January, 2004
University of Michigan

ASSESSING THE ACADEMIC WORK ENVIRONMENT FOR FACULTY OF COLOR IN SCIENCE AND ENGINEERING

EXECUTIVE SUMMARY

NSF ADVANCE Project
Institute for Research on Women and Gender
1136 Lane Hall, 204 S. State Street
Ann Arbor, MI 48109-1290
Phone: (734) 764-9537
http:www.umich.edu/~advproj

Assessing the Academic Work Environment for Faculty of Color in Science and Engineering

EXECUTIVE SUMMARY

Examining Race-Ethnicity at the University of Michigan

The University of Michigan's commitment to racial-ethnic diversity is clear, as evidenced most publicly by its legal defense of its continuing efforts to maintain a diverse student body. It has also made continued efforts to develop and sustain a diverse faculty. According to an account in the *University Record* from 1995 (Lomax, Moore & Smith, April 17, 1995),

> When James J. Duderstadt became President of the University of Michigan in 1988, he committed himself, his administration and the University to the Michigan Mandate, a blueprint for fundamental change in the ethnic composition of the University community. One major objective of the Mandate was to increase by the year 2000 the representation of persons of color within the professoriate so that the proportion of such individuals would correspond more closely to their proportion in the population of the State of Michigan and the United States of America. At the beginning of the 1989-1990 academic year, Charles Vest, appointed by President Duderstadt to serve as Provost and Vice President for Academic Affairs, asked his faculty advisory committee, the Senate Assembly Academic Affairs Advisory Committee, to devise approaches to address the problem of underrepresentation of persons of color within faculty ranks.

Nearly a decade later, UM President Bollinger declared, "our mission and core expertise is to create the best educational environment we can. We do this in part through a diverse faculty and student body." [UM News Release, 10/14/97]. As recently as June 2003, University President Mary Sue Coleman reminded the campus, "We must look to the future and affirm our institutional commitment to diversity in every aspect of our community: our student body, our faculty, and our staff." Many faculty and administrators have worked long and hard to ensure that the University has a faculty that is excellent in every respect, including in its racial-ethnic diversity.

Despite the commitment to creating a diverse faculty (and student body), faculty of color at the University remain a small minority in most fields. This report examines the specific situation of instructional track faculty of color in the sciences and engineering on the UM campus.

The data analyzed for this report were originally collected to examine the situation of women science and engineering faculty at the University of Michigan. But we deliberately designed the data collection to include enough faculty of color to permit examination of race-ethnicity as well as gender. Many studies have shown that while race-ethnicity and gender are different in some ways, they also operate similarly in others (Valian, 2000; Clark & Corcoran, 1983; Menges & Exum, 1983); it is therefore always useful to be mindful of both when making efforts to create and maintain a diverse workforce.

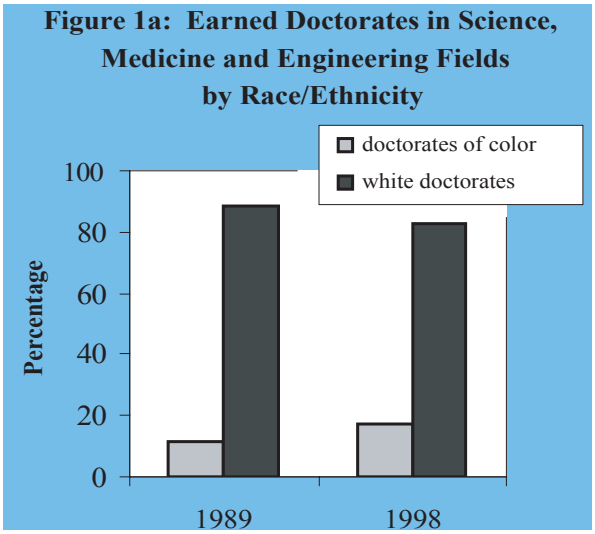
One of the challenges in writing this report

was choosing terminology. We recognize that there is no neutral language for describing an individual's race-ethnicity and that different communities and individuals find specific language to be more appropriate than others. Some challenge the use of color or place of origin language as unhelpful or misleading, while others find minority/majority terminology too dependent on context. Because we had to make a choice, and we are reporting on a hetereogeneous group in terms of race-ethnicity, we have adopted the term "of color" to refer to faculty who self-identify as a member of any racial-ethnic minority group. The contrasting (and also heterogeneous) group of "white" faculty refers to faculty who self-identify as European-American.

Background

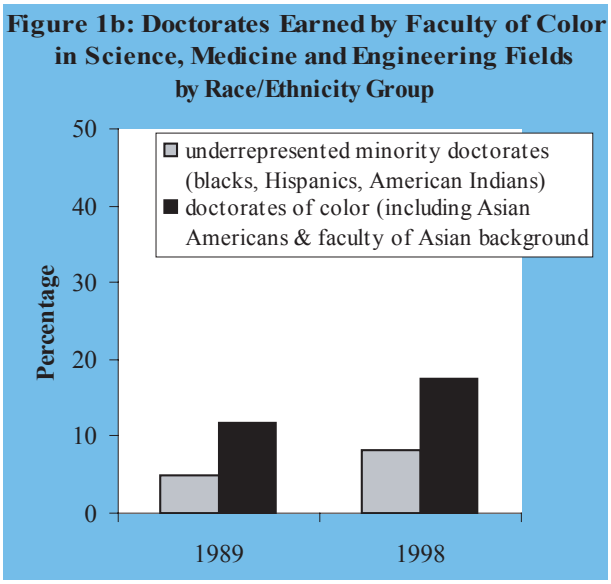
Among full-time doctoral scientists and engineers working in four-year colleges or universities, faculty of color (defined as those of Asian, black and Hispanic background) are less likely than white faculty to be at the rank of full professor, or tenured (NSF, 2000). In addition, black and Hispanic science and engineering faculty are paid less than white faculty in the same field, even after controlling for age and experience (NSF, 2000). These inequities also exist across minority racial/ethnic groups, and between men and women within those groups.

Figure 1a: Earned Doctorates in Science, Medicine and Engineering Fields by Race/Ethnicity



The low representation of faculty of color in science and engineering fields is in part a "pipeline" problem (i.e., not enough doctorates being awarded to students of color). Among science and engineering doctorates awarded to U.S. citizens where the race/ethnicity of the individual could be identified, minorities (including Asian-Americans) earned just over 11% in 1989 and 17% in 1998 (Figure 1a); meanwhile, underrepresented minorities earned just under 5% of the science and engineering doctorates in 1989 and 8% in 1998 (Figure 1b).

Figure 1b: Doctorates Earned by Faculty of Color in Science, Medicine and Engineering Fields by Race/Ethnicity Group



The problems are not limited to the "pipeline," though. Recent studies have shown that faculty of color who complete a Ph.D. in science or engineering and pursue an academic career often encounter more obstacles than their white counterparts. Studies indicate that organizational and environmental factors, such as a hostile working environment, may limit the career attainment and satisfaction of faculty of color in science and engineering fields, as in academe more generally (Allen *et al.*, 2000; Brown, 2000; CAWMSET Report, 2000; Laden & Hagedorn, 2000). Faculty of color report feeling like outsiders in the world of academic science, citing strained collegial relationships with white faculty, particularly when white

faculty mistakenly believe that affirmative action policies have permitted the hiring of less qualified faculty. In response, faculty of color report feeling pressured to continually prove they have earned their positions (Johnsrud & Sadao, 1998; Menges & Exum, 1983; Reyes & Halcon, 1988).

Some faculty of color report that several obstacles limiting their ability to reach professional goals in traditionally white institutions are the result of discrimination and racism (Brown, 2000). For purposes of analysis, scholars have found it helpful to distinguish overt from covert racism (Johnsrud & Sadao, 1998; Dube, 1985), and interpersonal from institutional racism (Johnsrud & Sadao, 1998; Haas,1992). With institutional racism the discrimination may be unintentional, but the policies or practices of an institution result in disparate treatment, even if they are believed to be racially/ethnically (or gender) neutral.

While there is increasing research on the status of scientists and engineers of color as well as that of women scientists and engineers, the particular position of women of color in academic science and engineering has remained largely unexplored. Garrison (1987) has suggested that women of color are also overlooked in the government's bifurcated efforts to increase participation of minorities and women in scientific degree programs. Understanding their singular position, at the intersection of race and gender, is essential for addressing adequately the unique situation of women of color (Holvino, 2001).

UM Survey of Academic Climate and Activities. This report, examining the work environment for faculty of color in science and engineering fields at the University of Michigan, is part of a larger study assessing the campus climate for women scientists and engineers. That study was undertaken to establish a baseline that would enable us to evaluate the impact of NSF ADVANCE-supported efforts at institutional change.

In this report we focus on using that dataset to assess the academic work environment for instructional track science and engineering faculty of color at the University of Michigan. First we compare the responses of instructional track faculty of color in the sciences and engineering to those of white faculty. We also explore gender differences among these faculty of color, comparing the experiences of female scientists and engineers of color to two key comparison groups: male scientists and engineers of color, and female social scientists of color. It is important to note, then, that one set of analyses examines the overall effect of race-ethnicity across gender. The other set identifies the effect of gender within race-ethnicity, and of type of discipline within gender and race-ethnicity.

Sample. The survey sample was drawn from instructional, research and clinical track faculty in science and engineering with paid appointments at the University of Michigan-Ann Arbor as of May 31, 2001. Because the number of faculty of color in science and engineering fields at the University of Michigan is small, the ADVANCE Evaluation Advisory Committee[1] recommended purposely sampling faculty of color to yield numbers large enough to permit analysis by race/ethnicity, and to protect confidentiality. We therefore sampled nearly all faculty of color, including:

- All women scientists and engineers of color across tracks (N=93) and women

[1] Members of that committee included Mark Chesler (Sociology); Mary Corcoran (Political Science, Public Policy, Social Work and Women's Studies); PaulCourant (Economics, Public Policy); Richard Gonzalez (Psychology); Sylvia Hurtado (Education); Janet Lawrence (Education); Valerie Lee (Education); Ann Lin (Public Policy and Political Science); Yu Xie (Sociology).

social scientists of color who were in colleges that also have science faculty (N=52).

- All men scientists and engineers of color, with the exception of instructional track male scientists of Asian or Pacific Islander background. For this group we drew a random sample of 50 (of 131) because the number of men in this category far exceeded the number of women of Asian or Pacific Islander background (N=25). This resulted in a total of 187 men of color in the sample, across racial-ethnic groups.

The sample that responded was equivalent to the larger survey pool in terms of race-ethnicity, rank and college for the instructional track. However, across tracks, faculty of color responded at a lower rate (26%) than white faculty (40%), as is often the case with social science surveys (CSHPE & CEW, 1999).

The sample data were statistically weighted to reflect the race and gender demographic characteristics of the UM faculty population surveyed, as well as the response rates by race and gender. The weighted analyses also included controls to correct for differences among the three core groups compared in the instructional track analyses.

It is important to note that the sample for this study is small, so inferences can only be made with caution. However, given the paucity of systematic data on the experiences of faculty of color in science and engineering, we felt it was critical to carry out these analyses and report on the results to the campus community.[2]

[2]We are grateful to the Evaluation Advisory Committee, as well as a group of senior faculty of color, for advice on this point and the report as a whole.

Comparing Instructional Track Faculty by Race-Ethnicity and Gender

Our primary comparisons were between white instructional track science and engineering faculty (N=185) and instructional track science and engineering faculty of color (N=42). In these and subsequent analyses we controlled for differences between the groups in age, rank, years of experience and years at UM. A second set of analyses compared instructional track female scientists and engineers of color (N=18) to two comparison groups: instructional track male scientists and engineers of color (N=24) and instructional track female social scientists of color (N=12).

Analyses were attempted comparing faculty of color on the three tracks (instructional, research and clinical). Because these analyses only examined within race/ethnicity differences by track, and the numbers of respondents on the non-instructional tracks were small (9 and 19 for research and clinical respectively), we concluded that these analyses were not particularly helpful in clarifying the experiences of faculty of color in comparison with white faculty, so we did not include them in this report.

Career Patterns. Science and engineering faculty of color reported a chilly work environment at UM, against a backdrop of similar professional backgrounds. We examined a number of characteristics of faculty in order to assess whether climate differences were attributable to other differences, or reflected differences in experience attributable to race-ethnicity. Comparing instructional track science and engineering faculty of color and white faculty, we found very few significant differences in professional experience: there were no differences in age and years since Ph.D., or in the areas of productivity, recognition, and career satisfactions.

Comparisons by gender revealed some expected demographic differences. Women social scien-

tists of color were younger and had obtained their degrees more recently than either group of scientists and engineers; however, there were no differences in rank between the women social scientists and women scientists and engineers (over 90% were at the assistant or associate professor rank). Male scientists and engineers of color were more likely to be full professors.

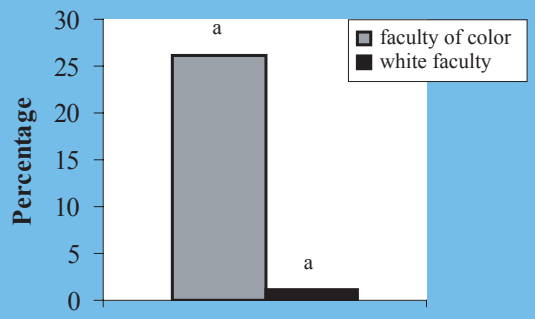
As was found in the comparisons by race-ethnicity, there were no gender differences among faculty of color in level of productivity and few differences in recognition (although significantly fewer women scientists and engineers reported having been nominated for research awards). Importantly, despite these similarities in career patterns, women scientists and engineers were significantly less satisfied with their jobs at UM than their male counterparts.

Household Structures. Generally, instructional track faculty in both race-ethnicity groups reported similar household characteristics: three quarters of the faculty in both groups had a partner and children, and over 60% had a partner who worked fulltime. However, faculty of color were more likely to be single parents.

There were important differences in household composition among the instructional track faculty of color by gender. Most significantly, if partnered, men scientists and engineers were less likely to have a partner who works fulltime than partnered women scientists and engineers or social scientists.

Work Experiences and Climate. While they shared many workplace experiences (e.g., in mentoring, service and teaching load), faculty of color reported a more negative climate than their white colleagues. Scientists and engineers of color reported less satisfaction with resource allocation, experienced higher levels of racial and religious stereotyping, and tokenism, and felt more surveillance than white faculty. Over

Figure 2: Reported Racial/Ethnic Discrimination at UM in Past 5 Years

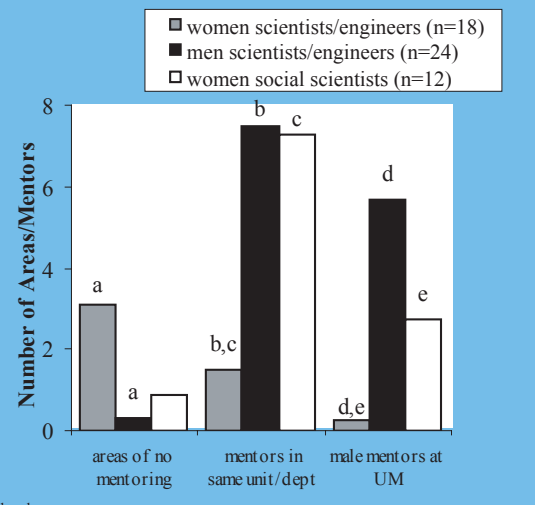


[a] Matching symbols denote statistically significant differences ($p \leq .05$).

25% of science and engineering faculty of color reported experiencing racial-ethnic discrimination at UM within the last five years (Figure 2). Areas of reported discrimination included allocation of space and other resources, access to administrative staff, and graduate student and/or post-doctoral fellow assignments.

Women scientists and engineers of color also reported important differences in their work experiences (e.g., less influence over educational decisions than both comparison groups, fewer items on initial and renegotiated contracts and significantly less mentoring; Figure 3). They also rated their departmental climate as significantly less positive than minority men scientists

Figure 3: Mentoring: Assistant Professors, Instructional Track Faculty of Color



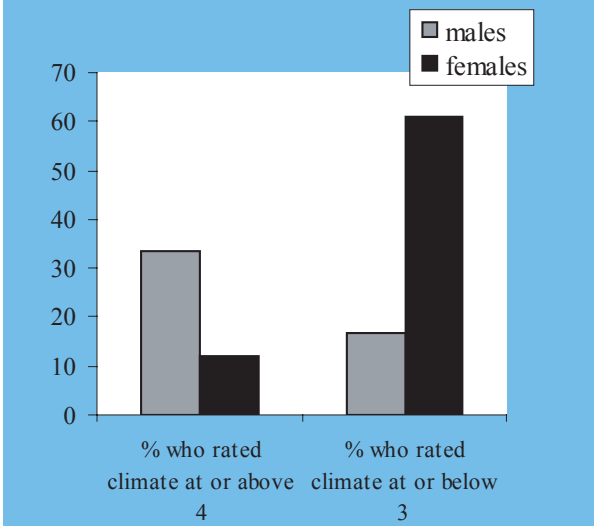
[a,b,c,d,e] Matching symbols denote statistically significant differences ($p \leq .05$).

and engineers (particularly in terms of gender egalitarianism, scholarly isolation and their ratings of their chairs on fairness, creating a positive environment, and commitment to racial/ethnic diversity). There were no group differences in experience of racial discrimination within the faculty of color, but women faculty of color reported significantly higher levels of gender discrimination than did the men.

Looking at the climate scales in the aggregate, women scientists and engineers of color rated their departmental climate as significantly less positive than their male counterparts. On a scale from one (negative) to five (positive), female faculty of color rated the overall climate as averaging below three, while their male colleagues rated the overall climate on average just below four.

One way to assess the magnitude of this difference is to look at the distribution of scores for men and women. Some women scientists and engineers of color rated the climate at or above four (12%), but almost three times as many men did (33%). Some men scientists and engineers of color rated the climate at or below three (about 17%), but over 60% of minority women scientists and engineers did (Figure 4).

Figure 4: Distribution of Climate Ratings Among Instructional Track Faculty of Color by Gender



Implications. Further analyses revealed that departmental climate ratings and campus academic experience indicators (career satisfactions, resources, felt influence, and mentoring), and not personal and professional indicators, were most closely related to overall satisfaction for each of the three sub-groups of instructional track science and engineering faculty of color.

These findings suggest that because scientists and engineers of color, and in particular female scientists and engineers of color, report more negative experiences with regard to departmental climate and broader academic experiences when compared to white science and engineering faculty, they are at a distinct professional disadvantage. Department climate plays a particularly important role in faculty satisfaction generally; the negative departmental climate reported by science and engineering faculty of color has clear consequences for their satisfaction, and satisfaction is generally a strong predictor of retention.

Because gender discrimination or racial/ethnic discrimination questions were rated for "the past five years" on the survey, we were able to examine whether these ratings could "predict" current satisfaction. We found that among all instructional track scientists and engineers, scientists and engineers of color, and female scientists and engineers of color, those who had experienced gender discrimination or racial discrimination reported a more negative climate.

Based on this evidence, it seems that bad experiences may in fact accumulate. Thus, it would likely be in the best interest of faculty and the University to work to prevent the occurrence of negative incidents, and minimize their impact on faculty through implementation of clear policies and procedures to address the difficulties scientists and engineers of color experience.

Conclusions

Science and engineering faculty of color and white faculty at the University of Michigan reported few differences in professional experience, household characteristics, and career experiences and satisfactions. They reported significant differences, however, in perceptions of the work environment. Scientists and engineers of color experienced a less positive climate than their white colleagues, including higher rates of tokenism and racial stereotyping, referred to as covert racism in the literature and linked to feelings of marginalization reported by faculty of color on university campuses (Johnsrud & Sadao, 1998). These results are consistent with other research that finds faculty of color are cut-off from full participation in their academic institutions, institutions that were initially established to serve an all white male faculty (Aquirre, 2000).

There is evidence that among faculty of color at UM, female scientists and engineers on the instructional track fared less well than male scientists and engineers or female social scientists. In this way, the findings discussed here largely parallel those observed among UM science and engineering faculty as a whole (Stewart *et al.*, 2002). These findings are especially important given other research (e.g., Rosch & Reich, 1996) showing that department climate and role of the chair are critical elements in integrating faculty into an institution.

Uses of the Findings

The findings discussed above highlight the importance of climate to overall job satisfaction and also indicate that negative experiences, such as racial discrimination, can "predict" current climate ratings. Therefore, preventing or minimizing early experiences of disadvantage could provide long-term benefits to faculty morale. We hope that the findings in this report will inspire further research on the particular challenges that face male and female faculty of color at the University of Michigan. In addition, we hope that, along with the findings from *Assessing the Academic Work Environment for Women Scientists and Engineers,* these findings will be used to make policy recommendations and identify practices that might improve the work environment for faculty of color, and all faculty, at the University of Michigan.

Inadequate institutional policies and practices, including lack of mentoring (Corcoran & Clark, 1984), unclear promotion policies (Austin & Rice, 1998) and discrimination (Menges & Exum, 1983), contribute to an inhospitable environment for faculty of color. Given the small numbers of faculty of color, and their experiences of the climate, the single most important remedy suggested by our findings is increasing the "critical mass" of science and engineering faculty of color by recruiting and retaining more racially/ethnically diverse scientists and engineers (Branch, 2001). The following remedies are also suggested by our findings:

Climate:

- chairs and senior faculty leaders play crucial roles in defining the climate for faculty; therefore it is important to provide them with adequate support and resources to provide excellent mentoring, problem-solving and conflict-resolution, and establish and maintain fair and judicious procedures and practices;
- encourage departments to make use of centrally provided resources and professional external evaluators to engage in systematic assessment of their own climates that might lead to active steps to address their negative features;
- ensure that departments and colleges have clear and transparent policies and procedures in hiring, tenure, and other decision-making processes that minimize negative experiences.

Mentoring:

- increase commitment to and understanding of mentoring among chairs and senior faculty leaders, as well as younger faculty;
- support on- and off-campus mentoring;
- create formal and informal mentoring programs for tenure track faculty.

Contracts and Resources:

- ensure that equitable offers, counter-offers, and contract agreements are made and monitored;
- ensure clear and transparent policies for allocation of resources.

REFERENCES

Aguirre, A., Jr. (2000). Women and minority faculty in the academic workplace: Recruitment, retention, and academic culture. *Higher Educatiaon Reports, 27*(6), p. 1-110.

Austin, A., & Rice, E.R. (1998). Making tenure viable. *American Behavioral Scientist 41*(5), 736-754.

Branch, A.J. (2001). How to retain African American faculty during times of challenge for higher education. In L. Jones (Ed.) *Retaining African Americans in higher education.* Sterling, Virginia: Stylus.

Brown, S.V. (2000). The preparation of minorities for academic careers in science and engineering: How well are we doing? In G. Campbell, R. Denes, & C. Morrison, (Eds.) *Access denied: Race, ethnicity, and the scientific enterprise*. New York: Oxford University Press, 239-269.

Clark, S. & Corcoran, M. (1986). Perspectives on professional socialization of women faculty: A case of accumulative disadvantage? *Journal of Higher Education, 57* (1) 20-43.

Corcoran, M., & Clark, S. (1984). Professional socialization and contemporary career attitudes of three faculty generations. *Research in Higher Education, 20(*2), 131-153.

CSHPE & CEW (1999). *University of Michigan Faculty Work-Lie Study Report.* Center for the Study of Post-secondary Education and the Center for the Education of Women. November.

Dube, E. (1985). The relationship between racism and education in South Africa. *Harvard Educational Review*, *55*, 86-100.

Garrison, H. (1987). Undergraduate science and engineering education for Blacks and native Americans. In G. Dix., (Ed.) *Minorities: Their underrepresentation and career differenials in science and engineering.* Washington DC: National Academy Press.

Hass, M. (1992). *Institutional racism: The case of Hawaii*. Westport, CT: Praeger.

Holvino, E. (2001). *Complicating gender: The simultaneity of race, gender, and class in organization change(ing). Center for Gender in Reoganizations*. Working Paper, no. 14.

Johnsrud, L.K., & Sadao, K.C. (1998). The common experience of "Otherness": Ethnic and racial minority faculty. *Review of Higher Education, 21.4,* (315-342).

Laden, B.V., & Hagedorn, L.S. (2000). Job satisfaction among facutly of color in academe: Individual survivors or institutional transformers? *New Directions for Institutional Research, 105*, 57-66.

Menges, R. J., & Exum, W. H. (1983). Barriers to the progress of women and minority faculty. *Journal of Higher Education, 54(2),* 123-143.

National Science Foundation. *Women, Minorities, and Persons with Disabilities in Science and Engineering, 2000.* Arlington, VA, 2000. (NSF 00-327).

Report of the Congressional Commission of the Advancement of Women and Minorities in Science, Engineering, and Technology Development (CAWMSET). (2000). *Land of the plenty: Diversity as America's*

competitive edge in science, engineering and technology. Retrieved Spring 2002, http://www.nsf.gov/od/cawmset.

Reyes, M. de la Luz, & Halcon, J. J. (1988). Racism in academia: The old wolf revisited. *Harvard Educational Review, 58,* 299-314.

Rosch, T.A., & Reich, J.N. (1996). The enculturation of new faculty in higher eduation: A comparative investigation of three academic departments. *Research in Higher Education, 37*(1).

Stewart, A.J., Stubbs, J., & Malley, J. (2002). *Assessing the academic work environment for women scientists and engineers.* http://www.umich.edu/~advproj/climatereport.pdf.

Valian, V. (2000). *Why so slow? The advancement of women.* Cambridge, MA: MIT Press.