

I think that their legitimacy [is important]. I mean, Michael (a member of the faculty recruitment committee) is a National Academy member! They're all distinguished scientists, they're all well-respected ... they're articulate, and fun, and smart, and people are persuaded by them. ... Highly credible peers is what they are. And their stance towards their peers is completely collegial.

At MidWestern, the faculty recruitment specialists are not assigned to a specific college and work in teams as members of the faculty recruitment committee across science and engineering departments and colleges. However, the credibility of faculty change agents is tied to their relationships with individuals within their own departments and colleges. Reflecting the primacy of academic cultures within colleges and departments, Theresa, an award-winning physical scientist and department head, felt her impact had been greatest in her own department and discipline.

Advocacy and the kinds of workshops that we do have an effect, we disseminate information to a larger community. ... We probably have a *larger* effect in our own small communities. I know within my department that being able to talk about gender bias in an executive committee meeting ... was a big step forward. ... I've probably had a larger effect within my department, my college, and within my disciplinary community.

Academic cultures at the grassroots level within departments and colleges are distinct and unique. Faculty members from within those cultures have the credibility to generate support and enthusiasm from their faculty peers to promote cultural change at the grassroots level.

Faculty members are central players within the academic cultures of departments and colleges. The credibility of the faculty recruitment specialist resided in their academic credentials and in their working knowledge of the grassroots academic cultures within departments and colleges. Participants at both Urban and MidWestern described the importance of credible and respected faculty leaders to further the goals of the ADVANCE program and promoting lasting change in the academic culture of the institution. Faculty recruitment specialists used their

credibility to engage in different methods of persuasion with their colleagues. Influential faculty leaders are an essential component of successful ADVANCE efforts.

Persuasion: Information-sharing and Education on Bias

The institutional cultures at Urban and MidWestern universities shaped the persuasion strategies used by the faculty recruitment programs to frame the issues and improve faculty search processes. The faculty recruitment specialists at Urban used data on the numbers of individuals who had earned Ph.D.s in science and engineering disciplines, as well as information on policies to communicate and persuade members of college search committees. In contrast, the faculty recruitment committee at MidWestern persuaded groups of search committee chairs and faculty colleagues by educating their peers using academic tools such as data from social science research on the problem of unconscious bias.

At Urban, the faculty recruitment program merged the importance of using faculty members with the administrative culture of the institution so that faculty recruitment specialists communicated information about search policies, processes, and data about the demographics of potential applicants. Faculty recruitment specialists persuaded search committee chairs to achieve diversity goals by targeting their searches and making special efforts to recruit women by using discipline-specific applicant availability data provided by professional associations, the NSF, and the university's equal opportunity office. Martha spoke about how she persuaded peers by providing information on the availability of women as applicants and the benefits of recruiting faculty women.

Most of the time these [search committee members] are scientists and engineers, and once you present the facts to them, they often come away thinking that we really should be hiring more women because we have no role models here. You

know, there are a very, very small number of available role models for our students.

Susan is a full professor in the physical and life sciences and was selected by the campus ADVANCE program to serve as a university-level faculty leader on gender issues at Urban University. She served as a faculty recruitment specialist in her college for a year. Susan persuaded colleagues to expand the number of women considered for faculty positions by providing ideas on how to address the absence of women in candidate pools.

Sometimes when the short list just has no women on it, you can say “why don’t we look and see if there are women available in the pool?” ... [We have to help people] use recruitment techniques rather than just waiting for an application to come in. ... I would tell them, “you can call colleagues and you can use directories” among other things.

Martha also used data on the number and type of applicants available for certain disciplines to persuade search committees to increase the number of women in applicant pools. “[I worked with search committees by] repeatedly asking questions about how the search is going [like] ‘are there women there?’ ‘I looked up your availability data today and there are 20% women in organic chemistry.’ ”

In addition to using data to inform search committees of potential women applicants for positions in science and engineering, another strategy used by faculty recruitment specialists at Urban was to provide committees and candidates with information on the availability of family-friendly policies and support programs at the university. Martha described the value of sharing policy and program information with search committee members so that the information could then be shared with candidates.

One of the important things is just the transfer of information. Things like what the maternity leave policy is, because most search chairs are men and they're fairly senior and they don't have any clue as to whether we even have a maternity leave policy. But, when they're talking to women faculty candidates, they'd better know these things. ... Things like that are really good.

Consistent with the institutional culture at Urban, the faculty recruitment specialists served an administrative function to assist search committees within their colleges to increase the number of women candidates recruited to apply for faculty positions. The administrative and bureaucratic nature of Urban's institutional culture guided the faculty recruitment specialists to provide immediately applicable and practical information for search committees. The focus of the information was to provide search committees with practices that had immediate results for that particular search.

The institutional culture at MidWestern University also shaped the faculty recruitment program but with very different results. MidWestern has a history of substantial engagement in diversity issues. The culture of the institution is informed by a commitment to social justice and is shaped by a strong national reputation in social science research. The institutional commitments to diversity and the social sciences shaped key elements of the ADVANCE faculty recruitment program including the use of social science research data in workshops to educate faculty peers on the benefits of improving search processes.

Once members of the faculty recruitment committee at MidWestern were selected, the committee spent a summer studying and discussing social science literature and learning about the problems of unconscious gender bias, gender schemas, and women's accumulated disadvantage in academe. Based on their review of the research literature and their sense of what

would be persuasive with their faculty colleagues, the faculty recruitment committee prepared workshops for search committee chairs and department faculties. The workshops used data from the social science literature on gender bias and discrimination to outline the problem and to describe the negative impact of gender bias on women in academe such as “Exploring the color of glass: Letters of recommendation for female and male medical faculty” by Trix and Psenka (2003) and “Gender schemas at work” from Valian’s book *Why So Slow?* (1998).

At MidWestern, the faculty recruitment committee capitalized on the strengths of the institution’s academic culture by using social science data in their workshops for search committee chairs. Anna, a member of the faculty recruitment committee at MidWestern and a full professor in technology and engineering fields, described how social science data improved the effectiveness of the presentations: “One of the main reasons that they are effective is because they are data-based. The [workshops] point to studies, and they point to data, and at least for scientists and engineers, that’s the way we’ve been trained to understand.”

Members of the faculty recruitment committee presented social science data and shared with search committees their own beliefs about the issue of bias. When making presentations to their faculty peers, members of the faculty recruitment committee discussed the intensity with which they had studied the issues and the process by which they came to understand the problem of bias. The faculty recruitment committee believed they increased their credibility and their ability to be persuasive if they shared the extent to which they examined and questioned the data and concluded that gender bias was a problem worth addressing in their own colleges. Juan, a member of the faculty recruitment committee, and a full professor in engineering, articulated how studying the issues of bias provided him with the ability to communicate in a way in which his colleagues would listen and could be persuaded.

You learn what your own perspectives are. And it equips you with tools and skills to talk about your beliefs and the issues we've been talking about in a way that other people will listen. ... You learn what the literature is [on bias] so you can persuade others.

In their workshops, faculty recruitment specialists used their own experiences of learning about the problem of unconscious bias from the social science literature along with the social science data to persuade their peers. Zoila, a life scientist and a member of the faculty recruitment committee, helped to write the ADVANCE proposal for MidWestern and is a Co-PI. She described the transformative power of using academic tools to explore, understand, discuss, and teach the social science research on unconscious bias.

So, learning how to read the social science literature [on bias] ... remains the most compelling thing about the transformative aspects of this. It's the merging of the social science disciplines and the way culture can be understood, and is understood, that as scientists and engineers we don't have any way of understanding. We sit down in a meeting with our colleagues and we don't know what social dynamics are. We've not been trained to understand that, right? ... We couldn't really understand [the problem] before we had the tools to really talk about how social groups work and how people interact ... the *academic* tools.

The faculty recruitment committee engaged their colleagues in reframing the discourse on gender bias by providing faculty members with the vocabulary and data-supported evidence to understand and talk about the issues.

Anthony, a full professor in the physical sciences and member of the faculty recruitment committee, expressed the conviction that the literature-based arguments were essential to being persuasive with faculty members who served on search committees.

My role [on the faculty recruitment committee] is to try and be persuasive in my arguments. We don't have the authority to demand change of our colleagues, but we can certainly be persuasive. I think the studies [on unconscious bias] are the key to appealing to thinking individuals that there is some bias here that has to be eliminated in order for us to go forward. ... I see myself as a persuader, as a facilitator for change within the university.

Members of the faculty recruitment committee learned about the problem of unconscious bias and then used data they found compelling to shape the manner in which they persuaded their peers. Using social science data was congruent with MidWestern's strong institutional commitment to the social sciences. The approach the faculty recruitment committee used to teach themselves and others about the issues amplified their credibility and persuasiveness within the academic cultures of departments and colleges.

Institutional culture influenced what was required to effect changes in faculty attitudes required for lasting institutional change. Data-based arguments were key in each setting, but the type of data varied by institution. At Urban, the faculty recruitment specialists used information and applicant availability data provided by administrators to persuade department search committees within colleges to change and improve advertising, applicant screening, and recruitment practices. At MidWestern, the faculty recruitment committee employed education on gender bias to persuade colleagues of the negative impact of bias on women applicants and candidates. The differences in the approaches to persuasion at Urban and at MidWestern suggest

the importance of understanding what types of information and data will be persuasive within distinct academic and institutional cultures. It is likely that an approach that combines using data about the availability of prospective applicants and data from the social science literature on bias would succeed in persuading a variety of faculty members who would benefit from different persuasion strategies.

In addition to using data to persuade faculty colleagues, another dimension of implementing lasting change is the manner in which authority and accountability for change was embedded in the change effort. Urban and MidWestern employed very different approaches to accountability and authority.

Authority: Administrative and Moral

Reflective of the culture of the institution, the degree to which faculty recruitment specialists had, or embraced, authority to command or enforce changes in faculty search processes was different at each university. Due to their appointments as an assistant to the dean of the college, senior administrators vested the faculty recruitment specialists at Urban with the administrative authority to approve steps in faculty search processes. At MidWestern, the faculty recruitment specialists employed what they called “moral authority” by arguing the value of eliminating bias from search processes because it was the just and fair thing to do.

Faculty recruitment specialists at Urban attributed their ability to influence their peers on the administrative authority afforded them by their dean and the office of the president. Decisions about hiring faculty at Urban lie with the department heads and their faculty members. When discussing the structure of the faculty recruitment program, the institution was described by William as “weak dean, strong department head.” The faculty recruitment specialist served as

an administrative link between the search committees, department head, college dean, and administrator responsible for faculty hiring.

The design of the faculty recruitment program reflected the administrative and hierarchical nature of Urban's institutional culture. The faculty recruitment specialist was granted the administrative authority to shape, approve, and deny steps in faculty searches. To achieve change, the administrative and hierarchical culture of Urban University dictated that the faculty recruitment specialists have the administrative authority to hold their colleagues accountable for improving search processes.

At Urban, the influence of the deans over faculty searches is defined broadly and department heads make final hiring decisions with input from their faculty members. Deans define the parameters of hiring for their colleges by establishing diversity goals and brokering resources for offers and start-up packages. The support of the dean for the role of the faculty recruitment specialist was important for legitimizing their authority as an assistant to the dean. Samuel described the value of having the support of the dean to using his authority as a faculty recruitment specialist to insist that searches be conducted in a fair manner.

What I was able to do was make sure that best practices were followed in the sense that we're not just going to say this guy is on the short list before we see all the candidates, we're just *not* going to. ... I had a feeling that I, at least, required that it was done in a fair, transparent, objective way. ... My authority ultimately lies with the dean.

The faculty recruitment program at Urban benefited from authority and built in accountability at the department, college, and university levels. In addition to administrative support, holding search committees accountable for diverse pools of candidates meant that the

advice of the faculty recruitment specialist could not be ignored. Steven described the value of adding the approval of the candidate short lists to the responsibilities of the faculty recruitment program and that this adjustment increased the accountability for the goals of ADVANCE.

We felt that we gave them advice at the beginning of the year when the search committees were getting going. ... We'd ask to touch base at the critical juncture of [creating the short list of candidates], but it would usually get overlooked.

Signing off on the short list was a way to make sure that we were able to jump in at that point and to therefore warn them that there would be some accountability.

It wasn't just advice, it was accountability too.

The authority to approve search plans and short lists provided the faculty recruitment specialists at Urban with the influence necessary to improve faculty search processes.

At MidWestern University, the faculty recruitment specialists rejected any administrative authority over approving search processes and had no formal administrative role in holding search committees accountable for the diversity of their candidate pools. They framed their ability to persuade their peers to change on what they called "moral authority". Sarah, a Co-PI who convened the faculty recruitment committee, articulated the institutional culture that promotes the faculty recruitment committee's use of moral authority. Sarah described MidWestern's historical commitment to social justice and equality as the dominant culture that gives the faculty recruitment committee an advantage in communicating a message about institutional change.

There is a long history of the administrative structure being on board with diversity issues. ... The fact [is] that they fit into the dominant culture in which diversity is generally recognized as a good thing. In which [MidWestern] is

thought to have played a kind of moral leadership role, in its own mind, and that it's a good thing. That's generally the culture.

The commitment to moral authority is evident in the remarks of Michael, a key player on the faculty recruitment committee at MidWestern. He described how the faculty recruitment committee persuaded colleagues to do the "right thing." When asked if the faculty recruitment committee had authority, Michael responded.

I don't think that's how we like to think of ourselves, right? Because that makes it sound like ... if we went away, they would do whatever they wanted and the only reason they're doing the 'right thing' is because we are a presence. And I think we like at least to believe, whether or not it is true, that that's not quite how it is. That they're doing the right think because we're sort of educating them on what *we've* learned on *why* it's the right thing and how to achieve the right thing. ... Yeah, our presence makes a difference, but it makes a difference more because it triggers them to remember these things that they anyway accept.

Sarah referred to additional elements of the institutional context for understanding how the faculty recruitment committee members use their access to deans and the provost as a type of informal authority to get things accomplished.

They want to be peer educators, they want to be colleagues. ... They are respectful and persuasive at the same time. They understand that role. ... They don't want to be dean ... They believe they have the kind of moral authority to hold the deans and the provost to certain kinds of goals ... and a huge part of what works is their stance, their position structurally as not *of* the power structure but legitimated *by* the power structure.

Faculty recruitment specialists at MidWestern University exercised moral authority by convincing their peers to “do the right thing,” supporting the leadership role of the deans in achieving diversity goals, and invoking MidWestern’s long history of commitment to equity. The faculty recruitment committee at MidWestern had no formal administrative role in holding search committees accountable for diversity in their pools. At Urban University, the faculty recruitment specialists actively used administrative authority by approving search processes that extended the role of the administration in holding search committees accountable for recruiting diverse candidates. The contrast between the two programs highlights the significant role that institutional culture plays in shaping a successful faculty recruitment program.

Summary

The faculty recruitment specialist programs at Urban and MidWestern universities provided an opportunity to explore the ways in which institutional cultures shaped two successful change efforts. The effectiveness of the faculty recruitment specialists as change agents at their institution depended on their ability to convince their colleagues of the need to change. To persuade their colleagues, faculty recruitment specialists had to be credible in an academic setting and successfully argue the need for change. The credibility, ability to persuade, and authority of the faculty recruitment specialists were contextual and informed by the academic and institutional cultures in which they implemented change efforts.

Credibility and leadership of the faculty recruitment specialists stemmed from their status as respected faculty members and their working knowledge of the cultures of their departments, colleges, and institutions. Providing education and expertise allowed faculty recruitment specialists to persuade their colleagues to improve faculty search processes. Administrative and

moral authority added to the influence the faculty recruitment specialists had over their colleagues and their ability to lead and advocate for institutional change.

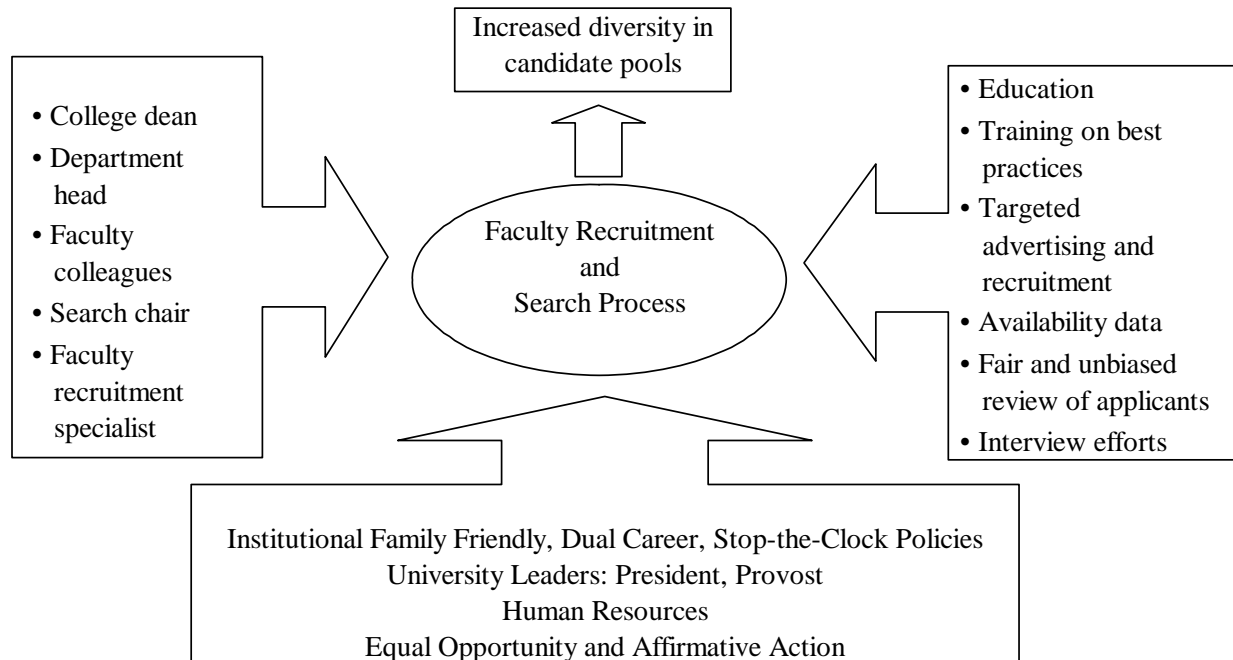
Urban and MidWestern designed and implemented faculty recruitment programs with different approaches. At both institutions, credible faculty members served as leaders and change agents to strengthen faculty search processes within academic departments and colleges. Data and information were employed differently at each institution, and the authority of the faculty recruitment specialist played a distinct role within the context of each university.

Faculty search processes are important to academic departments and changing faculty search processes to improve the recruitment of women faculty members was central to the change efforts implemented at many of the ADVANCE institutions. The models at Urban and MidWestern illustrate the benefits of engaging faculty leaders in changing a process that serves as the portal for faculty jobs. Search processes that are intentional about successfully recruiting women involve the coordination of multiple units of the university.

The process of searching for new faculty members brings together university, college, and departmental level individuals and processes to communicate interest to prospective faculty members. Recruitment and search processes are a vehicle by which prospective faculty members learn about the desirability of an institution and the existence of policies and programs that are family-friendly, support dual-career hires, and promote the professional advancement of women faculty members. Figure 5.1 illustrates a model for searches based on the faculty recruitment efforts at Urban and MidWestern that involves multiple institutional levels and a variety of administrative and faculty functions in the faculty recruitment and search process.

Figure 5.1

Faculty Search Processes



Faculty recruitment and search processes are at the center of the effort to increase women in candidate pools. The college dean, department head, faculty colleagues, search committee chair, and the faculty recruitment specialist have a role in articulating the goals of the search and engaging in recruitment efforts such as targeted advertisements, contacting colleagues, and marketing the search at appropriate professional conferences. University policies including those that articulate commitments to diversity and to work-life balance are communicated to candidates through the search process. Search committee members benefit from education and training on best practices and on learning how to screen applicants fairly and without bias. The

convergence of elements that impact search processes have tremendous potential for increasing the number of women who are recruited and hired as faculty members.

The ADVANCE programs at Urban and MidWestern selected faculty recruitment as a central feature of their institutional transformation efforts. The culture of each institution shaped the strategies used by faculty recruitment specialists to improve search processes that promoted an increase in the number of women recruited to and hired into faculty positions in science and engineering. Faculty search processes that succeed in increasing the number of women faculty are a result of bring together multiple elements of the institution's efforts to improve academic climates for women.

The ADVANCE teams at Urban and MidWestern used the strengths of their institutional cultures to benefit the implementation of their faculty recruitment programs. The design and structures associated with the program, the use of faculty leaders, the type and manner of providing information and data, and the authority of the faculty recruitment specialist were specific to the institution. Successful implementation of faculty recruitment programs at other institutions will benefit from examining these efforts for ideas on best practices. However, the strong role that institutional culture played in shaping the specific strategies, suggests that the direct transferability of either the Urban or MidWestern model is limited. To import the strategies employed by Urban and MidWestern to a different institution, administrators and faculty leaders would need to shape the elements of the faculty recruitment specialist program to be congruent with the culture of their university.

Institutional cultures shape the design and strategies used to implement change efforts aimed at lasting institutional change. Using respected faculty members as credible change agents to transform academic cultures is critical to persuading faculty colleagues to change behavior

and practices. Institutional cultures will shape whether and how change agents exercise authority and the manner in which individuals are held accountable for change. The long term impact of the changes implemented at Urban and MidWestern remain to be seen and will be best evaluated after several years have passed.

CHAPTER SIX

Conclusions

This study examined factors associated with institutional transformation designed to improve academic cultures for women faculty members in engineering and science fields. Data were collected from interviews with participants from 18 institutions that received NSF ADVANCE Institutional Transformation awards. Site visits were conducted at two institutions to explore faculty recruitment programs implemented by campus ADVANCE programs.

This chapter will summarize the key findings from this study, describe implications of the research, illustrate a model of institutional transformation for ADVANCE institutions suggested by these findings, discuss contributions made by this study to the literature, list suggestions for similar institutional change initiatives, and discuss implications for further research.

Summary of Key Findings

Findings from this study confirm the complex nature of engaging in change efforts aimed at initiating lasting organizational change that results in institutional transformation. Key findings were related to the four research questions that guided this study.

Policy, Process, and Individual Change Initiatives

The first research question addressed the types of policies, processes, and programs designed to create lasting institutional change. These were implemented at three organizational levels: the institutional, departmental, and individual. Family friendly policies were most frequently mentioned as institutional level initiatives. Improving faculty search processes was the most common departmental level initiative. A second type of initiative involved improving departmental climates. Mentoring and leadership programs were targeted to implement change at the individual level.

Communication and Leadership Strategies

Communication and leadership strategies were key to the successful implementation of policies, processes, and programs. Communication strategies involved shaping change messages to reach varied audiences often with the argument that change efforts would improve the climate for everyone not just women faculty members. Administrative and faculty leaders from multiple levels proved important to change efforts.

Factors that Impeded Change

Two factors impeded successful change initiatives. The focus on women faculty members by the granting agency was perceived as restrictive. Campus ADVANCE project leaders often wanted to branch out and include in their grant initiatives faculty from non-STEM disciplines, men, and ethnic and racial minorities. Project leaders also expressed the need to be strategic in communicating the goals and the benefit of the change agenda for the entire university community.

Five Preliminary Indicators of Lasting Change

Additional key findings emerged from this study. Participants identified five preliminary indicators of lasting change. These preliminary indicators are comprised of quantitative and qualitative evidence that participants identified as the manner in which ADVANCE initiatives contributed to lasting change for women in science and engineering at their institutions. The preliminary indicators demonstrate the variety of ways and arenas in which lasting change is perceived by participants to occur.

Increases in the numbers of women hired and promoted into faculty positions in engineering and science fields was a measure of success and a preliminary indicator of lasting change. Increased awareness of equity issues was described by participants as an indicator of

positive climate change at their institution. Broad-based support of lasting institutional change was evidenced by the involvement of diverse constituencies from across university units and disciplines. The involvement by senior faculty and administrative leaders in advancing change efforts contributes to lasting change by providing support and communicating the benefit of change for the institution. Providing the financial and human resources necessary to institutionalize selected ADVANCE initiatives promoted lasting change by committing the institution to investing in the future of the changes.

Institutional Culture

Institutional culture shaped initiatives to improve faculty search processes. Faculty leaders in both settings used data to persuade faculty members of the need for change. At one site, data that included national availability information was critical to advancing the change agenda. At the other site, social science data that illustrated gender bias was persuasive. Faculty members who were effective as change agents were those who were credible with their peers in that setting.

At Urban University, the administrative and hierarchical culture of the institution informed the design and implementation of the faculty recruitment program. Urban employed and trained faculty recruitment specialists in an administrative role to provide data on available applicants within the disciplines, approve search steps, and assist search committees to advance the diversity hiring goals of the college deans. The faculty recruitment program at Urban illustrated the importance of having change agents vested with both faculty and administrative capabilities engaged in successful faculty search processes. The credibility, persuasion strategies, and administrative authority of the faculty recruitment specialists reflected the administrative and academic cultures of the institution.

The institutional and academic cultures at MidWestern University are shaped by the institutional commitment to diversity and the importance placed on the contributions of the social science disciplines. The collaborative and collegial nature of the culture at MidWestern shaped the design of a peer education model aimed at changing the practices of faculty search committees. The use of respected senior faculty members to persuade their colleagues by teaching them about unconscious bias in the recruitment, hiring, and advancement of women was congruent with the academic and institutional cultures that valued faculty members as change agents. Consistent with the values of the institution, the faculty recruitment committee invoked MidWestern's commitment to social justice and used moral authority to persuade their faculty colleagues to "do the right thing" to eliminate gender bias from search processes.

The key findings from this study illustrate the complexity of implementing transformative institutional change. The preliminary indicators of lasting change themselves demonstrate the complexity of transformational change. The preliminary indicators include quantitative measures of the number of women hired and promoted into engineering and sciences positions, as well as qualitative measures that evidence an increase in the awareness of equity issues by colleagues and leaders, the involvement in grant activities by diverse campus constituencies, and committed leadership. The institutionalization of ADVANCE initiatives demonstrates the commitment of the institution to sustain the change efforts by investing human and financial resources in creating positions and offices designed to sustain ADVANCE initiatives. Findings from this study illustrate the variety of initiatives and strategies necessary to implement changes that have the potential to result in transformative institutional change. Campus leaders are cautioned, however, about the wholesale transportability of innovations from

one institution to another without careful consideration of the characteristics of the culture of the institution.

Implications of this Research

The success of the ADVANCE Institutional Transformation program will be predicated upon the ability of institutions to continue to support initiatives that advance women in the science and engineering fields after the projects reach the end of their funding cycle. The NSF has not promised continued funding of this effort and it is incumbent upon institutions to secure the financial and intellectual resources to carry on.

Findings from this study suggest the importance of attending to institutional culture when implementing change efforts. To succeed, efforts will benefit from capitalizing on the cultural strengths of the institution and deliver culturally congruent policies and programs at multiple organizational levels that are communicated effectively by well-respected faculty and administrative leaders who can be persuasive.

This study underscores the importance of change initiatives being compatible with the organizational culture in which they are being implemented. To be culturally palatable, many ADVANCE programs engaged scientists and engineers as leaders on the grant's initiatives. The need to be credible with colleagues in the sciences and engineering dictated that the spokespeople and leaders of initiatives be from those disciplines. The knowledge, skills, and expertise brought to ADVANCE initiatives by individuals with backgrounds in organizational theory, sociology, and psychology was underscored as valuable to the success of ADVANCE on their campus by the Co-PIs who mentioned it. Members of campus ADVANCE implementation teams would benefit from including faculty members from a variety of disciplinary backgrounds, including the social sciences, on their leadership teams.

It is a combination of initiatives at the institutional, departmental, and individual levels that amplify the opportunity for transformative change at institutions. On their own, grants to individuals and mentoring programs may be important but are not sufficient for transforming institutional culture. These individual-level programs frequently are designed to help women faculty members navigate “the system” of promotion and tenure or are in place to support the professional advancement of an individual who is facing significant personal need. Policies, on the other hand, have broad impact and can help transform culture by providing processes to be followed across multiple institutional units and by establishing mechanisms for training and accountability. Alone policies do not accomplish change but, in concert with education, training, and improved processes they can advance a change agenda.

In the organizational “middle” of colleges and universities are departments and their processes. This research confirms that it is within academic departments that individuals interpret and implement institutional policies. In conjunction with change efforts at the individual and institutional levels, departments can sustain efforts such as faculty recruitment programs that make them more hospitable for women faculty members.

To be transformative, change must be pervasive and broad. To increase the opportunity to succeed, the need for change needs to be understood and “heard” by a variety of constituencies. Defining the problem from a variety of perspectives provides the opportunity to devise multiple solutions and communicate the benefits of change in multiple ways. Campus ADVANCE programs benefited from expanding their spheres of influence to include individuals and units from a variety of perspectives.

This study affirms the important role of institutional culture in implementing change efforts. Each institution is unique and its culture will embody the heritage, missions, evolution,

geographic and socio-political contexts, disciplinary strengths and weaknesses, and successes and failures that comprise its institutional history. Change efforts initiated on one campus are not easily imported to another. The cultural context of the institution may preclude the easy implementation of a successful idea without significant alteration to ensure that it will be culturally congruent and will effect the desired change.

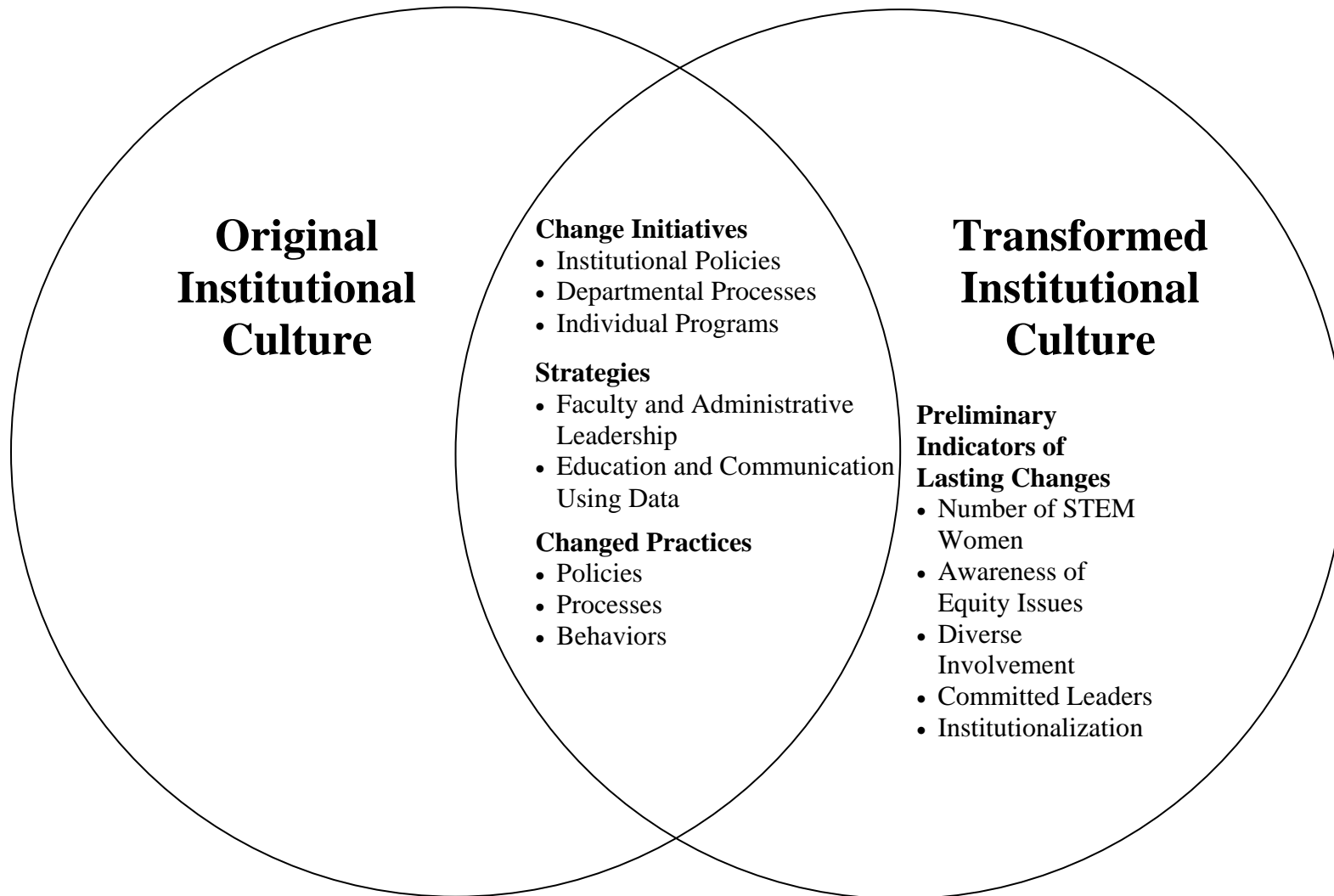
A Model of Preliminary ADVANCE-initiated Transformational Change

It is premature to establish whether initiatives implemented at universities that received ADVANCE Institutional Transformation awards have resulted in lasting transformational change. Findings from this study highlight the preliminary success of policies, processes, and programs that are varied in nature, use faculty and administrative leaders, educate university constituencies, and are compatible with the culture of the institution. To initiate change, faculty and administrative leaders and change agents must communicate the value of the change effort and be persuasive by having credibility and organizational authority.

Findings from this study suggest a model of transformative change in which initiatives are implemented at various institutional levels, leadership and communication strategies are employed to advance the change effort, and all elements are compatible with the culture of the institution (see Figure 6.1). This model suggests the centrality of the culture of the institution as a force that shapes the change efforts while simultaneously being the target for improvement. The overlap in the circles represents that the transformed culture is not completely different from the culture initially present. There is a good deal of overlap between the original and transformed culture.

Figure 6.1

Model of ADVANCE Institutional Transformation



The model of transformational change suggested by the findings of this study adds to our understanding of how efforts to create lasting change in a variety of different institutional settings have resulted in preliminary evidence of changed practices and processes that improve climates for women. The preliminary indicators of lasting change identified by participants are the result of varied and interconnected change efforts implemented at institutional and individual levels, using credible and influential faculty and administrative leaders, and using strategic communication and education strategies. In isolation, it is likely that no one initiative would result in transformative change. What is more probable is that lasting transformative change is the result of a combination of initiatives and the inclusion of diverse and varied campus constituents as leaders, change agents, proponents, and beneficiaries of the changes.

First, change initiatives that are implemented at several organizational levels, and at the individual level, build understanding of and support for the change effort throughout the institution. A synergy can be created at the institution when changes have resulted in improved institutional policies that are family-friendly and provide for partner hires, search processes that recruit intentionally and are free of bias, and departmental climates that are hospitable for women.

Second, the role of leadership and communication is important to lasting and transformative institutional change. Employing faculty leaders and senior university leaders to serve as champions and ambassadors is important for communicating institutional commitment to the goals of the change efforts. Faculty leaders are particularly important as change agents in academic cultures where their credibility as colleagues facilitates their ability to be persuasive and to exercise authority to implement changed processes.

Third, faculty recruitment and search processes are important to the academic goals of departments and colleges. Academic departments are frequently the organizational intersection for the values and goals of the institution and the college. Because of the important institutional role departments frequently play, changing departmental hiring practices and processes is an effort that can lead to transformational institutional change. This is one area in which faculty members have an important role as change agents.

Contributions of this Study to the Literature on Institutional Transformation

Findings from this study contribute to the literature on institutional transformation in higher education in a number of ways. Examination of change initiatives that share the same goal provides an unusual opportunity to compare and contrast change strategies and initiatives implemented at a variety of institutions. The contrast between the faculty recruitment programs at Urban and MidWestern is a good example of how examining two initiatives designed to achieve the same goal made it possible to explore the role of institutional culture in shaping a faculty recruitment program.

Another contribution made by this study is to add to the work of Eckel and Kezar (2003) on institutional transformation in higher education. Eckel and Kezar present a model of transformative institutional change with five core strategies common to transforming institutions. The five core strategies are a) senior administrative support, b) collaborative leadership, c) flexible vision, d) staff development, and e) visible action. These five core strategies are at the center of the Eckel and Kezar's Mobile Model for Transformational Change. The ADVANCE institutional transformation change initiatives have elements of the Eckel and Kezar model embedded in them and also have features unique to the nature of the ADVANCE effort.

The model presented by Eckel and Kezar (2003) emphasizes the importance of senior administrative support to institutional transformation. Findings from the study of ADVANCE initiatives confirm and amplify our understanding of the importance of senior leaders in transformative change efforts. In addition to individuals in top administrative leadership positions, this study draws attention to the value of engaging both administrators and faculty members as leaders and change agents in institutional transformation. Presidents, chancellors, provosts, and deans were all leaders who contributed to the success of ADVANCE initiatives at their institutions. In addition, faculty leaders played key roles in implementing a variety of ADVANCE initiatives across the institution. The importance of engaging faculty members as change agents to persuade their peers to adopt changes aimed at transforming institutional culture is an important contribution to understanding how lasting change can be initiated within higher education.

Findings from this study draw into question the centrality of collaborative leadership, as defined by Eckel and Kezar (2003), to successful institutional transformation efforts. Collaborative leadership is a core strategy described by Eckel and Kezar that “refers to individuals beyond those holding formal leadership positions who are involved in the change initiative from conception to implementation” (p. 78). Campus ADVANCE teams were composed of faculty members and administrators with a variety of disciplinary backgrounds, from different faculty and administrative ranks, and who frequently had responsibility for discrete components of the ADVANCE change effort. ADVANCE teams used leaders to implement and move initiatives forward who were not involved from “conception to implementation.” ADVANCE teams documented success and identified preliminary indicators of transformational change while sustaining changes in leadership personnel at all organizational

levels. Findings from this study would suggest that a core transformational strategy is one in which dedicated administrative and faculty leaders, at multiple organizational levels, can take charge of different and various elements of the change initiatives at different times over the course of the organizational change effort.

Findings from the ADVANCE change efforts support the primacy of flexible vision to transformative change and underscore the importance of being able to adapt initiatives and strategies to accommodate new information and adjust to unforeseen challenges. Flexible vision is the third core strategy outlined by Eckel and Kezar (2003) in their model of transformative institutional change. Flexible vision is “flexible yet clear ... but does not foreclose possible opportunities that might emerge” (p.78). In particular, the focus of ADVANCE on women faculty members required that change agents adapt or frame messages that would communicate to a variety of audiences and, at times, amplify the intended impact of the grant’s goals.

Findings from this study confirm the importance of staff development as a core strategy towards transformative change and add an additional dimension to our understanding of the importance of this core strategy. Staff development is the core strategy that Eckel and Kezar (2003) describe as “programmatic efforts for individuals to learn certain skills or gain new knowledge related to the change agenda” (p.78). ADVANCE teams used a variety of strategies to educate and train various types of leaders and different constituencies on new skills and knowledge related to the change agenda. Campus ADVANCE teams invested significant resources in education efforts that included raising awareness across the campus of the issues of gender bias and the unique experiences of women in science and engineering fields. ADVANCE programs implemented training initiatives designed to teach new skills to search committee members, department heads, deans, and other faculty members and administrators.

An additional dimension to staff development provided by the findings of this study is the degree to which the use of different types of data and information resulted in faculty members and administrators learning new skills and knowledge related to the change effort. The work of the faculty recruitment specialists at Urban and MidWestern indicated the value of using different types of data and information to persuade faculty colleagues. Findings from this study suggest that successful staff development is shaped by the academic and institutional cultures of the institution and employs different forms of data to be persuasive.

The final core strategy identified by Eckel and Kezar (2003) is visible action. This core strategy “refers to progress in the change process that makes continual advancement toward the articulated goals of the transformation agenda” (pp. 78-79). Findings from this study support the inclusion of visible action as a core strategy. Assessment of grant goals and progress reports are requirements of the NSF of campus ADVANCE teams. Study participants identified an increased number of women in science and engineering fields as a preliminary indicator of lasting change. The constant monitoring and reporting of progress on this goal provided an opportunity for the campus ADVANCE team to communicate visible action on grant goals and to inform the university community of successes.

Findings of this study suggest that an additional core strategy be added by ADVANCE leadership teams to the five core strategies outlined by Eckel and Kezar (2003) in their model of transformative change. The significant role of institutional culture in shaping change strategies warrants the inclusion of assessing institutional culture as a core strategy in the model for transformational change. Without the benefit of understanding how institutional culture promotes and impedes the implementation of change strategies, findings from this study suggest that transformational change is less likely to occur.

Suggestions for Implementing Transformational Change to Promote Gender Equity

Findings from this study of participants in the ADVANCE Institutional Transformation grant program inform future ADVANCE grant initiatives and provide suggestions for ways institutions can implement changes to promote gender equity for women faculty members in science and engineering fields.

Assess Institutional Culture

Successful change initiatives are more likely to succeed if they are informed by and congruent with the institutional culture within which they are being implemented. Assessing the culture of the institution requires understanding of its varied missions, its history, faculty and academic cultures, how decisions are made, the role of governance, the history of previous successful change efforts, and why efforts have failed. Cultural strengths that can be used to advance the change effort should be identified along with possible areas of weakness or resistance. For change efforts related to improving the climate and status of women, quantitative and qualitative data help to communicate the necessity of the change effort to a variety of audiences.

Assemble a Diverse Leadership Team

The opportunities for the success of institutional change efforts are improved by teams of change agents that represent a variety of disciplines and include women and men who are faculty and administrative leaders from several organizational levels. In addition to having team members who represent the disciplines, it is important for leadership team members to have varied professional and academic experiences and to be familiar with a wide variety of social science literature on organizational change, gender bias, higher education, and related fields.

Implement Changes at Multiple Organizational Levels

The opportunity for change efforts to succeed is improved when multiple initiatives are implemented simultaneously at various organizational levels as well as at the individual level. Institutional policies that reflect the improved manner in which the institution will conduct business support parallel changes at the college, department, and individual levels. For example, an institutional modified duties policy that allows for faculty members to adjust their workloads to accommodate extraordinary personal circumstances can promote and support changes within departments and colleges that allow for individual faculty members to benefit from the policy.

Faculty and Administrative Leaders and Change Agents

The likelihood that change efforts will succeed is enhanced by faculty members and administrators who serve in a variety of leadership and change agent roles and who communicate the value of diversity and importance of advancing women within the context of the institutional culture. Women and men leaders at junior and senior levels of the faculty and administrative ranks need to articulate the change message in culturally congruent ways to persuade their colleagues of the value of the changes for individuals and how changes will advance the goals of the institution as a whole.

Diverse and Broad Involvement

Engaging diverse individuals and units from across the institution in endorsing and benefiting from activities, programs, and other change initiatives creates investment in and enthusiasm for the improvements and change efforts. Engendering the support and understanding from a broad spectrum of individuals shifts institutional norms and generates allies and ambassadors. Participation from a variety of constituents provides information to the change proponents on how to amplify the benefit of the change efforts. New ideas and suggestions for

improving initiatives are generated by involving constituencies from various areas across the institution.

Educate and Communicate with the University Community

Enthusiasm and support are generated for the change efforts when the goals of the effort are communicated frequently, in numerous ways, by a variety of people, and to diverse audiences. While proponents of the change effort frequently feel that all they do is communicate the value of the effort, the decentralized nature of most institutions requires frequent and varied communications to maintain momentum.

Assessment

In addition to assessing culture and gathering data to prepare for change, assessing progress throughout the change effort provides opportunities to adjust change initiatives and to communicate successes of the change effort. Quantitative measures of the number of women hired and promoted are valuable ways to communicate the effects of change efforts such as departmental climate workshops, the impact of which may be more difficult to assess. Measurement, interview, and focus group data can help leaders to understand the impact of change initiatives and provide opportunities for a variety of campus constituencies to share their positive and negative perceptions and understandings of the change initiatives. Assessment activities also provide an opportunity to gauge resistance and hostility and to adjust or incorporate suggestions to reduce the impact of resistance to change.

Faculty Search Processes

Faculty recruitment and search processes can be the nexus of change efforts within academic cultures. This is an effort where faculty members play an instrumental role as leaders and change agents. As a process that results in bringing new faculty members into departments

and colleges, the search process is an opportunity to weave together the institutional, college, and department policies and programs that are designed to support the success of women faculty members. In addition, in the context of faculty searches, respected senior faculty members can serve as faculty recruitment specialists who receive specialized education and training and work with search committees on recruitment and search processes that invite diverse applicants and mitigate the effect of bias on applicant screening. Faculty recruitment specialists can educate faculty colleagues who serve on or chair search committees on how to diminish the impact of unconscious bias by raising consciousness and implementing the use of forms and other tools to assist in the fair screening of applicants.

Resistance to Change

When implementing organizational change to improve climates for women, program directors might want to anticipate resistance from numerous, and surprising, university constituencies. Change efforts designed to improve academic climates for women may be perceived to benefit one community of the university and not others: e.g., women are advantaged over men, junior women are advantaged over senior women, STEM departments and colleges are advantaged over others, faculty members over staff members, and faculty members over graduate students. Change efforts that are focused on improving academic climates for women require intentional and strategic decisions about the choices of female and male leaders, when it is appropriate for women to communicate the change message and when it is appropriate for men to do so. ADVANCE change efforts benefit from being communicated as beneficial for everyone in the university community including men and underrepresented minorities. Having women and men present information jointly can be effective in neutralizing resistance from audiences to either male or female leaders. The variety of audiences within the university community shape

how the change message is communicated and whether it is necessary to embed the focus on gender in a broadly stated message about departmental and institutional excellence.

Suggestions for Further Research

Initiatives at all ADVANCE institutions will benefit from the findings of this study and from additional research conducted on several elements beyond the scope of this study. Research initiatives that would contribute to understanding the impact of ADVANCE institutional change efforts would include closely examining gender as a dimension of the ADVANCE change effort, the impact of faculty members as change agents in academic settings, how synergy can be created between a variety of initiatives, and the degree to which differences between academic cultures impact institutional change initiatives.

There is an irony in the difficulty that campus ADVANCE leaders had in framing the change effort to advance women in science and engineering fields while, simultaneously, having to camouflage the effort with assurances that initiatives did not advantage women at the expense of men or other institutional diversity efforts. They often did this by framing the need for their efforts as necessary to maintaining their institution's competitive edge and that their efforts would improve the climate for everyone, not just women. Research comparing how ADVANCE institutions framed the need for and benefits of their change efforts would provide the basis of an interesting study.

Research on the value of faculty members as campus change agents would reveal specific strategies for employing faculty members in transforming academic and institutional cultures. A study that examined the experiences of faculty change agents and faculty members who are consumers of change workshops and other initiatives would provide ideas for how to increase the effectiveness of faculty change agents with their peers.

Examining how synergy is created by implementing a variety of change initiatives might be possible as a future research project. A comparison between ADVANCE institutions that launched a large number of initiatives and institutions that concentrated their efforts on a few initiatives would illuminate the degree to which the initiatives created visibility and broad based support and how the synergy created between and among the initiatives contributed to lasting institutional change. Another interesting area for future research is whether institutionalization of these efforts and the goal of achieving climate change required that ADVANCE institutions engage faculty members in disciplines outside of science and engineering.

As microcosms of larger societies, institutions of higher education reflect the challenges faced by women and underrepresented minorities everywhere. The unique nature of higher education requires that we continue to study efforts that successfully change the practices that prevent every member of the higher education community to advance and succeed. This study is one step to that end.

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APPENDIX A

Introductory Email

Dear ADVANCE Project Leader:

The Virginia Tech NSF ADVANCE Project, in collaboration with the University of Michigan and several other ADVANCE institutions, is collecting data – via telephone interviews – about experiences of PIs, Co-PIs, and major faculty participants at all nineteen institutions with NSF ADVANCE Institutional Transformation Grants, focusing specifically on their experiences with the process of institutional change. Two other teams of collaborators will conduct phone interviews that focus on attitude and behavior change as well as leadership. The purpose of these interviews is to determine “best practices” strategies based on successes of the various NSF ADVANCE programs.

I will be conducting the phone interviews for the institutions for which Virginia Tech is responsible. The hope is that we can interview at least one person from each institution, but could interview up to two individuals if that made more sense. The plan is to complete interviews during the months of June and July. Once we hear back from you we'll contact people directly about setting up a phone interview.

Many thanks for your help with this effort. Please let me know if you have any questions or would like to talk about this further.

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APPENDIX B

Informed Consent Form for Participants

Virginia Tech ADVANCE Grant

PROJECT TITLE: Benchmarking Multi Institution Study

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Purpose of the Project

Three teams from NSF-funded ADVANCE projects are conducting telephone interviews about the experiences of ADVANCE project team members and major faculty participants at each of the nineteen institutions receiving NSF ADVANCE Institutional Transformation Grant. The interviews are intended to gather information about the successes and challenges in implementing institutional transformation at the participating institutions. Efforts aimed at institutional transformation include the implementation of formal and informal practices and policies that transform institutional leadership and culture in ways that improve the recruitment, retention, and advancement of women in science and engineering.

Procedures

Interview participants have been identified by members of the ADVANCE leadership team at each of the participating institutions. A member of the Virginia Tech ADVANCE team will use information provided by each of the participating institutions to contact each of 2-3

participants per participating institution to arrange for a convenient time to conduct a 30-40 minute telephone interview. The interview will not be tape recorded, but field notes will be completed by the interviewer following the interview. The field notes will summarize key points made during the interview.

Participants are required to sign and return this informed consent form prior to the interview.

Risks and Benefits

There are minimal risks involved to participants in the study. The primary benefit of participating in this study is that participants will gain insight and contribute to the “best practices” knowledge base that will benefit all nineteen ADVANCE institutions as well as other institutions seeking to implement similar change efforts.

IV. Anonymity and Confidentiality

Notes from the interviews will be kept in a locked file cabinet in the ADVANCE offices at Virginia Tech and destroyed after the project is completed, or no later than after five years. Only personnel directly involved with the research project will have access to the field notes. Data collected will be analyzed and aggregate data will be incorporated into reports to NSF and may also form the basis of articles in scholarly journals or books. Although institutions will be identified, no personal identifiers will be included in reporting of the results. Nor will information be shared with non-ADVANCE personnel at the researchers’ or participants’ campuses.

Compensation

There is no compensation for participating in the project.

V. Freedom to Withdraw

You are free to withdraw from this project. You may decline to answer any question you are asked during the interview. You may also ask that your reply be kept off the record.

VI. Informed Consent

Participants will receive a copy of this Informed Consent form. A signed copy of the form will be stored at Virginia Tech.

This research project has been approved by the Institutional Review Board for Research Involving Human Subjects at Virginia Tech.

Participant's Permission

I have read and understand the Informed Consent Form for Participants and the conditions of this project. I voluntarily agree to participate in this project. Any questions I have about this project have been answered. I hereby acknowledge the above and give my voluntary consent to participate in this project.

 Participant's Signature Date University

For additional questions or concerns contact:
 Dr. Elizabeth G. Creamer, Associate Professor of Educational Research, Virginia Tech, creamere@vt.edu, Phone: 540-231-8441.
 Dr. David Moore, Chair, Institutional Review Board, Virginia Tech, moored@vt.edu, 540-231-4991.

APPENDIX C

Interview Questions for ADVANCE Benchmarking Study

This interview consists of questions about your experiences with the ADVANCE program at your institution.

Tell me a little bit about yourself and your role with your campus ADVANCE team.

I will be asking you about three aspects of your efforts to create lasting change at the level of the department, the college or the institution as a whole:

- things you tried that worked,
- things you tried that didn't work, and
- things you tried, and that produced something that surprised you.

Can you describe new structures, policies, or practices that have been adopted in your institution as a result of the ADVANCE project? These might come up in the areas of recruitment, retention, advancement, and leadership.

[In one or more of these instances,] Tell me about something that worked to produce an institutional change in your department, college, or the wider institution.

recruitment,
retention,
advancement, and
leadership

[In one or more of these instances,] Tell me about something that you tried, but that didn't work to produce change in your department, college, or institution.

recruitment,
retention,
advancement, and
leadership

[In one or more of these instances,] Tell me about something that surprised you as you made this effort to encourage departmental, college, or institutional change.

Is there anything I haven't asked about that is important that you'd like to tell me about?

APPENDIX D
Informed Consent for Individual Participants

Title of Project

Institutional Transformation: A Cross-Case Analysis of First Round ADVANCE Institutions

Investigators

Faculty Advisor Elizabeth Creamer, PhD
Associate Professor, Educational Leadership and Policy Studies
Virginia Tech
211 E. Eggleston (0302)
Blacksburg, VA 24061
reamere@vt.edu Phone: 540-231-8441

Doctoral Student Ellen Plummer
Doctoral student, Educational Leadership and Policy Studies
Director, Virginia Tech Women's Center
206 Washington St. (0270)
Blacksburg, VA 24061
eplummer@vt.edu Phone: 540-231-8181

I. Purpose of the Project Justification of Project

The purpose of this dissertation study is to understand the factors associated with institutional transformation designed to improve the climate for women faculty members in science and engineering fields at first and second round NSF ADVANCE institutions.

II. Procedures

Participants in this study will complete a one to two-hour interview. The interview will be audio-taped only with the permission of the participant and a verbatim transcript will be completed. If not audio taped, extensive field notes will be taken during the course of the interview and transcribed by the investigator.

III. Risks and Benefits

There are minimal risks involved to participants of this study. By participating, they will contribute to the understanding how academic climates can be improved for women in science and engineering fields.

IV. Confidentiality / Anonymity

Information provided by participants in these interviews will be held strictly confidential. Neither your name nor any other personal identifier will be associated with the information you supply. A person who has been trained on procedures for ensuring confidentiality will transcribe the interviews. Personal identifiers, such as proper names, will be removed from interview transcripts. These transcripts will be identified and stored by a numbered code. Tapes and transcripts will be kept in a secure location and only the investigator will have access to and be directly involved in the analysis of interview data. Tapes will be destroyed at the conclusion of the project. Pseudonyms will be used for each participating institution and each individual participant. Institutional descriptions will be broad and identifying information will be eliminated from study reports.

V. Compensation

There are no incentives or compensation offered for participation in this study.

VI. Freedom to Withdraw

You are free to withdraw at any time from participating in this project. You may ask that the tape recorder be turned off at any time during the interview.

VII. Informed Consent

Participants will receive a copy of the consent form, either electronically or as a hard copy, prior to the interview. Participants are asked to indicate their agreement with the stated conditions.

This research project has been approved, as required, by the Virginia Tech Institutional Review Board for Research Involving Human Subjects.

PARTICIPANT'S PERMISSION

I have read and understand the Informed Consent Form for Participants and the conditions of this project. I voluntarily agree to participate in this project. Any questions that I have had about the project have been answered. I hereby acknowledge the above and give my voluntary consent to participate in this project.

Participant Signature

Date

APPENDIX E
Informed Consent for Group Interview Study Participants

Title of Project

Institutional Transformation: A Cross-Case Analysis of First Round ADVANCE Institutions

Investigators

Faculty Advisor Elizabeth Creamer, PhD
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Virginia Tech
211 E. Eggleston (0302)
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Doctoral Student Ellen Plummer
Doctoral student, Educational Leadership and Policy Studies
Director, Virginia Tech Women's Center
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eplummer@vt.edu Phone: 540-231-8181

I. Purpose of the Project Justification of Project

The purpose of this dissertation study is to understand the factors associated with institutional transformation designed to improve the climate for women faculty members in science and engineering fields at first-and second round NSF ADVANCE institutions.

II. Procedures

Participants in this study will complete a ninety minute group interview. The interview will be audio-taped with the permission of the participant and a verbatim transcript will be completed.

III. Risks and Benefits

There are minimal risks involved to participants of this study. By participating, they will contribute to the understanding how academic climates can be improved for women in science and engineering fields.

IV. Confidentiality / Anonymity

Information provided by participants in these interviews will be held strictly confidential. Neither your name nor any other personal identifier will be associated with the information you

supply. A person who has been trained on procedures for ensuring confidentiality will transcribe the interviews. Personal identifiers, such as proper names, will be removed from interview transcripts. These transcripts will be identified and stored by a numbered code. Tapes and transcripts will be kept in a secure location and only the investigator will have access to and be directly involved in the analysis of interview data. Tapes will be destroyed at the conclusion of the project. Pseudonyms will be used for each participating institution and each individual participant. Institutional descriptions will be broad and identifying information will be eliminated from study reports.

V. Compensation

There are no incentives or compensation offered for participation in this study.

VI. Freedom to Withdraw

You are free to withdraw at any time from participating in this project. You may ask that the tape recorder be turned off at any time during the interview.

VII. Informed Consent

Participants will receive a copy of the consent form, either electronically or as a hard copy, prior to the interview. Participants are asked to indicate their agreement with the stated conditions.

This research project has been approved, as required, by the Virginia Tech Institutional Review Board for Research Involving Human Subjects.

PARTICIPANT'S PERMISSION

I have read and understand the Informed Consent Form for Participants and the conditions of this project. I voluntarily agree to participate in this project. Any questions that I have had about the project have been answered. I hereby acknowledge the above and give my voluntary consent to participate in this project.

Participant Signature

Date

