# NSF 02-121 ADVANCE Institutional Transformation Project Description 

A Change in the Culture at the University of Rhode Island Janett Trubatch, Joan Peckham, Karen Wishner, \& Jimmie Oxley, PIs

## C. 1 INTRODUCTION

Science and technology are the cornerstones of contemporary society at every level, from the personal, to the corporate, to the global (Peterson, 1997). Diversifying the practitioners in these fields, thus bringing different perspectives, skills, and values to the fore, will more responsibly integrate scientific practice with societal needs. As part of this, there is today a broad national concern about the underrepresentation of women in the science, technology, engineering, and math (STEM) academic disciplines. As such, we need to re-evaluate the process by which we produce and support scientists. To date, the advancement of scientists, whether in industry or academia, has been largely limited to white males (CAWMSET, 2000; Etzkowitz, Kemelgor, \& Uzzi, 2000; NSF, 2000). In order to increase the ranks of scientists, we need to include the large, untapped pool of qualified women and minorities.

Furthermore, the career advancement of women depends on them participating competitively in high demand fields, such as in the STEM disciplines. Although women have made continual strides in all sectors of academic employment, substantial disparities still exist in salary, rank, and tenure (Benjamin, 1998). Women represent about $23 \%$ percent of the science and engineering labor force, and earn significantly less than their male counterparts, partially because they are least represented in the highest paying areas (NSF, 2000). Even after controlling for time-since-doctorate, men are still more likely to be tenured ( $60 \%$ of men vs. $35 \%$ of women), and to be full professors ( $51 \%$ of men vs. $24 \%$ of women). Changing these trends is important to personal career growth for women, and, because of the political and economic importance of science and technology, increasing women.s participation increases their access to positions of leadership.

The intellectual tradition of positivistic science has been called into question. This approach, which has dominated scientific inquiry since the 17th century, defines science as objective, value-free, and theory driven. However, philosophers of science now insist on considering contextual and cultural elements when evaluating the conduct and products of science (Barton, 1998; Longino, 1990). If science does not diversify its workforce by including women and minority viewpoints, the realm of inquiry will be limited in approach and perspective. In an age in which science and technology are deeply intertwined with our ability to function peacefully and productively in the world, and guard its limited resources, diversifying the scientific community has critical implications.

The administration at the University of Rhode Island is deeply committed to an agenda promoting diversity. President Robert Carothers, in efforts to create an inclusive climate on campus, recently formed the President.s Commission on the Status of Women. Of this effort, Provost and Vice President for Academic Affairs M. Beverly Swan notes:
.. . . The University has proven to be an institution committed to issues of diversity. In keeping with that commitment, the President has determined to bring issues related to women to the forefront by making them a priority on the University.s agenda..

In addition, Provost Swan and Vice Provost of Graduate Studies, Research and Outreach, Janett Trubatch, are lead players in promoting an equity agenda, and are instrumental in their support of the proposed ADVANCE project. Many initiatives on campus, including NSF-sponsored projects, are testimony to our efforts to transform the URI campus. There is much work do be done, however, particularly in the STEM departments. The ADVANCE program will give us an uncommon opportunity to unify these efforts into a coalition with organized momentum that will truly enable institutional transformation at URI.

## C. 2 THE STATUS OF WOMEN AT THE UNIVERSITY OF RHODE ISLAND

C.2.1 BARRIERS AT URI. URI is an average-sized university ( $\sim 12,000$ students), located in the densely populated Northeast, an area that offers many opportunities for career development in the STEM fields. It is ideally situated in a region replete with major commercial and federal technological research and development laboratories, as well as numerous colleges and universities. Though diversity of opportunity abounds, URI needs increased faculty diversity in its STEM departments. Similar to national trends (NSF, 1998), except for Computer Science, the numbers of undergraduate women choosing STEM majors at URI are slowly increasing. However, women students looking for role models and mentors, a factor believed crucial for retention in the STEM pipeline (Fox, 1995), find few of them at URI: the number of STEM women faculty is not keeping pace with number of women students. It is irresponsible, and indeed self-sabotaging, not to provide these role models for our students. If these female students do not see themselves adequately reflected in their fields, the incentive to remain in them must certainly be diminished (AWSEM, 1997; Hollenshead, 1995). As shown in Table 1, this is clearly a problem at URI.

Faculty profiles in the STEM departments at URI reveal trends that are discouraging, yet reflective of national data. Full-time, ranked women are only $14.2 \%$ of the STEM faculty at URI. Comparing this to the percentage of female students, only the Biological Sciences and Computer Science (which includes a recently hired third woman) come close to achieving a balanced faculty pool. Parity is still distant, however: in areas such as Engineering (7\%), Chemistry (6\%), Physics (8\%), and Oceanography ( $8 \%$ ), the numbers are dismally low. This dearth holds slim prospects for women faculty attaining leadership positions, and thus effecting positive policy and climate change for women and other under-represented groups.

Contrary to national trends (NSF, 2001), in the STEM departments (see Table 2) the number of women does not noticeably decline at higher rank. While at first glance this appears encouraging, it shows that URI is not bringing in new tenure-track women faculty. At the administrative level, the situation is not much better: of the 12 academic deans at URI, only 2 ( $17 \%$ ) are women. Worse, of the 24 STEM departments represented in both tables, only $2(8 \%)$ are chaired by women. However, at the highest levels, URI fares better, with women filling two top administrative positions: both Provost Swan and Vice Provost Trubatch have shown strong and unwavering commitment to strengthening the position of women at URI, and are key players in the proposed ADVANCE project. According to Etzkowitz, et al (2000), the most critical feature ensuring success of a change effort is the endorsement by leadership.

In 1996, a third woman was hired in the College of Engineering, increasing the percentage of women faculty there to $4.4 \%$. Two years later, she left due to the hostile climate in the College, and after many difficult months, remedial actions were taken (COE, 2000). Though these actions had positive consequences, resistance to change (part of the underground landscape of the .chilly climate.) remains. The mandated nature of these changes may have predicted a hollow response by those required to endorse them. We believe this condition exists at some level in the STEM departments at URI.

In sum, the barriers for STEM women faculty at URI addressed herein include:

- lack of female faculty at all levels, junior and senior
- lack of role models and qualified mentors for incoming faculty and students
- resistance to acknowledgment of climate issues
- need for more collaborative efforts
- need to unify and organize campus change efforts
C.2.2 EVIDENCE OF PROGRESS AT URI. URI as an institution is committed to equitable conditions for women in STEM. The Women Studies program has been involved in a 20-year curricular reform movement, recently focusing on increasing scientific literacy through the integration of science into Women's Studies courses and socio-cultural issues into science courses. URI was funded by this NSF AAC\&U initiative. Speakers, conferences, reading groups, and multidisciplinary learning communities have been funded by various URI and outside sources, including an NSF-AAC\&U initiative (Women and Scientific Literacy: Building Two-Way Streets), and an NSF-CCLU initiative (STEM Learning Communities). Active efforts exist to expand the networks of people, establish a climate for new ideas and practices, and even modify the buildings and infrastructure of the campus (Hughes, et al, 2001). The Women in Science lunch group (now 50+ strong) initiated in the 1980s, brings faculty, researchers, graduate students and staff from four colleges together on a regular basis to discuss topics of scientific interest, as well as topics related to women in science, including hostile climate issues in their own departments. The Women in Oceanography Collegium at the Bay Campus has sponsored workshops and speakers for several years. Recently the President created a Commission on the Status of Women, which includes faculty, students, administrators and staff from across the university. The group advises the President on issues such as sexual harassment; tenure, retention, and promotion of women; family leave and child care; recruitment and retention of women of color; and personal safety. In a separate development, the FamilyFriendly Task Force has been confronting the balancing of work and family. Further, URI will open the doors this fall to a new,
larger home for the Women's Center that includes a residence space for a learning community of 33 women undergraduates majoring in science and engineering.

Table 1. Percentage of Women Students versus Full-time, Ranked Women Faculty in STEM Fields

|  | \% Women Students |  |  |  |
| :--- | ---: | ---: | ---: | ---: |
| Department or Program | Undergrad | Graduate | Total | \% Women faculty |
| Biological Sciences — all | 61 | 51 | 60 | 43 |
| Physical Sciences | 24 | 32 | 26 | 16 |
| $\bullet \quad$ Chemistry | 35 | 40 | 37 | 6 |
| - Computer Science | 12 | 35 | 16 | 39 |
| $\bullet \quad$ Mathematics | 40 | 47 | 42 | 25 |
| - Physics | 19 | 4 | 18 | 8 |
| Engineering — all | 16 | 14 | 15 | 7 |
| Environment \& Life Sciences — all | 55 | 47 | 53 | 15 |
| Grad School of Oceanography —all | 0 | 43 | 43 | 8 |

Table 2. Number of Male and Female Full-time Faculty by Rank and Percentage of Women

| Department or Program | Male |  |  |  | Female |  |  |  | \% Female |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Asst | Assoc | Full | Total | Asst | Assoc | Full | Total |  |
| College of Arts \& Sciences | 4 | 6 | 44 | 54 | 7 | 3 | 6 | 16 | 23 |
| - Biological Sciences | 1 | 1 | 7 | 9 | 2 | 2 | 3 | 7 | 43 |
| - Chemistry | 1 | 1 | 12 | 14 | 0 | 0 | 1 | 1 | 6 |
| - Computer Science | 1 | 2 | 5 | 8 | 2 | 0 | 1 | 3 | 39 |
| - Mathematics | 1 | 2 | 9 | 12 | 2 | 1 | 1 | 4 | 25 |
| - Physics | 0 | 0 | 11 | 11 | 1 | 0 | 0 | 1 | 8 |
| College of Engineering | 6 | 9 | 49 | 64 | 2 | 2 | 1 | 5 | 7 |
| - Chemical | 0 | 2 | 7 | 9 | 0 | 1 | 0 | 1 | 10 |
| - Civil | 2 | 3 | 6 | 11 | 1 | 0 | 0 | 1 | 8 |
| - Electrical | 1 | 0 | 15 | 16 | 0 | 0 | 1 | 1 | 6 |
| - Industrial | 0 | 2 | 4 | 6 | 0 | 0 | 0 | 0 | 0 |
| - Mechanical | 2 | 2 | 10 | 14 | 1 | 0 | 0 | 1 | 6 |
| - Ocean | 1 | 0 | 7 | 8 | 0 | 1 | 0 | 1 | 11 |
| Environment \& Life Sciences | 8 | 14 | 43 | 65 | 3 | 5 | 4 | 12 | 15 |
| Graduate School of Oceanography | 3 | 6 | 24 | 33 | 0 | 0 | 3 | 3 | 8 |
| Total | 21 | 35 | 160 | 216 | 12 | 10 | 14 | 36 | 14.2 |

## C. 3 GOALS \& CONCEPTUAL FRAMEWORK

We believe this is an opportune time to initiate institutional transformation via the ADVANCE program. The time is ripe for organizational change and there is much energy and commitment at URI. However, we recognize the importance of enlisting the support of the targets of change. Thus, fundamental to our model is defining the level of readiness to change in the STEM departments. These determinations will guide the ADVANCE program at the departmental and administrative levels. The longterm goals will be to:

1. develop and share a comprehensive understanding of the status of women STEM faculty
2. increase the number of ranked women STEM faculty
3. advance the careers of all women faculty, especially STEM faculty
4. improve the available network of support for all women faculty, especially STEM faculty
5. increase administrative collaboration to engage in and promote organizational change

Table 3. ADVANCE Program Plan

| Goals | Strategies | Variable | Process \& Outcome Indicators | Timeline |
| :---: | :---: | :---: | :---: | :---: |
| Develop \& share understanding of status of women at URI | Visibility | - ADVANCE Resource Center <br> - Sponsored events, Publicity <br> - Campus colloquium | - Operating center <br> - Press releases <br> - 3 colloquia <br> - Active website | - Yr 1 start ctr, website <br> - Yr 1-5 events <br> - Yrs 1, 3, 5 coll |
|  | Evaluation | - Self-study data collection <br> - Quan/Qual, surveys <br> - TTM assessment | - 3 TTM reports <br> - Quan/Qual studies | - Yr 1 self-study <br> - Yrs 1, 3, 5 eval |
|  | Dissemination | - Reports / Presentations / Pubs <br> - Tailored TTM change model <br> - Website | - 15-20 conference presentations <br> - Publications <br> - Model report | - Yrs 1.5-5 trvl, web <br> - Yrs 3-5 pubs <br> - Yr 5 model |
| Recruitment | Appoint prefaculty | - Pre-Faculty Fellows Program | - 10 new STEM faculty hired by end of grant | - Yrs 1.5-5 |
| Career advancement | Funding | - ADVANCE Incentive fund | - 1-5 awards / year | - Yrs 1-5 |
|  | Education / <br> Training | - Career workshops <br> - Mentor training <br> - Web tutorials | - 4-6 workshops / yr <br> - 4-6 tutorials <br> - 25 + lunch speakers | - Yr 1 pilot workshops <br> - Yrs 2-5 workshops <br> - Yrs 1.5-5 training <br> - Yrs 2-4 tutorials |
|  | Speakers | - Topical speakers lunches | - 7-9 lunches / yr | - Yrs 1.5-5 |
| Networks of support | Work/Family initiatives Social connections | - Child-care / trailing partners policy review <br> - Organized events, gatherings, trips | - Meetings with agencies <br> - Services review report <br> - Monthly events <br> - Positive reports of work/ family integration | - Yrs 1-5 |
| Administrative collaboration | Education | - Workshops / speakers <br> - Collaborative goal-setting | - Workshops, training seminars <br> - Meetings with deans / chairs <br> - Department advisement <br> - Active support by department / administration | - Yrs 1-5 |

These goals fall under three conceptual categories:

1. Oversight and Information Management. The leadership of the URI ADVANCE initiative is indicative of the momentum this project will have. It offers real potential to effect meaningful change.

- ADVANCE Organizational Leadership (see Figure 1)
* Provost: active participation in fund allocation and fellows selection
* Advisory Committee: prominent and diverse campus representatives
* Leadership Team: top administrator and representatives of four colleges
* Deans and Chairs participation
- ADVANCE Resource Center
* A visible presence as a home office for ADVANCE project
* Clearinghouse for resources on gender issues, networking opportunities, and archiving efforts
- Evaluation and Dissemination
* Transtheoretical Model of Change: assessing readiness
* Self-study: integrated evaluation at multiple time-points
* Development of a Readiness-for Organizational-Change model for gender equity
* Website, web-based training modules, reports, presentations, publications

2\&3. Recruitment and Career Advancement of Women Scientists. We plan to increase the number of women STEM faculty and advance the careers of existing faculty by:

- Pre-Faculty Fellows Program
* Significant research/teaching opportunities
* Expanded career training, mentoring, and social support
- Faculty Career Development
* ADVANCE Incentive Fund
* Career management workshop series
* Mentor training
* Monthly topical social events

4 \& 5. Organizational Change. According to Rosser (1997), Goals 2 and 3 represent early phases of a process toward inclusive science, but are slow to change the system itself. At URI, these systemic efforts will include:

- Faculty and Administration Issue Awareness
* workshops/speakers/seminars
* sharing of findings - review of broader impacts to campus, science, and society
* collaborative goal setting and action plans with departments/administration
- Improved Support Services
* Work/family initiatives: trailing spouse/child care
* Increased social networking opportunities
* Improved mentoring and research collaborations
- Visibility on Campus:
* Centralization through ADVANCE Resource Office
* Sponsored events that are highly-publicized
* Active dissemination of findings . reports, presentations, press releases
* Active ADVANCE presence in each department

The overall ADVANCE program plan is presented in Table 3.

## C. 4 ACTION PLAN

C.4.1 PRE-FACULTY FELLOWS PROGRAM: Cultivating New Faculty. The College of Engineering has developed a successful fellows program that has led to excellent faculty hires. Modeled after this effort, we propose to create a Pre-Faculty Fellows program to develop high-potential female candidates who could then be recruited into tenure-track faculty positions. URI is expecting 16 to 20 retirements per year for the foreseeable future, over half of which are predicted to be in the STEM fields. This program, endorsed by the deans of each of the four colleges and the Provost, is designed to fill many of those slots with woman candidates. The fellowships would allow participants to observe and be involved in the strengths of the university. Past experience indicates that retention is high for new faculty who become involved in helping to build strong, high quality research programs (Hughes, 2001). The funding of Pre-Faculty Fellows will provide the incentive to begin this process. Our objective will be to bring in four highly qualified fellows as soon as possible, and maintain that number throughout the 5-year grant period. Fellowships can be held up to 3 years, with appointment to faculty rank at any time during that period. The overall aim is to have 9-10 new tenure-track faculty established by the end of the grant period; administrators support continuing the annual pre-faculty appointments for at least another 5 years beyond that. During this second five-year period, funded by URI, the number of fellows will be reduced to two per year. The overall goal will be to eventually hire 15 Fellows as faculty in a 10-year period. This effort alone would reflect a $41 \%$ increase in the number of women STEM faculty, and would increase their representation from $14 \%$ to $19 \%$.

Fellowships will be developed to establish the candidates as independent researchers while strengthening the University's overall research program. Strong preference will be given to candidates with an earned doctorate in a scientific or engineering discipline, although exceptional candidates in their final phase of doctoral work may be considered. Both women just entering their careers, and those more established who have never chosen a ranked faculty route, will be considered. To enable fellows to get a solid research program underway, their pre-faculty activities will focus on research, although teaching opportunities will also be available. Since research opportunities are often slow in coming to new faculty assigned heavy teaching loads, this program offers an attractive opportunity to develop a research program immediately. We are also fortunate to have relationships with numerous commercial and federal technology labs nearby, and RITEC (Rhode Island Technology Council), a not-forprofit organization that works toward developing the state's technology community, has agreed to help connect our Fellows
with appropriate research sites.
While Fellows will be encouraged to take a leading role in designing and conducting their own research programs, it is often easier to break into a research area as a collaborator with an already established researcher. To encourage such collaborations, proposals including a Fellow as a co-principal investigator will receive a $\$ 15,000$ incentive award. This award will come from the ADVANCE Incentive Fund, described below. NSF and the Provost.s office will also share in providing up to $\$ 20,000$ in start-up funds for each Fellow. In addition, the Dean and/or Chair of the department will be expected to contribute $\$ 5,000$ in start-up funds, providing an attractive package to the applicant, as well as a monetary commitment from the department and Provost. Salary and benefits commensurate with other University positions for recent graduates with doctoral degrees, and moving expenses will be provided.

Fellows will be offered professional and personal development opportunities beyond the scope of the present faculty development, and will be provided educational opportunities through seminars, training, and professional continuing education, including the ADVANCE workshops outlined for existing faculty. They will be assigned two mentors who have participated in the ADVANCE mentor training program, one from within their department, and one from outside, for advice and assistance. To foster the importance of role modeling for aspiring women scientists, Fellows will also be encouraged to take part in the mentor training program. For example, undergraduates from the Coastal Fellows Program ( $70 \%$ of whom are women) in the College of Environment \& Life Sciences may work with pre-faculty as part of their training.

To provide a sense of personal connection at URI, social networking opportunities will be organized through the ADVANCE Resource Center and other on-going activities, such as the Women in Science lunches. Career assistance for partners will be a priority, as well as quality child-care. Fellowships can be held for a period of up to three years, and appointment to faculty rank can be made any time during that period. As a further incentive, when a Pre-Faculty Fellow is hired, she may request an early tenure decision if desired, and departments will be encouraged to consider this option. Solicitation will occur in the fall for the following academic year. To solicit applicants, brochures and applications will be sent to all science and engineering graduate programs in the U.S. Particular emphasis will be placed on institutions with large numbers of under-represented minorities. In addition, advertisements in professional journals (such as Nature, Science, EOS), and postings to professional organizations. websites and list-serves, particularly those supporting minority memberships, will be targeted. Direct mailings and personal contact with top PhD students identified via their participation at national meetings will occur.

Each year the Provost will determine which departments will need to fill vacancies, and those departments will participate as part of a selection committee headed by Dr. Harry Knickle, Associate Dean of Engineering. The committee will be comprised of appropriate department representatives and a member of the ADVANCE Leadership Team. They will engage in a rigorous review of Fellows candidates who have strong potential to be permanently hired. The committee will present recommendations to the Provost, who will make the final selections.

## C.4.2 FACULTY CAREER DEVELOPMENT: Developing Leaders

 Director to help fund research by women scientists, and to award worthy efforts by individuals or departments that promote climate or organizational change. As evidence of university support for this program, the fund will receive a $33 \%$ match from URI the first year, with an additional $20 \%$ increase in match each of the remaining years up to $\$ 20,000$. At the conclusion of the grant period, the Provost will continue the fund at a $\$ 20,000$ per year level. Specific parameters for use will be developed by the Leadership Committee and will include: research collaboration incentives (up to $\$ 15,000$ for a woman faculty member who is either a PI or a co-PI), research funding requests, and additional start-up monies for new faculty that must be matched by the home department. Assistant faculty members will be given priority for research funding. Awards may also include: annual mentoring awards to the most effective female mentor; departmental equity awards for departments exhibiting the most proactive efforts toward assessing and making positive changes toward gender equity. This fund will serve as a representation of strong leadership endorsement of equity endeavors, and will be widely publicized.
C.4.2.2. ADVANCE Career Workshops. We will organize a series of Career Development Workshops to provide some of the basic skills and knowledge needed to help young faculty progress successfully in their careers. The target participants for these workshops, women faculty in science and engineering, will be given priority for registration, but if additional space is available, the workshops will be open to any other faculty, soft-money researchers, and post-docs. Pre-Faculty Fellows will be strongly encouraged to attend. We will market these workshops to faculty as a packaged, integrated, yearlong series, consisting of a variety of topics and formats, although individual workshops can be selected. In addition to aggressive advertising, mentors (and departmental chairs) for the women scientists will speak personally to them to strongly encourage their attendance. The time of the workshops will be adjusted to facilitate attendance by women faculty who have teaching and childcare
responsibilities.
The series will be developed and coordinated by ADVANCE Leadership Team members Dr. Joan Peckham and Dr. Karen Wishner. Workshops will be developed and piloted in Year 1 and run as a full series thereafter. We will utilize the Alton Jones URI campus retreat center for selected workshops, and will rotate topics to diversify the offerings each year. As incentives, women STEM faculty and Pre-Faculty Fellows will be offered stipends to participate. As the series progresses, web-based tutorials will be developed for general use and for dissemination to other universities. Examples of workshops include:

1. Effective Teaching Workshops. Dr. Bette Erickson, Assistant Director of the Instructional Development Program, will coordinate a series of teaching workshops. Dr. Erickson has won awards for conducting a highly successful series of faculty development workshops at URI, including a yearlong Faculty Fellows Program for STEM faculty on effective and innovative pedagogy and curriculum development in theses disciplines. Internal and external evaluations of these programs have been uniformly positive. In addition to facilitating her own workshops, Dr. Erickson will invite presenters from on and off campus who have concrete information and strategies about the issues for women.
2. Grant-Writing Workshop. This will be a collaborative effort involving experienced scientists, writers, and representatives from funding agencies, if possible. We envision a 1-day or weekend intensive workshop, including substantial practice, and possibly several mini-seminars on specific grant-writing topics. Goals include (a) understanding the outlook and needs of various funding agencies, including the new emphases on outreach and the broader impact to society, (b) developing effective modes of proposal organization and presentation of ideas, (c) budgeting for the research, including university and federal requirements, and (d) providing computer and formatting advice, for electronic submission. Numerous successful examples will be provided in all these categories. The different funding approaches suitable for federal agencies, state agencies, private foundations, and businesses will be analyzed. Writing practice and evaluation will be included, with substantial feedback by both scientific colleagues and writing experts, so that it should be possible to complete the core concepts of a research proposal during the workshop. With regard to budgeting, women tend to under budget compared to their male colleagues (Etzkowitz et al. 2000), thus shortchanging their research programs. Advice will be given on how junior faculty can ascertain the kinds of items and amounts typically funded by an agency. Suggestions for obtaining or gaining access to large expensive equipment not presently at URI, and procedures for requesting matching funds will be presented. Large collaborative programs are increasingly common at many agencies. Suggestions will be made about how to locate and select colleagues for collaboration (both within and outside the university), how to position oneself to fit into a large program led by others, and the benefits and pitfalls of various types of groups versus individual efforts. By the end of the workshop, participants should have a much greater knowledge of both the structure and politics of writing a potentially successful grant.
3. Lab Management Workshop. Modern laboratories, research, and regulations require increasingly complex management skills. In their own labs and in addition to their actual research, faculty must supervise personnel, organize purchasing and budgets, direct student research, meet accounting and reporting requirements of the university, state, and funding agency, and comply with lab safety and waste management regulations. Within the department and university, faculty must find the available resources and learn how to obtain them effectively. Typically, faculty learn this knowledge by trial and error, which wastes a lot of time and energy, and can be very frustrating to a new hire. It has been shown that women faculty may be more reluctant than men about asking senior members of the department for advice about these issues, and may receive less casual advice in the hallway or lunchroom (Etzkowitz et al. 2000). However, businesses realize the importance of management skills and are very successful at training their personnel to function effectively within the organization and to cope with crises. Dr. Laura Beauvais, Professor of Management in the College of Business, will work with Dr. Faye BeaudreauxBartels, Professor of Electrical Engineering, to develop a program to train research scientists in pertinent Management skills. Dr. Beauvais has lectured and presented widely on workplace gender issues, and leadership skills for women. This program will consist of several short seminars on specific topics and will emphasize practical skill development.
4. Negotiation and Communication Skills Workshop. Negotiation and communication skills are vital for working with others in the department and colleagues elsewhere and obtaining a fair share of departmental and granting agency resources. It is well documented that women faculty often have a smaller share of the pie (lower salaries, smaller less desirable offices, etc.) (MIT,1999). In some cases, this is because the women never thought to ask for more, or have not been able to develop reciprocal relationships that promote open discussion (Kanter, 1977). This workshop will train women faculty in appropriate and effective ways to communicate to people in a variety of relationships and to negotiate for needed resources. This workshop will consist of substantial practice and scenario development. Lynn Derbyshire of the Communications Department will participate in the development of this workshop.
C.4.2.3 Monthly Topical Lunches. Sometimes faculty navigate the university best through somewhat informal channels. Social networks and the sharing of ideas and resources can be crucial in establishing productive careers. Using the model developed by the "Women in the Sciences" lunches at URI, (Hughes, 2001) and the Women in Oceanography Collegium we will organize monthly discussion lunches in which all faculty members are invited, but women are strongly urged to attend by (and with) their mentors/mentees. Topical speakers will be invited to discuss issues surrounding the building of a viable research program and a successful, fulfilling career. These will include speakers now managing successful research programs at URI and also at other nearby institutions (such as other universities, private consulting companies, or federal labs). We expect this program to become a permanent event and funded by the Provost.
C.4.2.4 Mentor Training Program. There is much evidence that effective mentoring is one of the most important features in successful adjustment in a new career (Fox, 1995). URI has several formal mentoring programs, such as in the College of Arts \& Sciences and the College of Engineering. It is characteristic in most STEM departments at URI that entering faculty are assigned a mentor, sometimes from another department. While this is a valuable connection, it is often the case that the mentors have little choice, and sometimes interest, in the mentoring role (Didion, 1995). Mentors are assigned without formal training about mentoring roles and responsibilities, in particular about how vital it is for women in these disciplines. Anecdotal evidence suggests that improved mentoring would be a valuable support mechanism and a means of negotiating unfamiliar territory at URI. Drs. Boudreau-Bartels and Cathy Roheim Wessels of the College of the Environment and Life Sciences will develop a training program. A pool of willing mentors will be developed, to be matched with incoming faculty and pre-faculty. Because new faculty often need guidance along three fronts, in research, in teaching, and in navigating the political landscape, a two-mentor policy will be implemented, one from within the department, and one from without. The educational features of the mentor training program will be formalized in a web-based tutorial.
C.4.3 ADMINISTRATIVE COLLABORATION: The Key to Organizational Change. Institutional change cannot be limited to the molding and support of individual faculty members. The institution must engage in systemic change that will provide a more supportive environment for women. Such core change will not only improve the environment for women, but will support the growth of all faculty. This type of change requires that we have ongoing conversations with university administrators. Etzkowitz, et al (2000) note that departmental reform typically occurs due to the leadership of one or a few influential people who endorse the advancement of women. We are fortunate to have strong administrative support for the ADVANCE initiative.

Critical to enabling true climate change is the quality of communication. Much research in community psychology supports the effectiveness of collaboration (Henning-Stout, 1994). A collaborative model will be used at all times during interactions with administrators and faculty to encourage acceptance of the issues and ownership of the problems identified. This is a feature often overlooked in change efforts (Powell, et al, 1998), and lack of ownership is likely most responsible for the intractable nature of the chilly climate. Avoiding a top-down, punitive approach will be a central feature in our action plan and is consistent with the Transtheoretical Model, which emphasizes that change is best when it is self-motivated (Prochaska, Prochaska, \& Levesque, 2000). The Provost has agreed to provide the ADVANCE Leadership Team with time in regular meetings of the deans to provide information, materials, and events that clearly communicate the issues and their possible management for female URI STEM faculty. We will provide administrators in the colleges and departments of URI with the results of the climate survey and self-study and work collaboratively to process this information into a set of objectives and action plans. Information about recruitment and retention strategies for female faculty will be part of the conversation. We will sponsor workshop speakers and facilitators from within and outside the university to meet with administrators to outline best practices and strategies for administering a diverse faculty, and conduct leadership seminars.

The deans will be asked to provide this information to their department chairs. Members of the ADVANCE Leadership team or a departmental representative will offer to assist in this propagation of information to the department level, and will work with departments in reviewing/revising mission statements and policies to include a commitment to diversity, using the College of Engineering.s efforts as a reference. While each dean may wish to handle these issues differently, we will have available suitable literature and speakers from which the department chairs might draw upon, and will encourage chairs to invite ADVANCE representatives to department meetings to do on a departmental level what will be done at the administration level.
C.4.4 WORK-LIFE ISSUES: Weaving a Network of Support. Since the passage of the Family Medical Leave Act in 1993, significant progress has been made toward improving the support services available to workers, in particular working women (CAWMSET, 2000). All employers, including universities, ignore work and family issues at the risk of losing talented workers to other organizations (AAC\&U, 2000; AAUP, 2001). URI has recognized the importance of family-friendly policies in recruiting and retaining top-quality employees, and supports the work of its Family-Friendly Task Force (FFTF). Since its formation in 2000, the FFTF has grown to include about 40 members who work together to find solutions to pressing work-family issues. The ADVANCE Leadership Team will work in concert with the FFTF and the Women's Equity Committee to evaluate the effective-
ness and scope of URI.s policies and practices regarding work-family issues. Drs. Jimmie Oxley and Karen Wishner will organize these efforts and liaison with the other committees. The following will specifically be addressed:
C.4.4.1 Trailing Partner. We believe it will be easier to attract and retain female faculty members if some provision can be made for the professional/employment needs of her spouse or significant other. Due to state budget constraints, guaranteeing additional job placement is not feasible; however, we will strongly encourage consideration of this option and will include a review of model programs at other institutions as part of our faculty/administration awareness program. Also, URI Career Services has expressed an interest in developing a program that includes services to this population. We envision these possibilities:

1. 2. If the partner's professional expertise is not appropriate for a university position, job placement aid will be offered. This will go to the extent of paying a professional placement agency to aid in the preparation of a suitable resume and search.
1. If the spouse.s profession is appropriate for a university position, regardless of the field, the appropriate department or office will be strongly encouraged to offer at least a temporary second position, such as a postdoc. The intent is that this person will become a valuable member of the department, and may be hired permanently when an opening becomes available.
C.4.4.2. Family Care. After performing a campus needs assessment in 2001, the FFTF focused on bringing a child-care center to campus. The university donated land, and the FFTF, working with a faculty expert on early-childhood education, has drafted a request for proposals for construction and operation of a child-care center. The group will work with the successful bidder to ensure that the center's hours of operation and programs meet the needs of the university community. In spring 2002 the FFTF, in conjunction with the university's training group, also sponsored a series of workshops on balancing work and caring for elderly relatives. The ADVANCE team will work with the FFTF and URI's Department of Human Resources to consider flextime mechanisms for employees, review the use and perception of the University's family leave policy, and begin a discussion about slowing the tenure-clock .
C.4.4.3. Social Networks. Meaningful social connections can be critical contributors to the overall job satisfaction for new faculty, especially women who may experience restricted access to professional networks in some of the STEM departments (Fox, 1995). Although large metropolitan areas are not too distant, URI itself is located in a semi-rural town with a population of 26,000 that is dominated by families. A new hire may be younger and have different interests than her faculty peers. Networks for minority women may be particularly problematic in a predominantly white environment (Tack \& Patitu, 1992). Determining specific needs and ensuring connections should greatly enhance the probability of retention. We propose facilitating development of social support systems by establishing a (voluntary) list of area junior faculty and science and engineering professionals who might share interest in casual social events. The ADVANCE Resource Center will serve as a clearinghouse for information about how to connect with similar others. The Program Coordinator will assemble a list of professional persons newly come to the area (including the Pre-Faculty Fellows) and organize a series of social activities during the fall semester of each year (URI might sponsor an introductory picnic on the Bay at the Graduate School of Oceanography's Bay Campus, for example). Outings, get-togethers, book groups, dinners, performances, trips, etc. will be offered and well publicized. Regional networks will also be established by organizing informal social activities with young professionals at other science-related facilities. Within about a 1-hour drive of URI, there are several universities with strong research science departments (Brown, UMass Dartmouth, UConn Avery Point, Roger Williams University) and federal science and engineering labs (EPA, NOAA, Navy labs). The junior faculty, engineers, and science professionals at these institutions probably feel the same degree of isolation as junior faculty at URI, and connecting with them will enable social as well as important professional networking opportunities.

## C. 5 OVERSIGHT \& MANAGEMENT

C.5.1 ADVANCE RESOURCE CENTER: A Visible Presence. Gender equity efforts at URI have been significant, and have resulted in many positive changes. However, these efforts are diffused and decentralized, and depend on the individual energies of concerned (and over-taxed) women. An ADVANCE Resource Center office will be established on campus that will be modeled after the URI Multicultural Center, which serves as a gathering place, a clearinghouse for diversity efforts, and a force in promoting diversity activities and initiatives throughout the campus. Managed by the ADVANCE Program Coordinator and staffed by undergraduate and graduate students, ADVANCE activities will be overseen from this office, but also other groups, such as the Women.s Equity Committee can use the office as a central location from which to operate and organize. In this way, a common agenda, pooled resources, shared information, and an inclusive picture of equity at URI can be understood. The ADVANCE Team has already investigated several possibilities for a location, including the new Women's Center, and conversations are underway with the Provost and Vice Provost. We envision the space to include an office, as well as an attractive and comfortable gathering space that could be used for: 1) library of URI diversity publications, presentations, reports,
etc., 2) display of relevant data, brochures, upcoming events, etc., 3) general library of academic gender equity resources, 4) meetings, informal gatherings, small presentations, meeting place for planned trips, 5) regular social gatherings, with refreshments, music, a speaker, etc., and 6) planning of events and activities.
C.5.2 ADMINISTRATIVE STRUCTURE: Integrated Management. Figure 1 shows our administrative structure, and some (but not all) the key participants. Our team will consist of many prominent individuals who have track records promoting gender equity. Our Advisory Committee is still being formed, but now includes the Dean of Arts and Sciences, Winifred Brownell; an organizational evaluation psychologist, John Stevenson; the Multicultural Center Director, Melvin Wade; Carolyn Sovet, Women.s Center Director; and Kathy Mallon, Director of Strategic Planning and Research.

The Provost, M. Beverly Swan, and the Vice Provost of Graduate Studies, Research, and Outreach, Janett Trubatch, also the Project Director and lead PI, are key leaders, and are committed to its success. The Leadership Team represents all four colleges we are targeting, and will oversee each branch of effort. The Program Coordinator, Barbara Silver, is a social psychologist and is currently managing an NSF-funded grant on STEM learning communities. She will oversee all aspects of grant operations, will ensure active communication and integration of efforts, liaison with other campus organizations, and will manage the ADVANCE Resource Center.

Figure 1
NSF-ADVANCE Key Participants
Advisory Committee
Winifred Brownell, Dean, College of Arts \& Sciences
John Stevenson, Professor, Psychology
Carolyn Sovet, Ass't Director, Student Life; Director, Women's Center
Melvin Wade, Director, University Multicultural Center
Laura Beauvais, Professor, Bus. Admin; Chair, Women's Equity Ctte
Kathy Mallon, Director, Strategic Planning \& Institution Research


## C.6.EVALUATION

The ADVANCE evaluation will be comprehensive and interactive, beginning with a self-study that includes data collection, quantitative analyses, and qualitative/ethnographic surveys. These will be repeated at mid-point, at the end of the grant period, and at a distal time point. Readiness-for-change evaluations based on the TTM model described below will guide our intervention strategies and timeline.
C.6.1 SELF-STUDY. In concert with the Office of Strategic Planning and Institutional Research, our evaluation team will begin to build a thorough database, retroactive to 1999. This will include recruitment data, salary, start-up funds, time to tenure, time at rank, access to resources, publications, awards, research dollars, leave time, teaching, committee, and advisee workloads, courses taught, marital status and spousal information, etc. Much of this type of data is not easily available or organized at URI. The ADVANCE initiative comes at an opportune time, since URI is in the process of replacing existing administrative data systems with advanced, integrated software systems developed by PeopleSoft. This will constitute an overhaul of existing data collection practices, and provides a unique opportunity to redefine target variables. Importantly, the expanded data collection criteria will impact all faculty data, providing departments campus-wide with enhanced means of evaluating conditions of faculty employment.

Quantitative: Dr. Lisa Harlow, Professor of Psychology, specializes in quantitative methods and will oversee the development of quantitative data collection and analysis over the grant period. In conjunction with Pro-Change (discussed below), she will also develop and validate an attitude scale tostatistically measure attitude change toward gender equity in academe. The intended outcome is a valid, reliable measure that can be available for general organizational use.

Qualitative: Dr. Lisa Bowleg, Associate Professor of Psychology, an experienced qualitative evaluator, will design and oversee the qualitative analysis, including an ethnographic climate study and assessment of gender interactions in the workplace, involving: 1) focus groups; 2) in-depth interviews; and 3) naturalistic observation. Dr. Bowleg will develop and oversee the administration of qualitative measures of project effectiveness, including: 1) satisfaction of Pre-Faculty Fellows; 2) perceptions from faculty and administrators about program effectiveness (workshops and training, information dissemination, addressing work/family issues, Pre-Faculty Fellows program, ADVANCE Incentive Fund, etc.), and 3) perceptions of other faculty and students about gender issues in STEM departments.
C.5.2 ASSESSING READINESS: The Transtheoretical Model of Change . A feature of top-down approaches is that, although the leaders of the institution legitimate the change, it has a punitive quality that may force compliance, but that does little to erode the .chilly climate. that remains tenacious in the STEM fields. Attempts to implement organizational change must match the readiness of the targets of change. If most of the individuals are not willing, which is often the case in traditional STEM departments, resistance is likely, money is wasted, and resentment is fostered. The ADVANCE project will proceed based on the findings of Pro-Change, an independent, women-run organizational change consulting firm that uses the Transtheoretical Model of Organizational Change (TTM). This model, with over 20 years and $\$ 60$ million in research assessing the efficacy of its interventions (Prochaska, Prochaska \& Levesque, 2001), has been recognized as the most influential approach to the integration of behavior change theories and practice (Pendlebury, 1996). The model has had a significant impact on individual health behavior change, and is now being successfully applied to organizational behavior change (Levesque, Prochaska, \& Prochaska, 1999; 2001). The TTM understands change as progress over time through a series of five stages:

- Precontemplation . not intending to take action
- Contemplation . intending to take action in the foreseeable future
- Preparation . ready to take action
- Action . overtly engaging in new behavior
- Maintenance . sustaining the overt changes over time

In designing intervention strategies, the identified stage of change is integrated with 10 cognitive, affective, and behavioral processes that facilitate change. The ADVANCE evaluation team, in concert with Pro-Change guidance, will develop the optimal conditions for change at the faculty, departmental, and administrative levels, by providing stage-matched interventions that reduce resistance, increase participation, and maximize the likelihood of action. Pro-Change estimates that the assessment process should take 4 to 6 months, fitting well with the Pre-Faculty Fellows recruitment phase and the planning phase of the other ADVANCE plans. Steps in the TTM approach include: 1) identification and definition of target behavior changes, 2) customization of TTM survey measures for individuals and organizations, 3) administration of TTM measures, 4) data analysis and feedback, 5) provision of stage-matched individual and organizational intervention strategies, and 6) re-administration of TTM measures in years 3 and 5 .

## C. 7 BROAD IMPACT

## C.7.1 PRODUCTS \& DISSEMINATION

Website: An ADVANCE website will be continually updated as an information source about equity efforts, issues, and opportunities on and off campus. Reports, evaluation results, and training modules will be posted, and an editorial page will be created as a campus forum for open discussion about equity issues.
Evaluation Results: Following years 1,3, and 5, evaluation reports will be presented at a campus colloquium, and at departmental, administrative meetings. Interpreted findings from the TTM, qualitative and quantitative analyses will be included, as well as how well outcome indicators are being realized. Collaborative discussion about the significance and broader impacts of the findings will take place.
Products: We plan to present and publish our findings widely. We believe that our widespread efforts, including tutorials, the development of the Readiness for Organizational Change model, and a validated quantitative attitude change questionnaire, will enable us to become a model institution.
C.7.2 SUSTAINABILITY. We plan on at least these enduring changes:

- Provost.s ADVANCE Incentive Fund
- ADVANCE Resource Center with permanent Director; and liaisons with campus organizations
- ADVANCE Website, with discussion forum page
- Training modules; periodic career workshops; monthly topical lunches
- Leadership Team oversight, and continuing dialog with administration and departments
- Work/family policy improvements
- Revised department mission policy statements to include commitment to fairness and diversity
C.7.3 BENEFITS TO WOMEN, SCIENCE, AND SOCIETY. We believe these changes will enable departmental growth, providing expanded offerings and perspectives, and making STEM an attractive choice for students and prospective faculty. Indeed, our policy and programmatic efforts will benefit all faculty at URI, and will hopefully gain URI a reputation as a model for progressive change. As the only state university in a small state, there is potential for substantial influence in the public eye in general, and for women in particular. As numbers of women scientists increase, especially in leadership positions, the way science is conducted and even conceptualized should reflect more diverse perspectives (Fox Keller, 1991; Rosser 1997). In an age where ethics are central to scientific decision-making, we recognize the profound potential of this evolution to science and to society, far beyond career advancement for the women at URI.


## RESULTS OF PRIOR NSF SUPPORT

Joan Peckham, PhD, Professor, Computer Science \& Statistics
NSF Award Number: DUE 9980908; \$199,000; Jan.1, 2000 . Dec.31, 2002
Title: Multidisciplinary Science \& Engineering Learning Communities for Students and Faculty
Results: Multidisciplinary student learning communities (LC) are being run to attract, retain, \& increase the success of women students in STEM. This includes a summer bridge camp for incoming engineering students. A peer mentor program trains female STEM majors to mentor LC students; workshops and a yearlong faculty LC study innovative pedagogy in STEM fields.
Publications: Hughes, et al. 2001.
Available data: improved attitudes and academic performance have been measured; mainstreaming of at least one LCs and the bridge camp; hosted a conference at URI; developed a computer science marketing campaign to attract females; positive input from faculty and student participants.

## Karen Wishner, PhD. Professor, Oceanography

NSF Award Numbers: OCE9632746; \$421,421; 9/15/96-8/31/2000, OCE9806444: \$331,522 11/1/98-10/31/02
Titles: (1) U.S. GLOBEC Interaction of Zooplankton Vertical Migration with Episodic Mesoscale Advective Features: Impacts on Population Retention \& Loss, (2) U.S. GLOBEC Cross-frontal Distributions and Exchange of Zooplankton on Georges Bank
Publications: Wishner et al. ( $1998,1999 \mathrm{a}, \mathrm{b}, \mathrm{c}, 2001 \mathrm{a}, \mathrm{b}$, submitted, in prep.) and contributions to GLOBEC web site Results and Data: These projects, parts of the US GLOBEC project on Georges Bank, examined zooplankton distributions to determine the influence of various physical oceanographic features. This work contributed to the knowledge and understanding of zooplankton dynamics on Georges Bank, especially the interactions of an important copepod with its physical and biological environment. Numerous undergraduate \& graduate students were trained and supported on these grants; 4 undergraduate (women) senior projects were completed.

