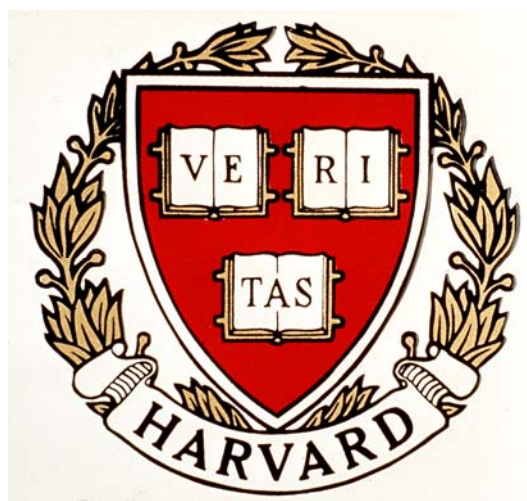


Report from the Task Force on Women in Science and Engineering



May 2005

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The Task Force on Women Faculty and the Task Force on Women in Science and Engineering wish to thank the many individuals who have made invaluable contributions to this report.

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Table of Contents

I. Executive Summary	4
A. A Beginning Not an End.....	5
B. Task Force Charge	5
C. Task Force Membership and Approach	5
D. Recommendations.....	6
E. Relationship to the Task Force on Women Faculty	7
F. Next Steps.....	7
II. Report of the Task Force on Women in Science and Engineering.....	9
A. Introduction.....	10
B. Task Force Membership and Approach	11
C. Key Findings and Recommendations.....	11
III. Detailed Recommendations	15
1. Create Study Centers in the Pivotal Science Concentration Courses	16
2. Develop the Harvard Undergraduate Summer Scientific Research Program.....	19
3. Improve the Environment in Science Departments	22
4. Create, Enhance, and Sustain Activities within Departments that Promote the Success of all Doctoral Students and Appoint a Coordinator in GSAS to Oversee These Activities.....	24
5. Create an Office for Postdoctoral Affairs.....	26
6. Require Pedagogical Training with a Gender Bias Component for Doctoral Students	27
7. Improve Freshman Advising.....	29
8. Track the Progress of Graduate Students and Postdoctoral Fellows, and Provide Mentoring and Professional Development.....	30
9. Provide Mentors for Junior Faculty in the Science Departments	32
10. Explore Options to Provide Paid Maternity Leave and Increase Childcare Scholarships for Doctoral Students and Postdoctoral Fellows	34
11. Expand the Dependent Care Fund for Short-Term Professional Travel.....	36

12. Establish Research Enabling Grants for Primary Caregivers in the Sciences	37
13. Design Programs on Diversity	40
14. Revise and Expand Search Processes to Increase the Recruitment of Women and Underrepresented Minority Faculty in the Sciences	42
15. Establish Programs to Provide Funding and Relief for Key Transition Points in Academic Careers	45
16. Limit the Length of Appointment and Set a Base Salary for Postdoctoral Fellows	49
17. Proposal to Improve Safety at Night for Lab Scientists	50
IV. Future Directions.....	51
V. Appendices.....	52
Appendix A – Charge of the Task Force	53
Appendix B – Women in the Sciences at Harvard University.....	55
Appendix C – Membership of the Task Force.....	58
Appendix D – Membership of the Working Groups	59
Appendix E – Working Groups’ Meetings	62
Appendix F – Reports from Working Groups	63
Appendix G – Postdoctoral Fellows	64

I. Executive Summary

A. A Beginning Not an End

In spite of more than three decades of concern, Harvard has made only limited progress in its efforts to create a genuinely diverse faculty. Women and minorities remain significantly underrepresented in relation not just to their proportions in the broader population, but in comparison to their presence in the student body of Harvard's ten Schools and, in many cases, to their numbers in the pool of Ph.D.s in individual academic fields. In the past year, these issues have generated intense discussion across Harvard about causes and potential remedies. On February 3, 2005, the University announced the formation of two Task Forces—the Task Force on Women Faculty (WF) and the Task Force on Women in Science and Engineering (WISE)—to "develop concrete proposals to reduce barriers to the advancement of women faculty at Harvard" before the end of the academic year in May.

Within this very narrow time frame, the Task Forces have concentrated on identifying issues for immediate action, as well as recommending structures and initiatives that will ensure continuing commitment to enhancing faculty diversity. The Task Forces' investigations have revealed complex and wide ranging concerns warranting significant further attention and analysis. In their three-month effort, the Task Forces have only begun to understand and address the questions that must become an ongoing concern and a continuing priority for the Harvard community and, in particular, for its leadership. This report represents a beginning, not an end.

The Task Forces have worked to identify how Harvard can build and nurture the very best faculty. A diverse faculty is a strong faculty because it emerges from the broadest possible consideration of available talent, talent that Harvard as an institution and a community must encourage and sustain throughout the varied stages of academic careers. The development, recruitment, and support of outstanding faculty, issues which have been at the heart of the Task Forces' deliberations, provide the essential foundation of a great university.

B. Task Force Charge

The charge of the Task Force on WISE was to analyze and make recommendations concerning effective ways to build and sustain the "pipeline" of women pursuing academic careers in science, from undergraduate studies to graduate and postdoctoral work to advancement through faculty ranks. The full text of the charge is in *Appendix A*.

C. Task Force Membership and Approach

The Task Force on WISE was chaired by Barbara J. Grosz, Higgins Professor of Natural Sciences in the Division of Engineering and Applied Science and Dean of Science at the Radcliffe Institute for Advanced Study. The full membership of the Task Force, which included junior and senior faculty from the Faculty of Arts and Sciences (FAS), Harvard Medical School (HMS), and the School of Public Health (HSPH), may be found in

Appendix C. To gain an in-depth understanding of issues at all levels of the pipeline in the charge, working groups led by Task Force members were formed in five career-stage and field areas: undergraduate students, graduate students, postdoctoral fellows in the life sciences, postdoctoral fellows in the physical sciences, and individuals with professional research appointments.¹ An additional working group focused on faculty in the Harvard-affiliated hospitals. The working groups comprised faculty members from the Task Force as well as other faculty members and students or trainees at each level. A full list of working group membership is provided in *Appendix D*.

The Task Force met weekly to review goals, data, research, and preliminary proposals from the working groups as well as issues related to women faculty in the sciences. The working groups consulted their constituencies in a variety of ways, including holding department-specific meetings and open forums, to seek advice from a broad range of individuals. A detailed list of meetings held is in *Appendix E*. In addition, the two Task Forces solicited ideas from faculty across the Harvard Community by writing to faculty and providing email addresses to which they were encouraged to send ideas.

D. Recommendations

In formulating recommendations, the Task Force drew upon prior studies at Harvard and recent efforts at other institutions. Given the similarity of issues raised at each career stage, specific proposals are organized across several broad topics: sustaining commitment, mentoring and advising, enabling academic careers in the context of family obligations, and faculty development and diversity. Recommendation numbers are indicated in parentheses. Detailed recommendations are in Section IV of the report.

1. Sustaining Commitment

- a. Undergraduates
 - i. Create Study Centers in the Pivotal Science Concentration Courses (1)
 - ii. Require Pedagogical Training for Doctoral Students with a Gender Bias Component (6)
 - iii. Develop the Harvard Undergraduate Summer Scientific Research Program (2)
- b. Improve the Environment in Science Departments (3)
- c. Create, Enhance, and Sustain Activities within Departments that Promote the Success of all Doctoral Students and Appoint a Coordinator in GSAS to Oversee These Activities (4)
- d. Create an Office for Postdoctoral Affairs (5)

2. Mentoring and Advising

- a. Require Pedagogical Training with a Gender Bias Component for Doctoral Students (6)

¹ Although individuals with professional research appointments are, in a strict sense, outside of the academic pipeline that flows towards tenured faculty positions, they are an important presence within the academic community, a source of role models for younger scientists, and an important locus of scientific talent. A full report from this working group can be found in *Appendix F*.

- b. Improve Freshman Advising (7)
- c. Track the Progress of Graduate Students and Postdoctoral Fellows, and Provide Mentoring and Professional Development (8)
- d. Provide Mentors for Junior Faculty in the Science Departments (9)
- 3. Enabling Academic Science Careers in the Context of Family Obligations**
 - a. Explore Options to Provide Paid Maternity Leave and Increase Childcare Scholarships for Doctoral Students and Postdoctoral Fellows (10)
 - b. Expand the Dependent Care Fund for Short-Term Professional Travel (11)
 - c. Establish Research Enabling Grants for Primary Caregivers in the Sciences (12)
- 4. Faculty Development and Diversity**
 - a. Design Programs on Diversity (13)
 - b. Revise and Expand Search Processes to Increase the Recruitment of Women and Underrepresented Minority Faculty in the Sciences (14)
 - c. Establish Programs to Provide Funding and Relief for Key Transition Points in Academic Careers (15)
- 5. Miscellaneous Environmental Factors**
 - a. Limit the Length of Appointment and Set a Base Salary for Postdoctoral Fellows (16)
 - b. Improve Safety at Night for Lab Scientists (17)

E. Relationship to the Task Force on Women Faculty

While the Task Force on WISE focused on issues specific to women at all academic career stages in the sciences, from entering undergraduates to tenured faculty, the Task Force on WF studied the status of women faculty across all schools at Harvard University and the issues they face. The Task Force chairs and staff met weekly to coordinate efforts and recommendations across the two Task Forces. The Task Forces exchanged and reviewed recommendations at appropriate milestones during the process. The Task Force on WISE endorses the recommendations developed by the Task Force on WF.

F. Next Steps

The Task Force on Women Faculty, in coordination with the Task Force on Women in Science and Engineering, recommends that a Transition Committee be established to provide initial oversight and implementation of recommendations developed by both Task Forces until accountability for the various action items called for in the Task Force recommendations is formally institutionalized throughout Harvard.

The Transition Committee, consisting of Task Force chairs, Professors Barbara Grosz and Evelyn Hammonds, and Dean Drew Faust, will be supported in its initiatives through expertise resident in the Office of Budgets, Financial Planning & Institutional Research (OBFPIR), Information Management Services and the Office of Work/Life Resources within the Office of Human Resources, the Office of the General Counsel, and other areas of the University as appropriate.

During the summer and fall of 2005, the Transition Committee will:

- Determine the cost and further refine the proposals with a view to their effective implementation;
- Design programs on diversity for University leaders in the larger context of leadership and management;
- Work with appropriate deans to put in place the structures and people needed to begin implementation of the recommendations;
- Continue the data collection effort across Schools;
- Establish initial scope of work, identify potential membership, and coordinate the work of supporting committees:
 - The Climate Survey Committee, which will launch a climate survey instrument for junior faculty in the fall of 2005 and design a survey instrument for all ladder (junior and senior) faculty by the end of 2005;
 - The University Committee on Child Care, which will analyze childcare-related alternatives put forward by the Task Forces and develop an implementation plan to achieve goals outlined in the Task Force reports.

II. Report of the Task Force on Women in Science and Engineering

A. Introduction

1. Context

The Task Force on Women in Science and Engineering (WISE) is one of two Task Forces Harvard established on February 3, 2005, to develop, before the end of the academic year in May, “concrete proposals to reduce barriers to the advancement of women faculty at Harvard.” The WISE Task Force’s charge was to analyze and make recommendations concerning effective ways to build and sustain the “pipeline” of women pursuing academic careers in science, from undergraduate studies to graduate and postdoctoral work to advancement through faculty ranks. The full Task Force charge can be found in *Appendix A*. The combined broad scope and short time frame of the Task Force’s charge led to a focused effort to identify key problems at each stage of the pipeline. The Task Force sought to distinguish those problems for which policies and programs could be recommended immediately from those for which further study would be needed. In addition, the Task Force attempted to define programs, policies, and institutional structures that would contribute to the effectiveness of its explicit recommendations and provide the basis for addressing those problems that were found to require further analysis.

The recommendations proposed in this report address specific problems at each stage of the pipeline. They are neither complete in addressing the full range of problems identified nor do they represent an exhaustive set of programs to address particular problems. However, each is supported by experience at research universities, and together they provide a foundation on which to build more extensive efforts. Detailed implementation plans and costing will be completed during a transition phase that will also allow feedback from the larger Harvard community. The proposals will be further refined and modified during this phase.

Harvard is currently embarking on several important new scientific initiatives, expanding its faculty, and developing many large-scale endeavors (e.g., Broad Institute, Institute for Innovative Computing). For those initiatives to succeed, Harvard must attract the best scientists at all levels as well as the best scientific leadership. A timely investment made to address the issues as outlined in this report will ensure that Harvard is an environment attractive to all the best talent, including women and underrepresented minorities. Women bring diversity in understanding and approach to the research enterprise, and Harvard cannot afford to lose this talent.

2. Schools at Harvard Targeted by the Charge of the Task Force on WISE

The charge required the Task Force to examine the academic scientific pipeline in three of Harvard’s Schools: The Faculty of Arts and Sciences (FAS), Harvard Medical School (HMS), and The School of Public Health (HSPH). Only FAS teaches undergraduates, but all three Schools include individuals at every other stage of the academic science pipeline: graduate study, postdoctoral training, junior faculty, senior faculty, and professional research staff. The percentage of women at each of the three Schools is listed in *Appendix B*. The three Schools have different tenure clocks, financial support structures, and existing policies, and within each School, department culture varies.

Insofar as it was possible, the recommendations have been written in general terms so they may be applied to all Schools and scientific disciplines. In a few instances, however, it was necessary to identify distinct policies for individual organizational units. Most of the structural and policy recommendations presume that deans and department chairs will need to modify the proposals to meet the specific needs of individual Schools and departments.

3. Relationship of Recommendations to Underrepresented Minorities

Although the charge to the Task Force was to address issues affecting women in science, many of the barriers women face are also barriers for members of underrepresented minorities, and some scientists are both female and members of underrepresented minority groups. To the extent that it was possible, the Task Force has aimed to write proposals that are inclusive of the needs of underrepresented minorities. However, since the needs of women and the needs of underrepresented minorities in science do not fully overlap, a study examining the barriers facing underrepresented minorities in science should be conducted in the future.

B. Task Force Membership and Approach

The Task Force on WISE was chaired by Barbara J. Grosz, Higgins Professor of Natural Sciences in FAS's Division of Engineering and Applied Science and Dean of Science at the Radcliffe Institute for Advanced Study. The full membership of the Task Force, which included junior and senior faculty from FAS, HMS, and HSPH, may be found in *Appendix C*. To gain an in-depth understanding of issues at all levels of the pipeline in the charge, working groups led by Task Force members were formed in five career-stage and field areas: undergraduate students, graduate students, postdoctoral fellows in the life sciences, postdoctoral fellows in the physical sciences, and individuals with professional research appointments. An additional working group focused on research and faculty in Harvard-affiliated hospitals. The working groups comprised faculty members from the Task Force as well as other faculty members and students or trainees at each level. A full list of working group membership is provided in *Appendix D*.

The Task Force met weekly to review goals, data, research, and preliminary proposals from the working groups as well as issues related to women faculty in the sciences. The working groups consulted their constituencies in a variety of ways, including holding department-specific meetings and open forums, to seek advice from a broad range of individuals. *Appendix E* contains a detailed list of meetings held. In addition, the two Task Forces solicited ideas from faculty across the Harvard Community through letters that provided email addresses to which members of the community were encouraged to send ideas.

C. Key Findings and Recommendations

1. The need for positive role models in academic science

Two related problems were reported by women at almost every stage of the academic pipeline: the lack of female peers at the same career stage, leading to problems of

isolation, and the lack of role models at more advanced stages of the pipeline. The proposals to improve the situation for Harvard women faculty in the sciences will contribute not only to the recruitment and retention of the best faculty but also to the encouragement of those earlier in the pipeline by providing positive role models. Aspiring young female scientists need to see a position in academic science as an attractive career option. It is crucial not only for Harvard but also for the nation to attract talented women to careers in science.² The proposals described herein aimed at the advanced stages of the pipeline have two main goals. The first is obviously to enable the career of the person at that stage. The second is to demonstrate to younger scientists that there are mechanisms that will enable them to have fulfilling careers as scientists as well as fulfilling personal lives.

2. Overview of recommendations

In formulating recommendations, the Task Force drew upon prior studies at Harvard and recent efforts at other institutions.³ Given the similarity of issues raised at each career stage, the specific proposals have been organized across several broad topics: sustaining interest, mentoring and advising, enabling academic careers in the context of family obligations, and faculty development and diversity. The proposals summarized below directly address critical issues for which immediate actions are clear. As a result of the constrained time frame for its deliberations, the Task Force was able to consider only in a preliminary way a number of other important concerns; these are discussed in Section III, Future Directions, and in the reports of the working groups. The Task Force expects such issues to be further explored and deliberated once the foundation laid by the recommendations in this report is in place.

Sustaining commitment

At the undergraduate level, the attrition rate from science concentrations is greater for women than for men. According to the Office of the Registrar, in the graduating class of 2004, 47.9% of men, as compared to 42.1% of women, who entered Harvard with expressed interest in a natural science concentration actually graduated with a degree in natural science. From discussions with undergraduate students, three main issues emerged as key areas to address in order to encourage and sustain interest in science: enabling success in challenging introductory science courses, preventing gender bias in the classroom, and improving the undergraduate research experience. Proposals directly targeting undergraduate students aim to address these three issues.

Meetings with graduate students and postdoctoral fellows also made it clear that environment continues to be a problem in some departments. To sustain interest throughout graduate school and postdoctoral fellowships, women need to feel respected

² The proposals' focus on keeping women scientists in the academic pipeline is in no way meant to be derogatory of other careers in science. Rather, this pipeline is the focus of the Task Force's charge, and from this perspective the goal is to ensure that those who choose scientific careers outside of academia do so for positive reasons and not because there are negative associations with academic careers.

³ The Task Force is grateful for helpful conversations with faculty at other institutions including: Nancy Hopkins and Lotte Bailyn at MIT; Joan Girus and David Dobkin at Princeton; Pat Jones, John Hennessy, and John Etchemendy at Stanford; Abby Stewart and Martha Pollack at the University of Michigan; and Jo Handelsman at the University of Wisconsin.

in a collegial department environment. Unfortunately, in some departments, women graduate students and postdoctoral fellows report hearing disrespectful criticisms of their abilities from male colleagues and a lack of a supportive environment. Although some female students and postdoctoral fellows of all disciplines face these problems, the problem is especially acute in certain departments, where women are rare, isolated, and sometimes poorly supported. Urgent action is needed to improve the climate in many departments, and several proposals suggest ways in which this could be accomplished.

Another common issue raised among all groups was the inadequate access to basic information and support for programs to encourage diversity in science. Pressing needs for increased communication and resources were raised in every meeting with graduate students and postdoctoral fellows. Specific proposals put forward by the Task Force aim to increase the oversight of career progress, availability of resources, and support for programs to promote the success of all students and fellows.

Mentoring and Advising

The need for improved mentoring and advising was also raised at every level of the pipeline. Proper advising of freshmen is essential to retain women interested in science at this early stage. For graduate students and postdoctoral fellows, the role of the thesis or laboratory advisor is to provide explicit guidance to students. The best advisors are also mentors, providing a range of professional development training as well. However, many advisors do not fulfill their mentoring role adequately. Some departments and graduate programs have systems in place to ensure the adequate advising and mentoring of all students, whereas others do not. Finally, although the old myth of Harvard junior faculty as second-class citizens is no longer accurate in the sciences, discussions with faculty highlighted the fact that mentoring of junior faculty often remains inadequate. At all levels, leaving mentoring to informal channels often leaves women and underrepresented minorities with less support, and it is therefore important that formal plans be put in place for advising, tracking, and oversight of individuals at all levels of the pipeline. Specific proposals aim to address these issues.

Enabling Academic Careers in the Context of Family Obligations

Experimental scientific research differs from other scholarly disciplines in at least two key ways. First, in addition to having to master a complex subject, postdoctoral fellows and junior faculty in scientific disciplines must develop technical expertise in the laboratory. By necessity, the training period for scientists has increased as the technology has advanced. Most students in the sciences finish their doctoral degrees in their mid 20's to early 30's. The next 10 years, which correspond to the key childbearing years, are spent either as postdoctoral fellows or junior faculty.⁴ This expansion into the childbearing years increases the significance of the second key way in which much scientific research differs from other scholarly disciplines, which is that scientific advancement involves experimentation often requiring irregular and long work hours

⁴ In the biomedical sciences, according to a recent report, *Bridges to Independence*, from the National Research Council, the average postdoctoral fellowship in the biomedical sciences is now just under 5 years, and the median age for the first faculty appointment is 36. See *Appendix F* for more details on postdoctoral fellowships.

within a very specialized laboratory environment; it cannot be accomplished from a home office. Unique to the sciences, this constraint significantly impairs progress that can be made by faculty with increased family responsibilities.

As a result, childcare needs influence many women to drop out of the academic pipeline. Asking young women to compromise the care of their children to compete professionally in science, to put off having children, or to forego having children altogether is an unforgivable intrusion into their personal lives and leads many women to choose other careers. The Task Force on WF has focused on the general availability of childcare as well as other work/life issues for faculty, and their report should be referenced for these topics. However, The Task Force on WISE has identified several key areas that need particular attention in the science pipeline and has put forward several recommendations to help enable successful academic careers for women scientists who also have significant family responsibilities.

Faculty Development and Diversity

As stated above, young women in the sciences do not have sufficient positive role models. Increasing the numbers of women and underrepresented minority faculty will thus not only help to increase the representation of women and underrepresented minorities at the faculty level but also will invariably enhance the representation of women and underrepresented minorities at every level of the pipeline. Proposals from the Task Force on WF identify a number of means of improving recruitment and retention of women faculty across disciplines. Here, the Task Force on WISE offers proposals that address recruitment and retention issues of particular salience in the sciences. Specifically, as department climate remains an acute issue in many scientific departments, the need for committed and effective departmental leadership is crucial. Furthermore, given the small pools of women and underrepresented minority candidates in the sciences, conducting an effective search is key to ensuring that talented women are encouraged to apply and are not overlooked in the search process. Finally, support for women, in the form of either funding or time, is needed at several vulnerable transition points at advanced stages of the pipeline.

III. Detailed Recommendations

1. Create Study Centers in the Pivotal Science Concentration Courses

- **Create study centers targeted to introductory science courses staffed by undergraduate students who previously excelled in the course**

Rationale

The major undergraduate science concentrations have a small set of challenging courses taken by all or most of the concentrators in their freshman and sophomore years (see Table 1). Difficulties with these gateway courses often discourage students from pursuing science concentrations. Success in these courses develops confidence that is especially crucial for those students, such as women and underrepresented minorities, who also face additional challenges such as differential treatment in the classroom.⁵

Based on 15 years of research, including 400 interviews at 90 universities, Harvard professor Richard Light asserted that students learn more when they study together in small groups outside of class than they do studying alone and that some of the most meaningful college experiences involve advice, opportunities, and challenges from teachers outside of the classroom.⁶ Therefore, strong, supportive study groups can be the determining factor in the success of women and underrepresented minorities in science concentrations. Additionally, these types of groups promote greater performance in the classroom and encourage long-term academic development.

Study Centers have been operating for a number of years in the Math and Physics Departments. Additionally, smaller, more targeted programs have been in existence in many of the individual science and math courses. This proposal is based on the success of these existing models. The Math and Physics study centers have effectively served the larger introductory courses, but they are not yet in place for many of the smaller advanced introductory courses. The proposed new study centers, which will target courses for potential concentrators, will have little overlap with existing programs.

The study centers will provide supportive environments for study and problem solving as well as a place where study groups form and grow. They will be open to all students, but experience suggests that women will take greater advantage of these centers than men.

Recommendations

Create “study centers” targeted to specific courses (or related groups of courses) from this set of courses in the major science concentrations (see Table 1). The study centers should be staffed by students who recently excelled in the courses in question and have been specially invited by the course faculty to participate in the program.

Explanatory Note: This staffing by students knowledgeable in the specific course is important to ensure that staff and students are using the same vocabulary and notations.

⁵ Crombie, G., Pyke, S.W., Silverthorn, N., Jones, A., Piccinin, S. (2003). Students' Perceptions of Their Classroom Participation and Instructor as a Function of Gender and Context, *Journal of Higher Education*, 74, 51-76.

⁶ Light, R.J. (2001). *Making the Most of College: Students Speak Their Minds*. Cambridge, MA: Harvard University Press.

These student staffers would be available to answer questions and provide suggestions relating to the course material. In addition to a solid understanding of the material, student staffers must also have strong communication and social skills and the ability to relate well with women and underrepresented minority students. The Task Force recommends that the study centers not be staffed by teaching fellows because they are responsible for grading the students' class performance, and therefore students may not feel comfortable asking some questions. The position of study center staffer will provide both recognition and a valuable learning experience for students who have done well in these important courses. Targeting outstanding women and underrepresented minority students for these positions will encourage and help advance their participation in the sciences. Because study centers are less intense tutoring experiences than individual tutoring sessions and the invitations to participate will come from faculty members, the Task Force expects to attract sufficient outstanding staff for the program.

Study centers could be housed in undergraduate lounges, small departmental classrooms, the science center in the afternoon, or house dining halls in the evening. It is especially important for study groups in these centers to take place during the days before problem sets are due. It would be beneficial for students if faculty and teaching fellows would encourage them to come to the study centers. Occasional appearances by the faculty in the courses, and possibly more frequent appearances by graduate teaching fellows, would highlight the importance of the study centers. Although there would be no evaluation component, the Task Force recommends that staff track the number of students who attend the centers.

Funding is needed to support approximately 2,535 hours of student staffing at the rate of \$12 per hour, which is the Bureau of Study Counsel's standard tutoring rate, for a total of \$30,420. The total size of the proposed study center program is smaller than the Bureau's current effort in tutoring (approximately 6,000 hours per year). The Bureau is eager to help with the organization of the program. Additional funds are also needed to support extended resources from the Bureau of Study Counsel in the form of at least one-half of a FTE. Based on a discussion with representatives from the Bureau of Study Counsel, this employee will be responsible for recruiting and training of study center staff, managing the schedule (arranging space within the houses and departments), coordinating with faculty and departmental staff, managing payroll, and, if additional resources were made available, evaluating the study centers. Evaluation of the study centers would be a valuable tool in assessing the effectiveness of the centers as well as projecting long-term needs and expenses.

Table 1: The table lists the concentrations and the courses that are in critical need of study centers. It also outlines the terms during which the courses are offered, the level of priority, whether or not study groups already exist, and the number of staffing hours needed to support the study centers. The Task Force estimates that each course will require five staff hours per week for a 13-week term for a total of 65 hours. This figure should be adequate in most courses and should allow a reasonable test of the program next year.

Table 1 – Undergraduate Introductory Science Courses in Need of Study Centers:

Department	Course Number	Term	Priority	Exists	Hours (Fall)	Hours (Spring)	Comments
Applied Math	21a	fall	high	no	65		
Applied Math	21b	spring	high	no		65	
Applied Math	105a	fall	high	no	65		
Applied Math	105b	spring	high	no		65	
Astronomy	145	spring	see note	no		65	1
Astronomy	150	fall	see note	no	65		1
Biological Sciences	50	fall	see note	no	65		2
Biological Sciences	52	fall	see note	no	65		2
Biological Sciences	54	spring	see note	no		65	2
Biological Sciences	56	spring	see note	no		65	2
Biological Sciences	80	spring	see note	no		65	2
Chemistry	5	fall	high	yes	65		
Chemistry	7	spring	high	yes		65	
Chemistry	15	fall	high	no	65		
Chemistry	17	fall	high	no	65		
Chemistry	20	spring	high	no		65	
Chemistry	27	spring	medium	no		65	
Chemistry	30	fall	medium	no	65		
Chemistry	60	spring	medium	no		65	
Chemistry	160	fall	medium	no	65		
Computer Science	50	fall	high	some	65		
Computer Science	51	spring	high	some		65	
Computer Science	121	fall	high	no	65		
Computer Science	124	spring	high	no		65	
Economics	1010a	fall	see note	no	65		3
Economics	1011a	fall	see note	no	65		3
Engineering Sciences			see note				4
EPS							5
Math	23	both	high	no	65	65	
Math	21+below	both	high	yes	65	65	
Physics	15a	both	high	yes	65	65	
Physics	15b	both	high	yes	65	65	
Physics	15c	both	high	some	65	65	
Physics	16	fall	high	yes	65		
Physics	143a	both	high	some	65	65	
Statistics							6
Total					1365	1170	

1. Astronomy is a small concentration; it may not be necessary to cover both Spring and Fall courses.
2. These courses are subject to change as the biological sciences are currently reviewing and restructuring their introductory undergraduate courses.
3. Since there are very few women in the more quantitative areas of economics, it may prove beneficial to create study centers for these courses.
4. Introductory engineering courses are organized differently from the other science courses; further discussion is required to determine if study centers would be useful for these courses.
5. There do not seem to be any appropriate courses in Earth and Planetary Sciences for study groups.
6. Further discussion is required to determine if study centers would be useful for this concentration.

2. Develop the Harvard Undergraduate Summer Scientific Research Program

Develop a summer research program for Harvard undergraduates to significantly enhance the summer undergraduate scientific research experience

- **Create and maintain within the Harvard College Dean's Office a repository of comprehensive information about undergraduate scientific research opportunities**
- **Open one of the undergraduate Houses to accommodate students engaging in summer undergraduate research**
- **Develop workshops and seminar series within the House to further enhance the summer research experience**
- **Provide safe, reliable transportation to and from the labs**
- **Establish the program by the summer of 2006**

Rationale

For many aspiring scientists, undergraduate research is a critical part of the college experience. A good research experience gives students first-hand knowledge of the way scientific research is conducted, knowledge that cannot be obtained in the classroom. Summer research provides students with time to focus on their research and participate intensely in the activities of a research group. Although both men and women would obviously benefit from this research experience, a positive research experience in a supportive, collegial environment can make a significant difference in a female student's decision to continue in one of the fields of basic science. Studies have shown that both participating in undergraduate research in general, and also more specifically in a summer research program, increases the likelihood a student will choose to attend graduate school and complete a degree in the basic sciences.^{7,8}

The Harvard College Research Program (HCRP) funds, at least partially, the summer research of well over 100 Harvard students each summer. The total number of students currently participating in summer scientific research in Cambridge and Boston, based on a survey of departments, is estimated to be between 250 and 300. An expanded summer research program would likely attract even more students.

It should be possible to house large numbers of research students in a single Harvard House for the summer. In addition to providing safe and affordable housing to undergraduate students, housing the students together would provide much needed social support for undergraduates, especially women and underrepresented minority undergraduates, who may otherwise feel isolated in a lab over the summer. Housing the majority of summer research students in a Harvard House also addresses issues of safety.

⁷ Nagda, B.A., Gregerman, S.R., Jonides, J., von Hippel, W., & Lerner, J.S. (1998). Undergraduate student-faculty research partnerships affect student retention. *The Review of Higher Education*, 22(1): 55-72.

⁸ Alexander, B.B., Foertsch, J.A., & Daffinrud, S. (1998, July). *The Spend a Summer with a Scientist Program: An evaluation of program outcomes and the essential elements of success*. Madison, WI: University of Wisconsin-Madison, LEAD Center.

These proposals for improving the undergraduate research experience would be an excellent tool for recruiting an even larger share of the best undergraduate scientists to Harvard. By providing safe housing, social support, and workshops, these proposals will help to encourage women and underrepresented minorities to engage in summer research and continue to pursue scientific careers. Clearly, this program will require additional funding to support all aspects of the proposal. However, even when this program is in the planning stage, the structure will be so attractive that it may be possible to obtain external funding to help support the program.

Recommendations

1. Undergraduate research is a fundamental part of undergraduate education and should be centrally coordinated by staff in the Undergraduate Academic Programs in the Harvard College Dean's Office whether or not funding comes from HCRP.

Explanatory Note: The coordinator in the Dean's office should maintain lists of faculty and labs (including local industrial labs) interested in having undergraduate students participate in research. The coordinator should also collect follow-up information assessing students' experiences to help students subsequently looking for research opportunities during the semester. The program should not be limited to those students funded through HCRP. In particular, students paid by labs or outside fellowships should also be able to participate in all aspects of the program and live in the designated House. The staff would be responsible for planning and coordinating the seminars and workshops (see below for more details).

2. One of the undergraduate Houses should be designated for Harvard undergraduates doing summer research in Harvard labs.

Explanatory Note: Providing inexpensive housing will allow the scarce financial support for undergraduate research to go further. However, it is possible that the total funding will need to be increased. This will be much easier to determine once central coordination is in place. It would be ideal to provide meals for the research students at breakfast and dinner in the House dining hall. However, even if the dining hall of the House in question could be opened in the evening and supplied with only beverages and snacks, the House dining hall would still likely become a focal point for interactions and a natural place to run evening programs.

3. Further enhance the program with evening events.

Explanatory Note: For example, students could gain experience in scientific presentations through student seminars on their research. Scientists from the local community could be invited to speak in evening workshops. Special efforts should be made to invite distinguished local women and underrepresented minority scientists to speak to students. The program could also include evening workshops on how to select and apply to graduate schools, as well as how to apply for NSF, HHMI, or other graduate

fellowships, as these applications are submitted during the fall of the year prior to graduate school (i.e., in many instances, the senior year of college).

4. Provide safe, reliable transportation to and from the labs.

Explanatory Note: It is particularly important for women students to have safe means of travel, which is very difficult to arrange when the students are spread all over Cambridge and Boston. With most students in a House, it becomes much easier. The shuttles from the North Yard science area and the Longwood Medical Area to the House could simply be run during the summer with a schedule focused on the morning and evening commuting times, and a few late-evening times. Other options would include evening escorts or taxi vouchers.

5. This entire program, which centers on housing summer research students together, is so critical to the success of recruiting and retaining top-level women in the sciences that a way to launch the program by the summer of 2006 must be found.

3. Improve the Environment in Science Departments

- **Require departments to work towards building a sense of community among students, including a formal *departmental* orientation event for graduate students**
- **Make funds available to establish programs to train all members of a department in technical skills and equipment use**

Rationale

The 1991 *Report on Women in the Sciences at Harvard* highlighted the effect of departmental environment on women in science, noting that:

What happens to women graduate students reflects the intellectual and social life of a department as a whole. In departments where the environment inhibits graduate training, research and collegiality for both women and men, it is particularly damaging for the professional and personal outlook of women.

The Task Force identified three major factors that affect departmental environment. These are: the degree to which the department encourages interaction among students and with faculty, the number of women graduate students and their opportunities to interact, and access to technical training. The recommendations are intended to improve department environments by focusing on ways to address weaknesses in these key areas.

Departments have varied significantly in the extent to which they encourage collegial interactions among students and with faculty. Departments that make efforts at integration and collegiality have adopted a variety of methods for doing so. These range from holding weekly department lunches or dinners to retreats at which students and faculty present research. Other departments would benefit from using similar methods to build a sense of community.

It is especially crucial to promote a sense of community among women and underrepresented minorities. The small numbers of women graduate students in some scientific fields have caused many women graduate students to feel isolated. This feeling of isolation is experienced even in fields where there are significant numbers of women; the nature of the work leads women to be dispersed among different labs, limiting their opportunities for interaction. This isolation can inhibit the professional development and education of women scientists by depriving them of positive role models and support.

To make the leap from classroom training to laboratory research requires certain technical skills. Both confidence in one's abilities and commanding equal respect from peers depends on fluency in these technical arenas. Students typically learn such technical skills from senior graduate students or postdoctoral fellows who help teach those earlier in the pipeline. However, these informal networks may present obstacles for women and underrepresented minorities, and as a result, access to informal training tends to be more limited for women than it is for men. Thus, creating and maintaining a positive experience in the department environment requires that all members of the

department have equal access to technical training. Instituting formal training programs in the technical skills required for specific fields of research would help ensure that women and underrepresented minorities have equal access.

Recommendations

1. Create department-specific programs to help integrate graduate students into the intellectual environment and promote collegial interactions. In particular, require all graduate programs to provide a formal *departmental* orientation event during the first semester at which students not only learn about degree requirements but also are introduced to the informal networks and systems that contribute to collegial life and to the services provided by GSAS. During the semester, each department should sponsor events that are both scientifically focused and more informal to increase collegial interactions among graduate students and with faculty. If needed, department budgets should be augmented to support these activities.

2. Require department chairs to include in their annual letter to the Dean of the Faculty a description of their department's community-building efforts as well as student evaluations of the department environment.

3. Create cross-field programs and activities in GSAS that promote a sense of community among women and underrepresented minority science students and thus limit the feeling of isolation often experienced by students in many science departments.

4. Provide innovative teaching funds to enable faculty, graduate students, postdoctoral fellows, research staff, and lecturers to develop effective formal technical training relevant to their field of study.

Explanatory Note: These courses should be open to anyone engaged in research, including advanced undergraduate students as well as graduate students. In addition to helping graduate students acquire the skills they need while circumventing the necessity of relying on informal networks of more senior students—a system that can often put women and underrepresented minorities at a disadvantage—these courses would likely also benefit undergraduate students by helping prepare them for independent research.

5. Provide funds for departments to establish technical assistant (TA) positions to support the appointment of graduate students and postdoctoral fellows. The role of TAs would be to train other students on a one-on-one basis in specific technical areas (e.g., field specific computer programming, instrument fabrication, or the use of certain equipment).

Explanatory Note: These positions should be year-round with responsibilities similar to those of teaching fellowships. Students appointed to these positions should be required to participate in teaching fellow training (see Proposal 6), and their performance should be formally evaluated each semester.

4. Create, Enhance, and Sustain Activities within Departments that Promote the Success of all Doctoral Students and Appoint a Coordinator in GSAS to Oversee These Activities.

The responsibilities of the coordinator would be to:

- **Promote mentoring, networking, and professional development**
- **Promote information dissemination**

Rationale

Female graduate students in science expressed concern over the difficulty of obtaining information about policy issues and resources that are available for women. They also reported feelings of isolation and expressed the need for more opportunities to network with each other and professional women working in their fields of interest. While there are a number of existing departmental graduate women in science (GWIS) groups (e.g., chemistry, physics, and the biological sciences) that help to address these needs, they lack administrative support, interdepartmental connectivity, and communication resources. Continuity depends on particular women students, which places an additional burden on those students. The funding for these grassroots groups depends entirely on the largesse of the department and is therefore inconsistent across departments.

Additionally, many students and postdoctoral fellows report that the lack of female role models and faculty discourages them from pursuing careers in science. It is essential that in every field, efforts are made within departments to invite women and underrepresented minorities to give departmental seminars. Furthermore, women graduate students in science should be provided with opportunities to meet with the speakers in settings that encourage open and frank discussions of scientific issues and careers.

Recommendations

Create, enhance, and sustain activities within departments that promote the success of all doctoral students. Appoint a coordinator in GSAS – a senior person with a staff – to coordinate and oversee these activities.

Explanatory Note: To institute the range of programs needed requires increased administrative support. The proposed GSAS coordinator should be able to provide information and services to GSAS students as well as doctoral students at the School of Public Health. The Task Force further recommends creating a student advisory committee that advises the coordinator on student issues and helps to disseminate information to students.

The central coordinator's responsibilities (with staff support) would include:

- 1. Promote mentoring, networking, and professional development**
 - a. Organize and provide funding for interdisciplinary events such as casual forums for students to meet with faculty to learn networking
 - b. Provide funding for opportunities for GWIS to meet with departmental seminar speakers who can encourage graduate women in science

- c. Provide administrative and budgetary support for departmental graduate student groups, including GWIS groups
- d. Maintain a repository of “best practices” and work with department chairs or program directors to design appropriate programs for advising, mentoring, and improving department environment for graduate students

2. Promote information dissemination

- a. Host and maintain web pages
 - These web pages should link to a larger website (to be created) that will serve as the home for all women in science group web pages
 - Provide links to major job advertising sites, funding agencies, etc.
 - Maintain a calendar with relevant meetings, workshops, and functions
- b. Create a “Handbook for Graduate Student Life”
 - Include a section on the specific issues facing GWIS
 - Include general information on resources available at Harvard and in the Boston area (e.g., wellness and clubs)
 - Model after existing handbooks, such as the handbook on undergraduate student life or the OEB student handbook

5. Create an Office for Postdoctoral Affairs

- **The Office for Postdoctoral Affairs should provide oversight, administrative support, professional development resources, networking opportunities, and career resources for postdoctoral fellows**

Rationale

Postdoctoral fellows are neither students nor staff. As a result, currently there is neither institutional organization nor oversight of their training. In some cases, lack of adequate mentoring and resources can disproportionately disadvantage women. A recent survey by Sigma Xi found a strong correlation between administrative oversight and productivity of postdoctoral fellows. By providing postdoctoral fellows with administrative resources, including access to University policies concerning postdoctoral fellows, procedures for grievance resolution, professional development programs, mentoring programs, and career advice, it is possible to increase the quality and productiveness of the postdoctoral training experience.

Recommendation

An Office for Postdoctoral Affairs should be established within the Office of the Provost. A senior staff member should head the office and coordinate efforts with and provide oversight for the existing office for postdoctoral fellows at HMS.

Explanatory Note: The responsibilities of this office would include:

1. Provide administrative oversight of postdoctoral fellow appointments
2. Provide oversight of the professional development plan and annual reviews for postdoctoral fellows (see Proposal 8)
3. Provide funding and coordinate with GSAS and departments for professional development seminars (see Proposal 8)
4. Provide information on benefits and resources
5. Connect postdoctoral fellows in need with faculty members other than their advisor who are willing to serve as confidential mentors
6. Provide career resources

6. Require Pedagogical Training with a Gender Bias Component for Doctoral Students

- **Require all doctoral students in the sciences to take a Teaching Fellow training course that includes a component on gender bias**

Rationale

Graduate programs produce the next generation of faculty and research scientists. It is therefore essential that doctoral students learn how to teach well and that seminars that train doctoral students to teach include a component on gender bias. Training doctoral students to teach well will especially benefit the undergraduate students in their courses.

Female undergraduate students continue to report and express concerns about gender bias of teaching fellows in science courses. Although the bias is described as subtle, and almost always unintended, it decreases confidence and discourages women students from pursuing more advanced study in science.

Experience and practice in teaching is important for the future career success of doctoral students, regardless of their immediate career plans. Scientific research is typically done in groups, and Ph.D. level researchers spend a significant amount of time teaching other members of a research group on an informal basis. By granting a doctoral degree, the University is declaring recipients qualified to teach as well as to carry out research. Thus, teaching fellow training that incorporates education about gender bias is important even for students whose immediate career plans are not to pursue faculty positions. Furthermore, understanding gender bias and becoming familiar with techniques to avoid unintended bias in teaching and working with others will help doctoral students address and prevent such behavior not only in their roles as teachers but also as colleagues.

Recommendations

Require all doctoral students in the sciences to take a Teaching Fellow (TF) training course that includes a component on gender bias before allowing them to assume a teaching fellow position; require all doctoral students in the sciences to complete such a course before they progress to G3 regardless of whether they intend to become a TF.

Explanatory Note: By G3, even those graduate students who do not intend to pursue teaching fellowships begin to take on the roles of more senior students, informally teaching junior students in the lab. The requirement of a TF course in their first two years will enable all students to perform better in such informal teaching roles.

Implementation Note: Research on implicit bias shows that most people exhibit biases different from their explicit beliefs, and thus many of the behaviors experienced by students as biased are unintentional. Such behaviors can be changed with awareness and practice, but recognizing and changing this type of behavior takes time. Rather than listening passively, prospective teaching fellows need training in which they have the

opportunity to practice and receive feedback on active teaching and, ideally, to observe videotapes of their own behavior in order to identify and correct implicit bias.

The intention of the TF training requirement is that it be met by extended courses in which students engage in practice teaching or micro-teaching, so that they experience the gap between endorsing general principles (e.g. “discrimination is wrong”) and their own conduct, and that the training be extended in time and iterative, so that students can adapt and re-evaluate their own behaviors.

Some departments already offer excellent semester-long training. Departments that do not and are not able to develop such a program on their own could consult with the Bok Center, which has indicated its willingness to develop such courses in cooperation with departments if given the appropriate resources.

Special Note: The charge of the Task Force was to address the underrepresentation of women in the sciences and engineering, and so the Task Force’s proposal is limited to graduate students in these areas. The Task Force’s findings in the science and engineering departments raise the question of whether TFs in other departments also display implicit bias in their teaching and would therefore benefit from a TF training requirement. The Task Force hopes that the Deans of FAS and GSAS will consider broadening the scope of this program.

7. Improve Freshman Advising

- **Each undergraduate student with an expressed interest in science should be assigned an academic advisor with expertise in one of the student's expressed scientific areas of interest**

Rationale

Adequate advising of undergraduate students is essential to encourage and support interest in science. Currently, very few freshmen interested in science are assigned advisors who are science faculty. Instead, proctors typically fill the role of academic advisor. As proctor assignments are made based on “geography” (i.e., around entryways) as opposed to expressed academic interest, most undergraduate students with expressed interest in science have an advisor with insufficient knowledge not only of their specific field of interest but also about science concentrations in general.

Recommendation

Each undergraduate student with an expressed interest in science should be assigned an academic advisor with expertise in one of the student's expressed scientific areas of interest.

Explanatory Note: Although it would be ideal to assign each student with a faculty member as an academic advisor, this may not be possible in all cases. When it is not, the proctor/advisor roles could be split in the case of science students to ensure that students with an expressed interest in science have a proctor or member of the administration with expertise in science as their academic advisor.

8. Track the Progress of Graduate Students and Postdoctoral Fellows, and Provide Mentoring and Professional Development

- **Require all graduate students to meet with a thesis committee annually**
- **Require all postdoctoral fellows to submit a professional development plan and progress reports to the Office for Postdoctoral Affairs**
- **Create, develop, and administrate professional development programs for graduate students and postdoctoral fellows through coordinated efforts of The Office for Postdoctoral Affairs and GSAS**

Rationale

Although the clearest role of an advisor is to provide explicit guidance to students, the best advisors are also mentors, providing training in such areas as giving talks; writing papers, grants, or fellowships; networking; negotiating; and managing a lab. However, it has become clear that not all advisors are fulfilling their roles either as advisors or mentors. Reports to the Task Force working groups suggest that female graduate students and postdoctoral fellows receive less advising and mentoring than their male counterparts. Women are also more likely than men to report that they view their relationship with their advisor as one of “student-and-faculty” compared to “mentor-mentee” or “colleagues.”

It is essential that all doctoral students and postdoctoral fellows receive proper mentoring and professional development throughout their education and careers. Students and postdoctoral fellows may receive excellent science educations and technical training, but they do not necessarily learn the skills that are required to secure and sustain successful scientific careers. To create a permanent change in the representation of women and underrepresented minorities in the sciences, efforts need to be made to adequately advise graduate students and postdoctoral fellows and to cultivate their professional skill sets. Some departments have good advising policies that help to compensate for lack of individual advising, whereas in others, formal policies are lacking. Formal policies are needed to ensure that all students in all science departments receive proper advising and mentoring.

Recommendations

- 1. Require all graduate students to meet with a thesis committee of at least three faculty members at least once a year.**

Explanatory Note: It is important for graduate students to receive guidance and mentoring from faculty members in addition to their advisors. If a thesis committee is not formed immediately upon entering graduate school, an advising committee should fill this role until a student joins a research group and forms a thesis committee. GSAS, with support from the Registrar’s office, should maintain a record of thesis or advisory committee members. A yearly progress report, signed by all thesis or advising committee members, should be filed with the Registrar’s office before a student can register for the

next academic year. Several departments and programs have successful systems in place that can serve as examples for other departments.

2. Require all postdoctoral fellows to submit a professional development plan and progress reports to the Office for Postdoctoral Affairs (see Proposal 5) within one month of their appointment.

Explanatory Note: A recent study of postdoctoral fellows by Sigma Xi argues that formal oversight is beneficial not only to female fellows but also to all postdoctoral fellows as well as the University. Sigma Xi found that postdoctoral fellows who received structured oversight and training were more satisfied with their postdoctoral experience and were more productive in terms of publications. The Office for Postdoctoral Affairs should develop guidelines for professional development plans. Progress reports, signed by both the postdoctoral fellow and advisor, should be submitted annually.

3. The Office for Postdoctoral Affairs (see Proposal 5) and GSAS should coordinate the creation of professional development programs for graduate students and postdoctoral fellows.

Explanatory Note: The nature of these programs may vary, depending on the specific needs of students and postdoctoral fellows in a given department. Some examples include semester-long courses and intensive seminars or separate workshops on necessary skills such as how to: give a job talk; write fellowship applications, proposals and papers; manage grants; establish and manage labs; manage time; negotiate; and find a postdoctoral or faculty position. The Office for Postdoctoral Affairs and GSAS should coordinate to create, develop, and administrate these programs. Funding and support should be made available through the Office for Postdoctoral Affairs and GSAS to assist departments that choose to offer special department-specific programs.

9. Provide Mentors for Junior Faculty in the Science Departments

- **Require a departmental plan for formal mentoring of junior faculty**
- **Develop an individual mentoring plan for each junior faculty appointment**
- **Make mentoring workshops and other programs available to faculty**
- **Integrate junior faculty into the intellectual environment of the department**
- **Deans are responsible for the implementation and oversight of these efforts**

Rationale

The need for senior faculty to serve as mentors for junior faculty was stated in the 1991 *Report on Women in the Sciences at Harvard*:

Senior Faculty must aid in the professional development of their junior colleagues. . . . Senior faculty mentors can offer advice about sources of funding and preparation of grant applications, as well as the pleasures and perils of serving on particular departmental committees. Faculty mentors could highlight the work of junior colleagues at meetings; make referrals for speaking engagements, review articles and consulting opportunities as well as research students and postdoctoral associates; and promote nominations for awards or other honors. As the time for consideration of the junior faculty member for tenure approaches, mentors can help prepare the candidate for Harvard's review process and, when appropriate, recommend him or her to other faculty search committees.

The old myth of Harvard junior faculty as second-class citizens is no longer accurate in the sciences. Departments make a substantial investment in their junior faculty, and most departments have recognized the importance of welcoming their junior colleagues as valued members of the department. Nevertheless, in discussions with faculty, it became clear that lack of adequate mentoring of junior faculty remains an issue in a number of departments. In some cases, departments have no formal program; in others the program is not consistently deployed or senior faculty may lack knowledge of the best approaches to mentoring of junior colleagues. Leaving mentoring to informal channels privileges some junior faculty, leaving other junior faculty to fend for themselves. In such situations, women and underrepresented minority faculty often receive less support.

The 1991 report recommended that departments “provide senior faculty committees to advise junior faculty on scientific and career development and on departmental issues.” The emphasis placed on providing junior faculty with more than a single senior faculty mentor was not only to avoid problems of patronage but also to “offer advantages of greater visibility and increased collegiality within the department as well as providing a wider range of guidance and support.” Significant research on approaches to mentoring has been undertaken in the last few decades; a recent literature survey done for the FAS Divisional Dean for Social Sciences (Washburn memo, March 2005) provides an overview of this work. Departments may vary in the approaches that would work best for junior faculty in their field. In some cases, faculty from other departments may serve important mentoring roles. The recommendation is thus not for a particular type of mentoring plan, but that each department develop some kind of formal plan, and that all junior faculty be provided with mentor(s) according to that plan from the beginning of their appointments. As a result of the search process, the search committee includes

those faculty most familiar with the new appointee. Thus, it would typically be natural to assign to that committee the task of developing an initial proposal for instituting the mentoring plan for this person.

In addition to its discussion of the need for mentors, the 1991 report also described “widespread concern that junior faculty are not consulted or even informed of major decisions.” In several science departments, junior faculty still do not feel fully integrated into the intellectual environment of the department. Although senior faculty mentors can help solve this problem, faculty in general need to address the need for junior faculty to be treated as peers and as important contributors to the departmental community.

Recommendations

- 1. Require each science department to develop a plan for formal mentoring of junior faculty if there is not already one in place.**
- 2. For each new appointment, a specific individualized mentoring plan should be developed.** Clearly articulated responsibilities for the assigned mentor(s) should be outlined in writing at the time of initial appointment. This plan should be included with the appointment dossier and reviewed as part of all junior faculty reviews (e.g., second year and assistant to associate reviews in FAS). Departmental mentoring plans for all current junior faculty should be reviewed whenever the department chair is replaced.
- 3. Make available workshops and other programs from which faculty may learn how best to carry out the mentorship function.**
- 4. Departments that do not already do so should undertake efforts to integrate junior faculty fully into the intellectual environment of the department and to include them in decision-making about major departmental matters, including curricular developments, committee responsibilities, areas for faculty growth, and major initiatives.**
- 5. The dean of each School is responsible for implementation and oversight of these efforts to improve mentoring of junior faculty.**

Special Note: The charge of the Task Force on Women in Science and Engineering was to analyze and make recommendations concerning effective ways to build and sustain the “pipeline” of women pursuing academic careers in science. Obviously, there may be a need for this proposal to be implemented in fields outside of the sciences, and the Task Force hopes that deans and department chairs in other fields will consider adopting the measures suggested in this proposal where appropriate.

10. Explore Options to Provide Paid Maternity Leave and Increase Childcare Scholarships for Doctoral Students and Postdoctoral Fellows

- Explore ways to provide paid maternity leave for doctoral students and postdoctoral fellows
- Create new childcare scholarships for doctoral students and increase the amount awarded to postdoctoral fellows
- Consider extending aspects of the employee assistance program to doctoral students

General Overview

For women, graduate school and the postdoctoral years often coincide with childbearing years. These years are extremely financially challenging for doctoral students and postdoctoral fellows given the income levels of these positions and the high cost of living in Boston, making it very difficult to consider having children during this time. To encourage more women to pursue academic careers, Harvard should explore ways to make it financially and logistically possible for female doctoral students and postdoctoral fellows to have children. Currently, maternity leave policies are not uniform, funding for childcare scholarships is inadequate, and doctoral students do not have access to important kinds of advice offered through the Employee Assistance Program (e.g. childcare referrals).

Specific Issues

Maternity Leave: GSAS and HSPH policies guarantee doctoral students parental leave with accompanied stoppage of the “thesis clock,” but they do not guarantee stipends or healthcare benefits. Graduate students and many postdoctoral fellows are not eligible for short-term disability. Students and postdoctoral fellows must therefore negotiate additional funding with their advisors or departments to cover the period of short-term disability. For example, in the biological sciences, many students are funded by NIH training grants that limit stipends paid on maternity leave to 30 days; these students must then negotiate funding with their advisors or departments. Lack of funding for maternity leave is a serious risk to the pipeline, and the University should consider providing paid leaves to doctoral students and postdoctoral fellows. Additionally, by relieving advisors of the burden of paying for leaves from their grants, this would also help to avoid problems faced by advisors of high numbers of female students.

Childcare: In the greater Boston area, childcare is prohibitively expensive for graduate students and postdoctoral fellows. The current rate for infant childcare at the Harvard-affiliated Botanic Gardens Children’s Center in Cambridge is \$2,010 per month. The current annual stipend for a graduate student in the sciences is roughly \$26,000. Currently, the Office of Work/Life Resources and the ad hoc Child Care Scholarship Committees administer need-based childcare scholarships for postdoctoral fellows. Last year, including applications to both the Office of Work/Life Resources in Cambridge and the Child Care Scholarship Committees at HMS, 67 postdoctoral fellows applied for childcare assistance, and a total of approximately \$138,000 was awarded. However, the

awards were not sufficient. For example, in Cambridge, although the average award last year was \$4,111.11, many postdoctoral fellows with a demonstrated need did not receive adequate funding; based on the applications, the estimated need was 301% above the approximately \$100,000 awarded. DMS awards need-based childcare scholarships to all eligible graduate students in the division who apply (approximately 5–10 per year). The awards, which range from \$500-\$2,000, are insufficient given the cost of childcare in the greater Boston area. Furthermore, there are many more doctoral students outside of DMS in need of financial help for childcare.

Employee Assistance Program (EAP): The EAP is a prepaid benefit that provides short-term counseling, childcare and eldercare referral services, and financial and legal consultation to Harvard faculty and employees through the Wellness Corporation. Currently, graduate students are not eligible for the EAP.

Recommendations

- 1. Explore making paid maternity leave available to graduate students and postdoctoral fellows independent from the grants of advisors**
- 2. Create new childcare scholarships for doctoral students and increase the amount awarded to postdoctoral fellows.**
- 3. Consider the desirability and feasibility of extending aspects of the Employee Assistance Program to doctoral students.**

Explanatory Note: Because these issues have different implications in both structure and cost for different Schools, specific recommendations should emerge from a more extensive examination of the issues.

11. Expand the Dependent Care Fund for Short-Term Professional Travel

- **Expand the FAS Dependent Care Fund and replace the current monetary limit on funding with a usage limit**

Rationale

Financial constraints and obligations of caring for a young family or other dependents may prevent some doctoral students, postdoctoral fellows, and junior and senior faculty from professional travel, potentially hindering their careers. Expanding the Dependent Care Fund for Short-Term Professional Travel would enable eligible individuals to advance their careers through attending academic conferences and courses, or engaging in field work at a time when these constraints may otherwise preclude travel.

Recommendations

- 1. Expand the FAS Dependent Care Fund to all junior faculty members in all Schools of the university.**
- 2. Allow doctoral students, postdoctoral fellows, and senior faculty to apply for funding under special circumstances.**
- 3. Replace the current monetary limit on funding with a usage limit; specifically, individuals will ordinarily be able to receive funding to assist in travel to two events per year.**

Explanatory Note: For all recipients, financial assistance should be awarded to defray the incremental costs due to added caregiving needs incurred as a result of traveling for career purposes. Such costs may include, but should not be limited to, the costs associated with transporting a caregiver to a conference location or research site, extra dependent care at home while the recipient is traveling, or on-site care at a meeting. Given that individual situations, and therefore monetary needs, will vary greatly, the Task Force proposes allowing each person to apply for funding ordinarily twice a year for events of ordinarily not longer than one week, with the ultimate award value varying depending on the individual case. Limited funds should be available on a competitive basis for doctoral students and postdoctoral fellows to attend academic conferences at which they are giving a talk on their research, as such conferences are likely to be important for the advancement of their careers. Senior faculty members should also be allowed to request funding under special circumstances of demonstrated hardship. This program will require new funding from the central administration. To ensure equity across Schools, the Senior Vice Provost for Diversity and Faculty Development and the University Committee on Diversity and Faculty Development should provide oversight for the fund, although typically each School should manage its own fund.

12. Establish Research Enabling Grants for Primary Caregivers in the Sciences

- **Establish Research Enabling grants for junior faculty in the natural sciences to support key elements of their research programs at times when family responsibilities, as the primary caregiver, are especially demanding**
- **Establish Research Enabling Grants for extremely promising postdoctoral fellows to support their continuing high-level of productivity at times when family responsibilities, as the primary caregiver, are especially demanding**

Rationale

The postdoctoral and early faculty years are an extremely vulnerable time for women scientists. They must establish their scientific independence and publication record as well as obtain independent funding during a period of time that typically coincides with childbearing and significant family responsibilities. Experimental scientific research differs from other scholarly disciplines in that it often requires long and irregular hours in highly specialized laboratory environments or in intensive research project interactions. Such work cannot be accomplished from a home office. In addition, science progresses at a staggering pace, making it extremely difficult to re-engage in active scientific research after leaving even just for a year or two.

These requirements, which are unique to the experimental science, can adversely affect the progress of faculty, because the time demands of a competitive scientific research program are often incompatible with the inflexible schedule associated with raising a young family. Family responsibilities may, for example, preclude working in the lab at irregular hours as is often necessary to complete experiments. Failure to complete experiments that run during irregular hours may also negate entire experiments, thus adversely affecting a career.

To encourage the full participation of promising women scientists in academic careers, it is essential that Harvard provide junior faculty and postdoctoral fellows who are primary caregivers with the support and flexibility they need to develop and maintain a successful research program while having children, raising a young family, or facing significant eldercare or other dependent care responsibilities. By targeting Research Enabling Grants at the most talented scientists with family responsibilities, Harvard will enhance the quality and diversity of the faculty at all ranks. In the longer term, it will significantly increase the representation of women at the highest ranks in the sciences.

The success of several existing programs leads the Task Force to be confident that grants of this type have the potential to significantly increase the retention of women in the academic pipeline. First, the Eleanor and Miles Shore 50th Anniversary Fellowship Program for Scholars in Medicine has provided fellowships aimed at similar needs, though at a lower funding level, to junior faculty at Harvard Medical School. A recent survey of past recipients suggests that they have been extremely productive with respect to publications, educational contributions, and obtaining external funding. Second, two members of the Task Force who are both biomedical scientists have themselves provided women postdoctoral fellows who are also the primary caregiver for young children with

the significant additional support of a technician. These individuals have gone on to become faculty members at Harvard Medical School, The University of Pennsylvania, and Duke University. Finally, the National Institute of Allergy and Infectious Diseases (NIAID) announced in June of 2004 the creation of the NIAID Primary Caregiver Technical Assistance Supplements, which provide 1-2 years of technical support to postdoctoral fellows who are primary caregivers. On the other hand, members of the Task Force can also cite cases of extremely promising women who opted out of the academic pipeline after having children, and these individuals claim that if they had been given such support, they would not have abandoned their academic science careers.

Recommendations

Harvard should establish competitive Research Enabling Grants for junior faculty and postdoctoral fellows who are primary caregivers:

1. **Junior Faculty:** Grants could be used to: 1) hire additional technical staff to help in the laboratory setting; 2) purchase equipment that would enable more efficient research; 3) provide additional management of a research team, or 4) take a child and caregiver on extended field work.
 - a. Grants should extend for 2 years, which is a realistic window during which family responsibilities and constraints are at their peak and supported laboratory personnel can become proficient with the necessary tasks.
 - b. Grants should be for up to \$100K/year, based on the current cost of hiring a technician or a postdoctoral fellow (approximately \$50,000/year with benefits) and essential equipment in the sciences.
2. **Postdoctoral Fellows:** grants could be used to: 1) hire an extra “pair of hands” (i.e., a technician) in the laboratory; 2) purchase equipment that would enable more efficient research, or 3) take a child and caregiver on extended field work.
 - a. Grants should extend for 2 years.
 - b. Grants should be for up to \$50,000/year, given that this is approximately the salary and benefits package of a technician.

Explanatory Note: The funds provided by Research Enabling Grants are intended to provide exceptional junior scientists with the support and flexibility necessary to fulfill the potential of their scientific careers while also meeting the time demands of their families. They are not intended to be used for salary support or for childcare (see other proposals for such provisions), but rather in any other way the recipients feel will enable the pursuit of their careers.

The Task Force recommends that the selection of grant recipients be based on the scientific merit of the candidate’s research proposal and the scientific promise the

candidate has demonstrated. In addition, proposals should include and be judged on the extent to which such funding would enable the applicant's research. The program should be open to all primary caregivers, but such support is intended to be an especially important part of the University's effort to increase the representation of women at the high ranks in the sciences. As pregnancy can hinder the progress of a scientific research program in some cases (for example, there may be safety concerns for pregnant women in some types of research), a woman awarded this support should be able to choose to start the funding at any point after she becomes pregnant.

Grants for postdoctoral fellows should be targeted to those who have demonstrated the potential to obtain a top-tier faculty position. Based on the 1,300 postdoctoral fellows at Harvard (not including the hospitals) and the number of faculty typically hired at top-tier universities, the Task Force estimates that the top 2-3% may be eligible for a grant of this nature. The anticipated number of recipients is in the tens, not the hundreds.

13. Design Programs on Diversity

- **Design a program on diversity for the president, provost, and deans by July 1, 2005**
- **Design a program on diversity for department chairs of basic science departments in FAS, HMS, and HSPH, and work with hospital leaders to design and implement programs on diversity for department chairs and division chiefs**

Rationale:

A number of universities have found that programs on bias and diversity that inform those responsible for recruiting faculty and supporting faculty development (e.g., deans, department chairs, and search committees) about current research on bias and successful approaches to incorporating this research into faculty decision making can make a significant difference in the recruitment and retention of women and underrepresented minority faculty. For example, Stanford University includes discussion on diversity issues in its annual "Chairs Institute" and quarterly "Chairs Workshops." They also established a Faculty Recruitment Office within the Office of Faculty Development. The University of Michigan, under an NSF Advance grant has created a training program on diversity for department chairs and search committees as part of its STRIDE (Science and Technology Recruiting to Improve Diversity and Excellence) program. The University of Wisconsin, also with NSF Advance support, has developed climate workshops for department chairs, workshops for search committee chairs, sessions on sexual harassment, and workshops where the deans and the Equity and Diversity Committee meet with individual schools.

The success of programs at other universities has depended on the programs being developed by their own faculty and administrators, the continuing participation of faculty and administrators in the programs, and the support of high-level administrators for the importance of these programs to faculty development.

Discussions with those responsible for programs at other universities as well as with various members of the Harvard community make evident that department chairs and search committee chairs are the two high-leverage points within the system for changing Harvard's success in the identification, recruitment, and retention of women and underrepresented minority faculty. For programs on faculty diversity and development to serve as the catalyst for institutional change, it is essential that they occur in the context of more general leadership programs and that deans participate in the discussion of the issues and use their leadership roles to implement programs in their respective schools. Thus, the Task Force recommendations are staged, with proposed deadlines for program development that would enable plans to be put in place for the deployment of such programs during the fall semester of 2005.

Overview of Recommendations:

The Task Force recommends Harvard develop and implement two pipeline-diversity programs, one directed at university administrative leadership (deans and department

chairs) and the other at search committees (see Proposal 14). In each case, the Task Force proposes that these programs be embedded in a larger context so that attention to diversity is portrayed as an essential element of decanal and departmental leadership and of proper search procedures. In particular, the Task Force recommends that programs for administrative leaders be done in the context of deans' and chairs' meetings. The deans of each school should participate in the programs for their department chairs. The Task Force recommends that the programs for deans and department chairs occur early each academic year so that they can influence the full year of faculty development. Longer programs might be offered to new chairs, with shorter programs for those who are continuing as chairs.

Recommendations:

1. Design a program on diversity for the president, provost, and deans to be given at the deans' summer retreat.

Explanatory Note: This program would focus on educating the top university administrators about the current state of research on bias and actions that have proved useful for broadening the representation of women and underrepresented minorities in university settings. The main goals of this program include: to demonstrate the importance of such programs, to convey the importance of decanal leadership in the successful development of departmental leadership and improvement of faculty diversity, and to help launch programs for department chairs within individual Schools. The Task Force recommends that this program be developed by July 1, 2005, to be presented at the deans' summer retreat.

2. Design a program on diversity for department chairs of science departments in FAS, HMS, and HSPH as part of a larger session on departmental leadership and management.

Explanatory Note: By the end of the summer, deans should have developed plans and appointed committees to design and run a program on bias for chairs' meetings. These committees should have both male and female members, as the participation of leading scientists of both genders will be crucial to the success of this effort. It should either include or consult with chairs who have been successful in areas of diversity, experts on gender bias, and general program design and implementation. Department chairs should participate annually.

Special Note: The charge of the Task Force on Women in Science and Engineering was to analyze and make recommendations concerning effective ways to build and sustain the "pipeline" of women pursuing academic careers in science. Obviously, there may be a need for this proposal to be implemented in fields outside of the sciences, and the Task Force hopes that deans and department chairs in other fields will consider adopting the measures suggested in this proposal as appropriate.

14. Revise and Expand Search Processes to Increase the Recruitment of Women and Underrepresented Minority Faculty in the Sciences

- **Require search committee chairs to participate in a workshop on chairing faculty search processes that includes a presentation of techniques for ensuring diversity in faculty searches as a key element**
- **Design faculty search processes that incorporate “best practices” for ensuring thorough searches and ways to include proactive efforts to identify candidates who are women and underrepresented minorities**
- **Track faculty search efforts**

Rationale:

The search process is the key link in shaping the Harvard faculty. Increasing the number of women and underrepresented minorities among the science faculty ranks at Harvard requires thorough and unbiased search processes. Significant current literature demonstrates the need for search committees to search comprehensively for the most talented women and underrepresented minority candidates, to encourage applications from leading women and underrepresented minority scientists, and to take explicit steps to avoid implicit bias in evaluating applications. It is important for chairs of search committees to understand how to avoid allowing bias to influence search committee discussions and decisions, and for members of search committees to recognize the importance of thorough searches and careful evaluation of dossiers of women and underrepresented minority candidates.

Some universities have programs designed to educate faculty—especially search-committee chairs—about implicit bias and effective strategies for avoiding bias in searches. A look at existing university programs suggests that these programs are most effective when they are designed and run by faculty members. Male as well as female faculty should participate in the design and mounting of these programs as the participation of leading male scientists has been crucial to the success of such efforts.

Recommendations:

1. Design workshops for search-committee chairs and make participation mandatory. Deans should designate groups of faculty to design appropriate programs on diversity in faculty searches for science departments in their School as part of a workshop for search committee chairs. These committees should be gender balanced. Deans should also require that for either a junior or senior search to be authorized, the search committee chair must have participated in such a program within the last two years. To enable departments to start searches at different times during the academic year, these programs should be offered as least once per semester, though preferably more often. The Task Force urges that these programs be developed before September 2005 and that the requirements for search committee chairs be made effective for the academic year 2005–06.

2. Define search requirements to ensure attention to diversity. When looking for leading women and underrepresented minority scientists, deans should ensure that the searches that are conducted are thorough and proactive. To do so, it may be necessary for some Schools to revise their existing search requirements for faculty appointments.

3. Track faculty search efforts. Require that department chairs include the following information in their annual report to the dean:

- a. Participation of search committee chairs in required workshop
- b. Efforts to identify and recruit leading women and underrepresented minority scientists
- c. Women and underrepresented minorities invited as colloquia speakers
- d. Efforts taken to recruit women who were offered positions

Explanatory Note 1:

The program on diversity designed for search committee chairs will include a section on how to identify and recruit women and underrepresented minorities. The University of Michigan provides a handbook on faculty recruitment that includes many good ideas for introducing diversity into the recruitment process. Given the short time frame, the Task Force is unable to provide a full set of such recommendations. However, the following suggestions should be considered, if they are not already, as possible elements of formal faculty search requirements.

A. Define searches broadly and have search committees identify the most outstanding individuals on the job market even if they are not within the defined field of the search.

B. If possible, include more than one woman or underrepresented minority on the search committee to avoid situations in which a single faculty member bears most of the responsibility for diversity issues or is otherwise isolated. In some cases, this goal could be best achieved by including faculty from closely related fields or departments. At the affiliated hospitals, this could be achieved by expanding the search committee membership to include part-time faculty.

C. Require at least two members of the search committee to read all “realistic” applications. Provide double scrutiny by requiring at least two people outside of the search committee to read the top third (or 10, whichever number is smaller) of female or underrepresented minority applications. This will ensure that strong candidates are not overlooked for reasons of implicit bias. In addition to faculty, administrators within the department with a Ph.D. may be good resources for reviewing these applications.

D. Require serious discussion of the top women and underrepresented minority applicants in the final appointments dossier.

E. Employ explicit and careful measures to avoid favoritism, or even the appearance of favoritism, in cases in which there are internal candidates (current graduate students, postdoctoral fellows or, in the hospitals, instructors). With respect to internal candidates, lack of transparency may limit the ability to expand the applicant pool of women and

underrepresented minorities and put junior faculty recruited outside the search process at a disadvantage.

F. To increase the pool of female and underrepresented minority applicants at the junior and senior faculty level, departments should:

1. Implement ongoing mechanisms for identifying women and underrepresented minorities who have demonstrated great promise in science. For example, departments could start to collect names and maintain lists of young scientists to watch. Candidates for the list could include top undergraduate students, graduate students, and postdoctoral fellows who have passed through Harvard's departments; students and postdoctoral fellows who have given exceptional talks at research conferences; or names provided by colleagues at other institutions. These lists should be reviewed annually within departments, and outreach mechanisms should be implemented to initiate contact with people on the list.
2. Include several junior-level and senior-level outstanding women and underrepresented minority scientists in every colloquium or speaker series. Pay special attention to people working in areas in which future searches might be initiated.

G. When a junior faculty search begins or is imminent, departments should contact colleagues at other universities to request the names of exceptional women and underrepresented minorities among their current or recent graduates and postdoctoral fellows. The most promising women and underrepresented minority candidates should then be contacted and encouraged to apply.

H. Require that departments provide a detailed plan for identifying top women and underrepresented minority candidates before the authorization of a senior search.

Explanatory Note 2: It is understood that there will by necessity be a phase-in period, and during the first-year implementation phase, recommendations contained in this proposal should not impede a timely search.

Explanatory Note 3: The recommendations in this proposal are not intended to impair targeted searches.

Special Note: The charge of the Task Force on WISE was to analyze and make recommendations concerning effective ways to build and sustain the "pipeline" of women pursuing academic careers in science. Obviously, there may be a need for this proposal to be implemented in fields outside of the sciences, and the Task Force hopes that deans and department chairs in other fields will consider adopting the measures suggested in this proposal where appropriate.

15. Establish Programs to Provide Funding and Relief for Key Transition Points in Academic Careers

- **Provide funding, teaching, or administrative relief to support postdoctoral fellows and junior and senior faculty through key transition points of academic science careers, including support for:**
 - **Senior postdoctoral fellowships**
 - **Pre-faculty re-engagement fellowships**
 - **Support for re-engagement in research for clinical faculty**
 - **Relief time for tenure-track faculty in FAS science departments**
 - **Relief time for untenured, non-clinical faculty at HMS**
 - **Research support for senior faculty assuming major leadership roles**

Rationale:

Women often bear the burden of added committee work and mentoring as well as typically assuming a disproportionate share of the responsibilities of childcare and eldercare. In addition, women scientists in “dual career” situations must coordinate appointment decisions with their partners. Issues of timing and geography continue to lead women disproportionately to leave the academic pipeline or compromise career choices when transitioning to faculty positions. By providing resources during key transitions in the academic pipeline, Harvard could significantly increase the retention and promotion of women and underrepresented minorities, preventing the loss of talented women and underrepresented minorities (or, in the hospital settings, the disproportionate increase in the time to promotion for women and underrepresented minorities), and ultimately increase the presence of women and underrepresented minorities in Harvard’s senior faculty ranks and leadership positions.

The key at-risk transition points identified by the Task Force are:

- Pre-faculty: transition from postdoctoral fellow to faculty or re-engagement
- Re-engaging clinical faculty in research
- Pre-tenure
- Periods of significant leadership responsibility

At each of these transition points, incremental research funding or relief from teaching or committee duties could significantly enhance the retention of women in the science pipeline. For each of the recommendations, there is evidence from existing programs known to Task Force members supporting the efficacy of the proposed program. However, the ongoing success of recipients should be tracked to evaluate the impact of each program and revise its approach as needed.

Recommendations:

1. Create Funding to support the transitions of pre-faculty trainees

- A. Senior Postdoctoral Fellowships.** Make fellowship funds available for senior postdoctoral fellows who are at the end of a standard fellowship and whose careers would benefit from an extra year of funding. These funds would be directed at supporting exceptionally talented postdoctoral fellows (e.g., those completing a prestigious fellowship) who are competitive on the academic job market but for whom an additional year could significantly enhance their career possibilities.

Explanatory Note: These funds might enable key additional research needed to complete studies enhancing a current independent research project or to complete a manuscript for a high-profile publication, thus enhancing the publication record and making the fellow competitive for positions in the very top-tier research universities. Alternatively, the support could assist dual-career couples to better coordinate faculty searches by providing one of the partners with an extended appointment.

- B. Pre-Faculty Re-Engagement Fellowships.** Make fellowship funds available for junior scientists who left the academic track prior to getting their first faculty position, but have only been away a short time, to re-enter the track.

Explanatory Note: Science progresses at a staggering pace, making it extremely difficult to re-engage in active scientific research after leaving even just for a year or two (for example, to have children or to coordinate a job search with a partner). This funding would provide up to two years of salary support for an individual who has been away from research for a short period of time (i.e., less than five years) to retrain and re-establish a publication record. Funding would require a Harvard faculty sponsor and be extremely competitive; it would be given only to those individuals who had demonstrated potential to become a top-tier faculty member prior to leaving the academic track and whose research proposal indicates high likelihood that the recipient would again meet this standard.

2. Create programs and funding to support the transitions of junior faculty

- A. Re-engagement in Research for Clinical Faculty.** In the hospital setting, make funds available to enable faculty (instructors and assistant and associate professors) who are primary caregivers returning from a leave of absence or a period of narrowed professional focus to refocus and expand their academic work.

Explanatory Note: Faculty in the hospitals with dual duties of clinical work and research who also face significant dependent-care responsibilities often need to narrow their professional work to their clinical duties for a limited period of time.

Additional funding is needed to allow these individuals to re-invigorate their research programs when they are ready to re-expand their professional work.

- B. Relief Time for Tenure-Track Faculty in FAS Science Departments.** Provide associate professors in science departments who did not take advantage of standard departmental teaching relief in their first year with one term of teaching relief in the year before they are reviewed for tenure (or earlier if they choose). Departments should also consider providing associate professors who have had substantial teaching, advising, or committee responsibilities with lighter administrative and service responsibilities during that year.

Explanatory Note: For junior faculty to succeed in establishing the scientific record and visibility required for promotion to tenure, they must have adequate time to establish significant new research directions and results, publish their findings, obtain grant support, and, during the critical pre-tenure review year, travel to present their work at other universities. In addition to a normal teaching load, junior faculty women are typically burdened with extra committee work and often have significant family responsibilities.

There are no sabbatical leaves for FAS tenure-track science faculty because they receive higher salaries and typically lower teaching loads than their peers in the humanities and social science departments that provide paid leave. FAS science departments usually offer one term of teaching relief in the first year of a tenure-track appointment to enable scientists to establish research groups and laboratories and to apply for external funding. However, some faculty may find it better to postpone this term of teaching relief to later in their appointment.

- C. Relief for Untenured, Non-Clinical Faculty at HMS and HSPH.** Provide a term or year of relief from committee work and teaching responsibilities at the associate level to allow faculty members to focus their attention entirely on research. This relief time could be particularly important for women faculty with family responsibilities. As HMS and hospital faculty typically raise most of their own salaries, this proposal has administrative, but not financial, costs.

Explanatory Note: In the basic science departments of HMS and the School of Public Health (HSPH) faculty typically serve for more than ten years before they are considered for tenure. In the hospitals, the promotion to professor can often take much longer. During this time, faculty receive little relief from grant writing, mentoring responsibilities, committee work, teaching, editorial service, and professional travel. Usually, the amount of responsibility the faculty member assumes grows larger each year.

3. Create Programs and funding to support senior faculty leadership:

Research Support for Senior Faculty Assuming Major Leadership Roles. Provide funding to support the research programs of senior faculty who take time

away from their research to accept leadership roles and perform extraordinary service to increase diversity among the faculty at the University.

Explanatory Note: Although many deans or departments provide funds to those willing to take on major leadership roles, negotiations are left to individual faculty. Women and underrepresented minorities are often disadvantaged by these ad hoc arrangements.

Having women, underrepresented minorities, and other individuals deeply committed to increasing diversity in leadership positions is essential for encouraging and promoting women and underrepresented minorities at all levels of the pipeline. However, given the additional challenges faced by women and underrepresented minorities at all ranks, including demands on their time to serve on various committees, it is essential that Harvard encourage them to assume these positions by providing supplementary support to their research programs while they are burdened with major leadership responsibilities and by enabling the rapid ramping back up of their research program at the end of such leadership commitments.

16. Limit the Length of Appointment and Set a Base Salary for Postdoctoral Fellows

Rationale

Nationally and at Harvard, the number of postdoctoral fellows has significantly increased, employment opportunities have declined, and professional dissatisfaction continues to grow. Harvard has the greatest number of postdoctoral fellows nationally (~1,300, not including the affiliated hospitals). Although some Harvard schools set a minimum salary or a maximum length of appointment, there is no standardization across the Schools. The Task Force became aware that in some instances, postdoctoral fellows receive significantly less than the NIH stipend guidelines (currently \$35,568 for a first-year fellow), and the length of appointment can be indefinite. Although clearly the uncertainty and low pay of postdoctoral fellowships can drive both men and women into other careers, these factors contribute to the high percentage of women that opt out of the academic track at the stage of a postdoctoral fellowship.

Recommendations

Standardize the existing best practices within individual Schools across the University:

- 1. Limit the length of postdoctoral fellowship appointments at Harvard to three years, with the possibility to extend to five years.**
- 2. Establish a minimum salary for postdoctoral fellowships.**

17. Proposal to Improve Safety at Night for Lab Scientists

- **Extend the use of taxi vouchers to eligible doctoral students and postdoctoral fellows at HMS, HSPH, and FAS**
- **Make parking lots free of charge to doctoral students and postdoctoral fellows after hours**
- **Improve knowledge of available services**

Rationale

Women doctoral students and postdoctoral fellows who often work late in the labs have expressed feeling unsafe returning home after dark. The University already offers some late-night services in Cambridge (e.g., extended shuttle service, evening van service, and walking escorts), but from talking with graduate students and postdoctoral fellows, the Task Force learned that many students are unaware of these services. In the Longwood Medical Area, there are various shuttle buses serving multiple areas, but most of these shuttles stop running before midnight and do not operate on holidays. There is also a late night taxi service from Vanderbilt Hall available for graduate students, but the service only operates in a one-mile radius.

Some departments and labs have tried to compensate for gaps in transport service by issuing taxi vouchers for students returning home after hours. Taxi vouchers allow students or postdoctoral fellows to summon a taxi directly to their lab, allowing them to continue working while they wait. For students in the Longwood Medical Area, this saves them a late-night walk to Vanderbilt Hall and helps ensure a safe return home for those who live farther than one mile from Vanderbilt Hall. For students in Harvard-affiliated hospitals that are not located in the Longwood Medical Area, taxi vouchers serve an even greater need as shuttle service is often more limited at these sites.

Recommendations

- 1. Extend the use of taxi vouchers to eligible doctoral students and postdoctoral fellows at HMS, HSPH and FAS.** Rather than allowing individual labs or departments to choose whether to issue vouchers, the University should provide these vouchers through departments to ensure safe transportation home from the lab. The actual transportation costs would be the only cost to the University. The details of this program will need to be refined.
- 2. Make parking lots free of charge to doctoral students and postdoctoral fellows after hours.** Students could then safely park near their labs and work as late as they like. Currently, after hours parking is available for a cost of \$50 an academic year at LMA and \$200 an academic year in Cambridge, but it should be free for graduate students.
- 3. Make available services more well-known.** During orientation and other gatherings throughout the year, students should be advised of the safety services available to them. This information should also be included in the proposed “Handbook for Graduate Student Life” (see Proposal 4).

IV. Future Directions

The Task Force on WISE has made recommendations on those critical factors in women's careers in science for which the Task Force could formulate immediate policy, structural, or programmatic actions that would promote the participation of women and underrepresented minorities in academic science careers. The Task Force and its working groups have identified other important issues that they were unable to pursue sufficiently in the time frame of the Task Force's deliberations. Once new structures are put in place and new positions are established to meet the current recommendations, the Task Force anticipates that the University will further examine and evaluate these additional topics. More detail on some of these topics can be found in the reports from the individual working groups in *Appendix F*. Members of the Task Force urge that the following issues in particular be investigated as soon as possible:

1. Address the issues faced by minority students and those from disadvantaged backgrounds, and consider programs like the MIT summer program and the Meyerhoff Scholarship Program at the University of Maryland at Baltimore County as vehicles for increasing the numbers of these students who successfully pursue science careers.
2. Investigate ways to encourage more faculty to participate in programs that provide training to ensure that implicit and unintended biases do not adversely affect the experience of women and underrepresented minorities in science classes and in the laboratory.
3. Develop recruiting strategies to increase the number of female and underrepresented minority graduate students in the sciences.
4. Develop mechanisms to track funding for doctoral students. Determine whether there are issues of heavy teaching loads in later years, and, if so, take steps to alleviate this burden. Ensure that women and underrepresented minority students are supported equitably.
5. Investigate more systematically the climate for professional research scientists and develop strategies for: better integrating women and underrepresented minority scientists in the academic research community; improving their career track or re-entry to the faculty track; enabling them to participate more fully in the training and education of students, thus providing more role models for groups that are underrepresented in science; and raising the status of such positions so they become more attractive.

V. Appendices

Appendix A – Charge of the Task Force

To help understand and address the underrepresentation of women at various academic career stages in the sciences and engineering at Harvard University, Harvard has announced the formation of a Task Force on Women in Science and Engineering. The membership of the Task Force will be drawn from the several Faculties that conduct teaching and research in science and engineering; it will be chaired by Barbara J. Grosz, Higgins Professor of Natural Sciences in the Faculty of Arts and Sciences' Division of Engineering and Applied Sciences and Dean of Science at the Radcliffe Institute for Advanced Study.

The Task Force is charged with identifying factors that contribute in some way to the underrepresentation of women at various career stages; compiling successful strategies developed by other institutions or scholars to counter these factors and tailoring them as necessary to meet Harvard's specific challenges; formulating new programs and approaches; and, finally, recommending specific actions that the University should take to implement these strategies and track their effectiveness. This examination of issues relating to women faculty will include attention to the particular challenges and barriers faced by underrepresented minority women pursuing academic careers in science and engineering.

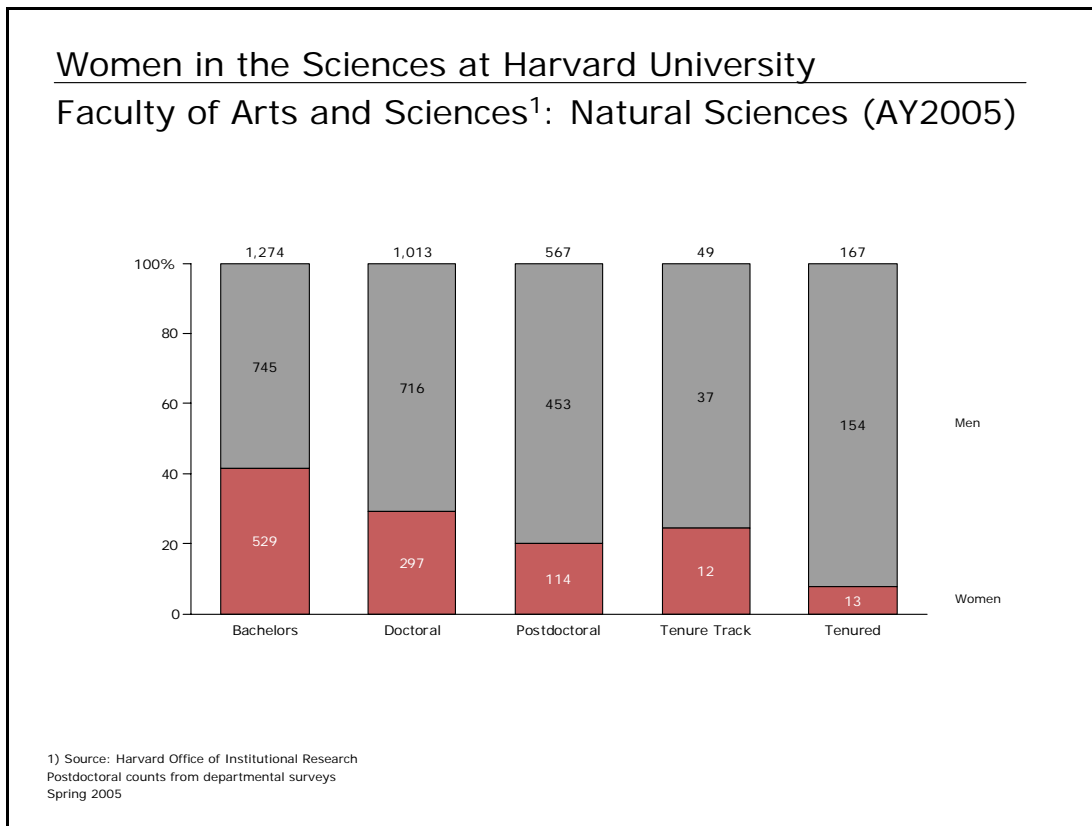
Specifically, the Task Force, operating with the assistance of working groups focused on specific career stages, disciplines, or problems and chaired by Task Force members, will aim to accomplish the following:

- Understand factors that affect the decisions of young women, including undergraduates, interested in careers in science and engineering. Find effective ways to encourage Harvard undergraduate women to pursue such careers. Diminish obstacles to success, including practices of which faculty may or may not be aware that have the effect of discouraging aspiring women scientists. Identify methods that will enable us to track leading undergraduate women through their college years.
- Understand and address factors in graduate school and in the post-doctoral years that influence professional success—including adequate recognition and support—and affect the decisions of women to pursue academic careers. Propose actions that will diminish obstacles to success during the years of training and that will also encourage women to enter careers in academic research and teaching. Devise methods of tracking leading women at this career stage and making them visible at Harvard early in their careers.
- Work with the Task Force on Women Faculty to maximize the chances of success in increasing the numbers of women science faculty at both the junior and senior levels.

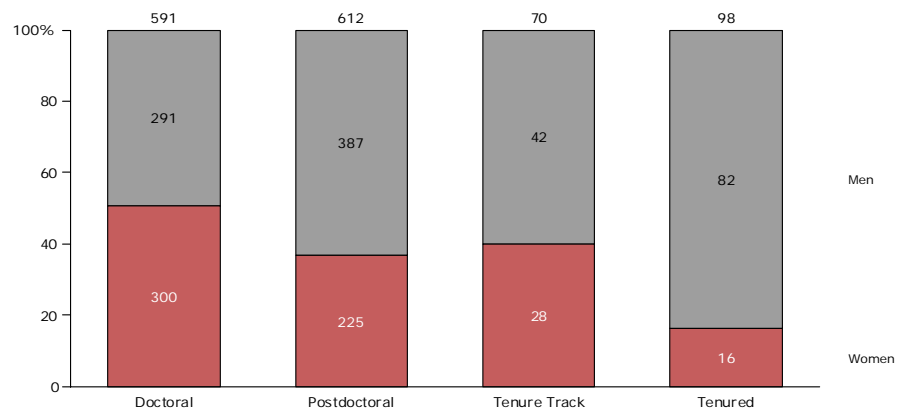
- Identify and encourage excellent women to apply for junior faculty positions; address issues in search processes and recruitment that would enhance the identification and hiring of outstanding women scientists.
- Identify and implement best practices for supporting women during their junior faculty years, ensuring equity, and maximizing chances of achieving tenure.
- Recruit and retain women senior faculty and support their research endeavors, in part by ensuring equity in equipment, lab space, secretarial and research support, access to graduate students and post-doctoral students, and salaries.
- Ensure that the awarding of named chairs, appointments to leadership positions, honorific nominations, etc., are conducted fairly and with adequate attention to problems of implicit bias.
- Ensure that senior women science faculty have opportunities to participate fully in all large-scale science initiatives, including explicit consideration for leadership roles in all such endeavors undertaken by Harvard or jointly with another institution. Support science initiatives proposed by women equitably.
- Attend to differences in culture, professional norms, and career paths among the scientific disciplines, departments, and Schools which affect differently the ability of women scientists to succeed in those fields.

The Task Force will be expected to consider and make recommendations concerning the most effective means of accomplishing the goals outlined above, taking into account best practices and proven effectiveness. While careful analysis and thoughtful deliberation will be required to ensure that the University adopts approaches that are effective and durable, it is expected that the Task Force will complete its work by the end of the 2004-05 academic year, and that its recommendations will be considered for implementation in a timely manner, with most implemented at the start of the 2005-06 academic year, or sooner if practicable.

Appendix B – Women in the Sciences at Harvard University

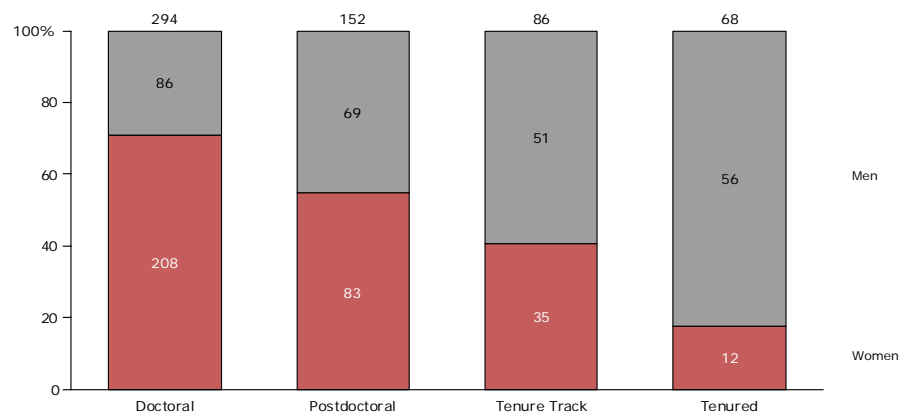


Women in the Sciences at Harvard University Medical School Quadrangle¹ (AY2005)



1) Source: Harvard Office of Institutional Research
HMS Doctoral category represents PhD students in DMS and not MD students
Postdoctoral counts from departmental surveys
Spring 2005

Women in the Sciences at Harvard University School of Public Health¹ (AY2005)



1) Source: Harvard Office of Institutional Research
Postdoctoral counts from departmental surveys
Spring 2005

Appendix C – Membership of the Task Force

Faculty

Barbara J. Grosz, Higgins Professor of Natural Sciences in the Division of Engineering and Applied Sciences, Dean of Science at the Radcliffe Institute, Faculty of Arts and Sciences, *Chair*

Catherine Dulac, Professor of Molecular and Cellular Biology, Faculty of Arts and Sciences

Susan Dymecki, Associate Professor of Genetics, Faculty of Medicine

Howard Georgi, Mallinckrodt Professor of Physics, Faculty of Arts and Sciences

Laurie H. Glimcher, Irene Heinz Given Professor of Immunology, Faculties of Medicine and Public Health

Michael E. Greenberg, Professor of Neurobiology and Neurology, Faculty of Medicine

Paula A. Johnson, Chief, Division of Women's Health, Brigham and Women's Hospital, Associate Professor of Medicine, Faculty of Medicine

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Venkatesh Narayanamurti, John A. & Elizabeth S. Armstrong Professor of Engineering and Applied Sciences and Dean, Dean of Physical Sciences, and Professor of Physics.

Lisa Randall, Professor of Physics, Faculty of Arts and Sciences

Suzanne Walker, Professor of Microbiology and Molecular Genetics, Faculty of Medicine

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Howard Georgi, Physics, *Co-chair*
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Robert Lue, Biology
Greg Tucci, Chemistry

Students:

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Milena Andzelm, Biochemistry
Jacqueline Chu, Chemistry Premed
Nathaniel Craig, Physics
Christine Lee, Biology, MCB
Patricia Li, Chemistry, Organic
Julia Mundy, Chemistry and Physics
Emily Riehl, Mathematics
Alexis Roosa, Computer Science
Talia Rosenberg, Applied Math

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Lisa Randall, FAS, Physical Sciences, *Co-chair*
Susan Dymecki, HMS, Genetics
Megan Murray, HSPH, Epidemiology
Elizabeth Denne, FAS, Math

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Mary Farrow, HSPH
Marissa Olson, DEAS
Oyinda Oyelaran, FAS, Chemistry
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Mike Greenberg, HMS, *Co-chair*

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Rachelle Gaudet, FAS, MCB
Kathy Swartz, HSPH
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Kristin Javeras, HSPH
Renee Johnson, HSPH, HPM
Jennifer Mansfield, HMS, Genetics
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Amy Prieto, FAS, Chemistry
Rebecca Thurston, HSPH, HPM
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Laura Weisel, Director of Administration, Microbiology & Molecular Genetics

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Deborah Santamore, CFA
Heon-ick Ha, Physics
Heather Losey, CCB
Kaori Sakurai, CCB
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Nancy Tarbell, MD, Director, Partners Office for Women's Careers, MGH

Appendix E – Working Groups’ Meetings

In approaching the issues at hand, the Task Force formed working groups that met with individuals at various stages of the pipeline, including undergraduate students, graduate students, and postdoctoral fellows, as well as those who have left the pipeline but remained at Harvard as research staff. In total, the Task Force on Women in Science and Engineering held 12 independent meetings and one joint meeting with the Task Force on Women Faculty. The Task Force working group subcommittees held meetings and hosted open forums to address the specific issues facing their respective groups. The Undergraduate Working Group held 3 meetings and 3 open forums; the Graduate Student Working Group held 2 meetings, 4 department-specific meetings, and 3 open forums; the Life Sciences and Physical Sciences Postdoctoral Working Groups held 4 meetings and 2 joint open forums; the Research Staff Working Group held 2 meetings and 2 open forums; and the Hospital Faculty Working Group held 4 meetings. The information gathered by the subcommittees was reported to and discussed by the Task Force.

Group	Working Group Meetings	Dept. Specific Meetings	Open Forums	Total Meetings By Group	Notes
Task Force	13			13	1
Undergraduate Working Group	3		3	6	2
Graduate Student Working Group	2	4	3	9	
Life Sciences Postdoc Working Group	2		2	4	3
Physical Sciences Postdoc Working Group	2		2	4	3
Research Staff Working Group	2		2	4	
Hospital Faculty Working Group	4			4	

1. The Task Force held one joint meeting with the Task Force on Women Faculty
2. The Undergraduate working group organized their open forums in connection with Women in Science at Harvard/Radcliffe (WISHR)
3. The Life Sciences and Physical Sciences held joint open forums and one joint working group meeting

Appendix F – Reports from Working Groups

Reports from the Working Groups will be Available June 30, 2005.

Appendix G – Postdoctoral Fellows

Members of the Task Force met with postdoctoral fellows from a number of departments at FAS, HMS, and HSPH and held two Town Hall meetings (one at FAS and one in the Longwood Medical Area) to solicit comments and suggestions for improvements. Through discussions stemming from these meetings, members of the Task Force became acutely aware of the difficulties faced by postdoctoral fellows. It is crucial that the University understands the position of postdoctoral fellow and the challenges therein.

Postdoctoral positions have become an obligatory stage between graduate student training and independent academic positions in many scientific disciplines. As a result, the most able students—those who will be the research leaders of the future—pass through research universities, including Harvard, as postdoctoral fellows. Harvard has the highest number of postdoctoral fellows of any university in the country; there are over 1,300 postdoctoral fellows at Harvard (not including the affiliated hospitals which add approximately 3,500 additional postdoctoral fellows).

Within the biomedical sciences, the problem of the position of postdoctoral fellow is particularly acute. In the last two decades, this position has changed from a temporary stop on the path from graduate student to independent investigator to more of a holding pattern. According to a recent report by the National Research Council, *Bridges to Independence*, between 1980 and 1998, the number of postdoctoral researchers at academic institutions doubled, and almost 75% of this increase was in the life sciences. Concurrently, the average length of a postdoctoral fellowship has also increased significantly (five years is currently not uncommon in the biomedical sciences), and the average age of the first faculty appointment in this field is now 36. Furthermore, although in 1980 investigators under the age of 40 received over half of the competitive independent research awards from the National Institutes of Health (NIH), in 2003, only 17% of awards went to investigators under the age of 40. Most strikingly, the median age at which Ph.D. researchers received their first competitive NIH research grant in 2002 was 42.

Thus, academic researchers in the biomedical sciences are spending long periods of time in postdoctoral positions during which they receive low pay and have little independence. Given the dramatic increase in the number of postdoctoral fellows, the competition for top-tier faculty positions is fierce, requiring high levels of productivity and long hours to produce the results and publications necessary for one to be competitive in the academic job market. In the biomedical sciences, although there are some technically demanding skills that are acquired during the postdoctoral period, much of the day-to-day work involves fairly menial labor that could be easily accomplished by a bachelors level technician (e.g., time-consuming protocols in molecular biology).

Over and above the problems common to all postdoctoral students, female postdoctoral fellows have the additional burdens of implicit gender bias, dependent-care responsibilities, and household management. These difficulties are often so onerous that talented women—individuals with the potential to make enormous contributions to

science and society—conclude that it simply isn't worth the effort and therefore choose to follow different paths. Taking a postdoctoral position is a gamble: several years of prolonged education, long hours, and low pay in return for the chance to attain a satisfying, high-level, independent position in research. For women, particularly because postdoctoral fellowships often coincide with the key childbearing years, the stakes in the gamble are generally higher than for men.

Harvard clearly needs to understand how the position of “postdoc” has expanded from “elite pre-faculty student” to include “low-wage Ph.D. technician” in some parts of its realm, but that evolution (or degeneration) of the position is complicated by a number of contributing factors, many beyond its control (particularly supply and demand: the high number of Ph.D.s relative to jobs in research). This broader subject is outside the scope of this report. The Task Force does, however, encourage Harvard to take a serious look at these issues and strive to take a leading role in improving the situation for postdoctoral fellows nationally. Several recent articles and studies have proposed specific ways to improve the situation for postdoctoral fellows, and the Task Force applauds these efforts. In this report the Task Force is primarily concerned with the “elite” group—the group with the potential to go on into faculty positions—and specifically with the women in that group. The science departments at Harvard hire an average of 30 new junior faculty members a year. Based on this number, it could be argued that Harvard should be “producing” a similar number of top-tier junior faculty members yearly out of its large pool of postdoctoral fellows. It is this top 2-3% of Harvard postdoctoral fellows that would be part of this “elite” group.

As a first step in addressing these issues, Harvard needs to better define the position of postdoctoral fellow as a temporary training period. Although clearly the uncertainty and low pay of postdoctoral appointments can drive both men and women into other careers, these factors contribute to the high percentage of women who opt out of the academic track at the postdoctoral stage. Within the Harvard system, some schools do have limits on the length of postdoctoral appointments and minimum salaries, but others do not. Harvard needs to standardize the best practices already present within individual schools across the University.