

National Science Foundation



PROGRAM FOR WOMEN AND GIRLS

Awardee Meeting

October 5-6, 1998

Arlington, Virginia

1998

National Science Foundation

Directorate for Education
and Human Resources

Division of Human Resource
Development



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HOT NEWS FROM WASHINGTON

H.R. 3007 Is PASSED

Dr. Roosevelt Calbert, NSF Division Director for Human Resource Development, held a special session during this year's conference to announce the passing of H.R. 3007. Dr. Calbert then explained to attendees the implications of the passage of the bill.

H.R. 3007, the Commission on the Advancement of Women in Science, Engineering, and Technology Development Act, calls for the appointment of a commission comprising seven representatives from U.S. businesses and four individuals from the ranks of U.S. educational or academic institutions in the fields of life science, physical science or engineering. The Commission will be mandated to identify the problems associated with the recruitment, retention and advancement of women, minorities, and persons with disabilities in science and engineering. The Commission will then prepare a report of these findings for submission to the President and Congress, recommending policies to overcome the barriers identified.

H.R. 3007 was introduced by Technology Subcommittee Chairwoman Connie Morella (Rep. - MD). "By addressing the barriers that face women and minority scientists and engineers," she stated, "Congress has taken action to help to ensure that our labor force is ready for the information age, and that our high-tech economy continues to flourish in the 21st century."



For more information on this bill, visit the web site thomas.loc.gov and type "H.R. 3007" in the area labeled "Search by Bill Number".

NSF's PROGRAM FOR WOMEN AND GIRLS

To promote gender equity in science, engineering and mathematics, the National Science Foundation's Program for Women and Girls (PWG) has supported more than 100 curricular innovations, professional development efforts, and informal learning opportunities for women and girls.

The National Science Foundation's mandate is to ensure the vitality of the United States in the scientific and technical enterprise. The Division of Human Resource Development, located in the Directorate for Education and Human Resources, supports the Foundation's goal by promoting activities to increase the participation of traditionally underrepresented communities in science, mathematics, engineering, and technology (SMET) education and careers. NSF's Program for Women and Girls (recently renamed the Program for Gender Equity in SMET), located within the Division of Human Resource Development, bolsters the work

of its Division and promotes NSF's vision through its efforts to achieve gender equity in SMET disciplines. The program accomplishes this by:

- Increasing awareness of the interests, needs and capabilities of girls and women.
- Promoting instructional materials and teaching methods for increasing interest, retention and achievement of girls and women.
- Increasing the availability of student enrichment resources, including mentoring.

In short, the Program for Women and Girls (PWG) is dedicated to changing factors that have discouraged early and continuing interest in SMET, and to

developing interest, knowledge and involvement of girls and young women in these fields. PWG realizes its goals by funding a variety of projects, including large collaborative projects and planning grants, small experimental projects, and information dissemination activities.

Each year, PWG holds a meeting for its awardees. The two-day meeting is designed to promote the exchange of ideas and experiences, as invited speakers and conference attendees share project challenges, research results and success stories.

THE 1998 ANNUAL MEETING FOR GRANTEES OF THE NSF PROGRAM FOR WOMEN AND GIRLS

THE 1998 ANNUAL MEETING

The 1998 Annual Meeting for Grantees of the Program for Women and Girls/Gender Equity was a great success, thanks to an impressive line-up of speakers and an enthusiastic assembly of more than eighty-five participants. The agenda, which allowed equal time for speakers and small group discussions, yielded lively and productive dialogue as attendees networked and shared insights about their research and education projects.

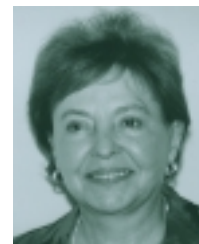
This year's speakers inspired participants and provided substantive and practical information for projects at all stages of development. Dr. Lynn Philips, author of *The Girls Report*, sponsored by the National Council for Research on Women, summarized current research on the status of girls. NSF staff members contributed special expertise: Dr. Mary Golladay from the Science Resources Division presented statistics on women in science; Stephanie Bianchi, NSF's Librarian, shared insights on tracking down relevant resources on the Internet; Dr. William Sibley brought participants up to date on the Government Performance and Results Act of 1993 and its effect on NSF project evaluations; and Evelyn Baisey-Thomas covered the use of FastLane for electronic communication with NSF.

Presenting the results of major projects, PWG principal investigators provided valuable guidance and encour-

agement: Drs. Arlene Chasek and Patricia Campbell presented *Making a Splash*, a marketing guide for researchers; Dr. Dorothy Bennett introduced the just-issued PWG web site and CD-ROM; and Dr. Carolyn Carter discussed the use of listserv technology among PWG members and with other groups engaged in gender equity and science education. Two evaluation sessions offered different perspectives: Drs. Toni Clewell and Lindsay Tartre of The Urban Institute spoke about the evaluation of PWG that is underway, and Dr. Joy Frechtling of Westat held a mini-workshop based on two evaluation handbooks published by NSF and the Directorate for Education and Human Resources.

More than thirty participants volunteered as facilitators for small group discussions during the meeting, covering topics such as "Lessons Learned in Dissemination" and "Research Frontiers for Women and Girls in SMET." Facilitators reported back to the general meeting, extending the participatory experience and bringing specific project knowledge into the general dialogue.

Dr. Roosevelt Calbert, NSF Division Director for Human Resource Development, treated participants to "Hot News from Washington," interrupting the meeting to report on the passing of H.R. 3007 on the very day it happened. H.R. 3007, known briefly as the "Women in Science"



bill, will focus attention on exactly the problems that are the basis for PWG projects. It will also result in a national-level commission report and recommendations within a year.

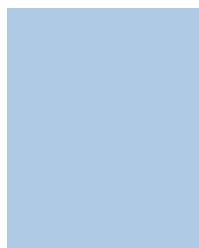
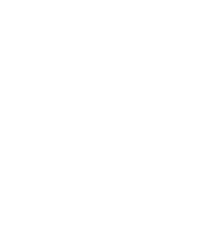
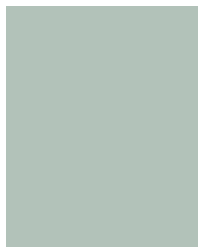
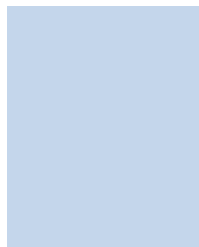
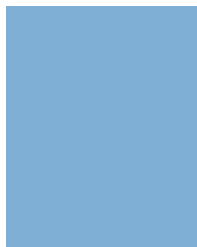
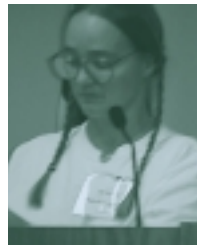
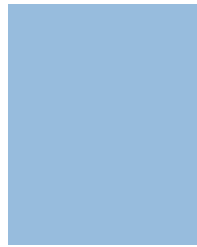
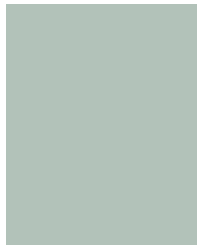
For those of you who joined us and would like a record of the event, and for those of you who could not attend and would like a sense of what took place, PWG is pleased to offer this highlights brochure. The presentations, exhibits and small group discussions at this year's meeting contributed to a meaningful experience for all who attended; this publication was developed to extend that experience to the reader.

**Dr. Ruta Sevo and
Dr. Margrete Klein
Program Directors
National Science Foundation
4201 Wilson Blvd
Arlington, VA 22230
Tel: 703-306-1635 x6870**

See the back of this brochure for information on ordering NSF publications and on contacting the Program for Women and Girls/Gender Equity.

See brochure tear-out sheets in the back of this brochure for lists of related web sites and directories, and the distribution list for the PWG listserv.

Visit our web site at www.ehr.nsf.gov/EHR/HRD/ge/ge-index.htm.



AGENDA

MONDAY, OCTOBER 5, 1998

8:30 a.m.

GREETINGS AND INTRODUCTIONS

Dr. Roosevelt Calbert,
Division Director, Human
Resource Development, NSF
Dr. Margrete (Gretchen)
Klein, Program for Women
and Girls, NSF
Dr. Ruta Sevo, Program for
Women and Girls, NSF

9:00

THE GIRLS REPORT

Dr. Lynn Philips, Author and
Faculty, New School of
Social Research and
National Council for
Research on Women

10:00

BREAK

10:30

SMALL GROUP DISCUSSIONS

Plan versus Actual: Surprises
in Project Design and
Management

Strategies for Funding,
Partnerships, Collaborations:
Lessons Learned

11:30

REPORTS FROM SMALL GROUPS AND SUMMARY

MONDAY, OCTOBER 5, 1998

12:00 p.m.

LUNCH

1:30

STATISTICS ON WOMEN IN SCIENCE

Dr. Mary Golladay, Program
Director, Human Resources
Statistics Program, NSF

2:30

BREAK

3:00

SMALL GROUP DISCUSSIONS

Research Frontiers for Women
& Girls in SMET

4:00

REPORTS FROM SMALL GROUPS AND SUMMARY

4:30

HOW TO MARKET MATERIALS FOR WOMEN AND GIRLS

Dr. Arlene Chasek, Rutgers
University
Dr. Patricia Campbell,
Campbell-Kibler
Association, Inc.

5:00

ADJOURN

See the back of this brochure
for information on ordering NSF
publications and on contacting
the Program for Women and
Girls/Gender Equity.

See brochure tear-out sheets in
the back of this brochure for
lists of related web sites and
directories, and the distribution
list for the PWG listserv.

Visit our web site at
[www.ehr.nsf.gov/EHR/HRD/ge/
ge-index.htm](http://www.ehr.nsf.gov/EHR/HRD/ge/ge-index.htm).

AGENDA

TUESDAY, OCTOBER 6, 1998

TUESDAY, OCTOBER 6, 1998

8:30 a.m.
GREETINGS

8:30
THE PROGRAM FOR WOMEN AND GIRLS
CD-ROM AND WEB SITE
Dr. Dorothy Bennett,
Education Development
Center, Inc.

8:55
THE LISTSERV FOR WOMEN AND GIRLS
(PWGLIST@AEL.ORG)
Dr. Carolyn Carter,
Appalachia Educational
Laboratory

9:00
SEARCHING THE WEB ON WOMEN AND
GIRLS IN SCIENCE
Stephanie Bianchi, NSF
Librarian

9:30
BREAK

9:45
SMALL GROUP DISCUSSIONS
Lessons Learned in Evaluation

Lessons Learned in
Dissemination

Recent Findings in Gender
Equity/SMET

Women and Scientific
Careers: Trends

10:45
REPORTS FROM SMALL GROUPS
AND SUMMARY

11:15
GOVERNMENT PERFORMANCE AND
RESULTS ACT OF 1993: UPDATE ON
NSF RESPONSE
Dr. William Sibley, Acting
Director, Division of
Research, Evaluation, and
Communication, NSF

11:30
THE EVALUATION OF NSF'S PROGRAM
FOR WOMEN AND GIRLS
Dr. Beatriz Chu (Toni)
Clewell, The Urban Institute
Dr. Lindsay Tartre, The Urban
Institute

12:00 p.m.
LUNCH

1:30
WORKSHOP ON EVALUATION
Dr. Joy Frechtling, Associate
Director for Educational
Studies, Westat

3:00
DEMO AND Q&A OF FASTLANE SYSTEM
Evelyn Baisey-Thomas,
FastLane Team, Division of
Information Systems, NSF

3:30
ADJOURN

THE GIRLS REPORT: WHAT WE KNOW AND NEED TO KNOW ABOUT GROWING UP FEMALE

THE GIRLS REPORT

Dr. Lynn Philips, a research scholar with the National Council for Research on Women, presented research and findings from *The Girls Report*, which she authored. *The Girls Report* reviews current statistics on health; social science studies on sports, sexuality and education; and feminist policy analyses, synthesizing the present state of research on today's adolescent girls. *The Girls Report* is a sequel to *Risk, Resiliency, and Resistance: Current Research on Adolescent Girls*, which was produced by the National Council for Research on Women for the Ms. Foundation in 1991.

As *The Girls Report* explains, adolescence can be both a rich and challenging time for girls as they confront new ideas, explore life's possibilities, and navigate through the stormy seas of physical, social, behavioral, and emotional changes. How are girls meeting these challenges? The research and policy studies reviewed and analyzed for this report provide a mixed picture of progress and continuing struggles.

Several large-scale national studies suggest that girls are as likely as boys of the same age to smoke cigarettes, that they have inadequate access to sports programs that offer physical, social,

and psychological benefits, that they are twice as likely as boys to be depressed, and that they often are the victims of violence.

On the other hand, new evidence identifies other, more encouraging trends. In school, girls continue to do well in reading and language, and their math achievement now almost matches that of boys. The teen birth rate has declined steadily since 1992, after rising by 25 percent between 1986 and 1991, and although access to contraception and abortion services has been restricted in many states, more teens appear to be using contraception than ever before.

Conclusions and recommendations from *The Girls Report* include:

- Girls are multidimensional individuals with diverse perspectives, needs, and developmental contexts.
- Girls can benefit from programs and strategies that build on their strengths and encourage them to explore meaningful possibilities for their futures.
- Research must continue to play a role in deepening our understanding of girls' needs and how to respond to them.
- Girls require and deserve the awareness, attention, and



commitment of a wide range of individuals and institutions to promote their healthy development.

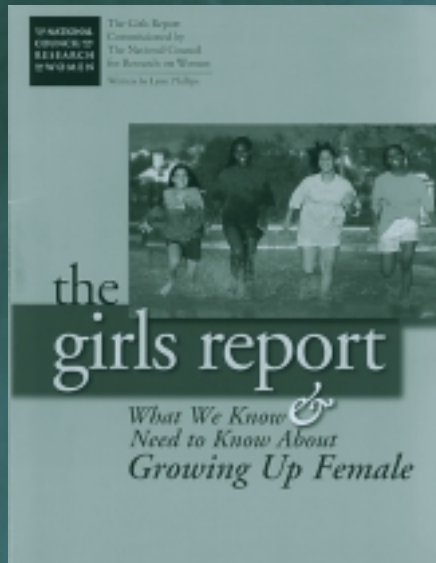
- Adults should listen to what girls have to say about their own lives.

Dr. Lynn Philips
Faculty, New School of Social
Research & Research Scholar,
National Council for Research
on Women
733 Berkeley Ave.
Plainfield, NJ 07062
Tel: 908-755-8284
E-mail: lp90@aol.com

Copies of *The Girls Report* are available from the National Council for Research on Women, Publications Department, GR2, 11 Hanover Square, 20th Floor, New York, NY 10005. Call 212-785-7335, fax at 212-785-7350, or visit the Council's web site at ww.ncrw.org. Cost is one to nine copies, \$20.00 each, plus shipping and handling, which is \$3.50 for the first copy, and \$1.00 for each additional copy.

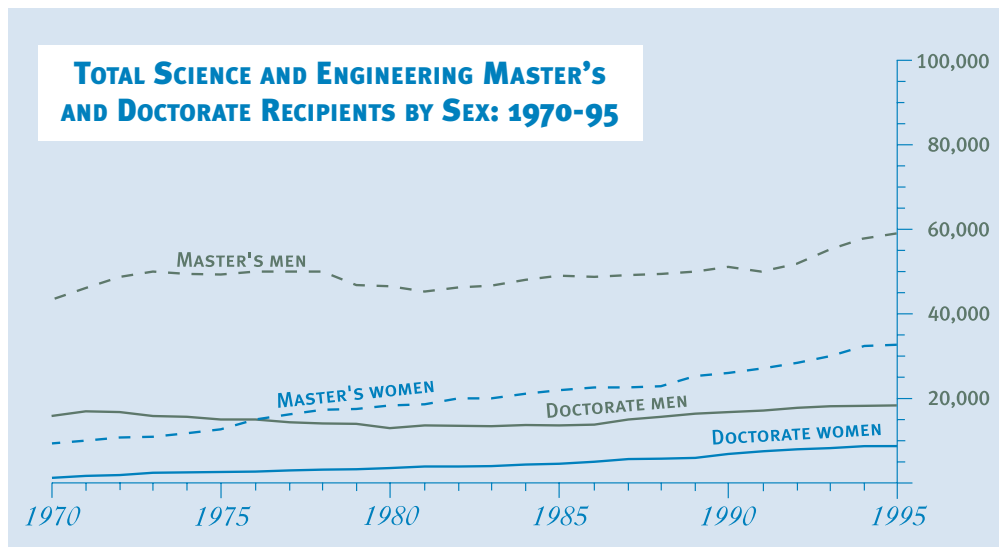
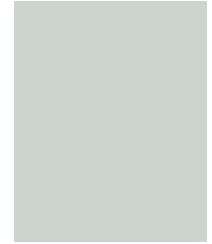
IF I COULD TELL ADULTS ANYTHING THAT WOULD MAKE MY LIFE BETTER, IT WOULD BE TO LISTEN TO YOUNG PEOPLE AND HELP THEM OUT. I'M YOUNG AND STRONG AND INDEPENDENT, BUT THERE ARE ALSO AREAS WHERE I NEED HELP, LIKE AT SCHOOL AND MY NEIGHBORHOOD AND AT HOME. KIDS NEED HEALTH CARE AND GOOD SCHOOLS AND SAFE STREETS AND CONSTRUCTIVE THINGS TO DO WITH OURSELVES. IT'S HARD ENOUGH BEING YOUNG, BUT BEING A GIRL, AND THEN THERE'S WHERE YOU LIVE AND THE COLOR OF YOUR SKIN, IT CAN BE REALLY HARD GROWING UP. I WOULDN'T EVER TRADE WHO I AM, I'D JUST MAKE SOCIETY HEAR US BETTER. YOUTH HAVE A LOT TO OFFER THIS WORLD, BUT SOMETIMES GIRLS AREN'T TAKEN THAT SERIOUSLY. BUT JUST WATCH ME. ME AND MY GIRLS ARE MAKING SOMETHING OF OURSELVES.

-TARA, AGE 15 (SELF-DESCRIPTION: "AFRICAN AMERICAN, FEMALE, STUDENT")



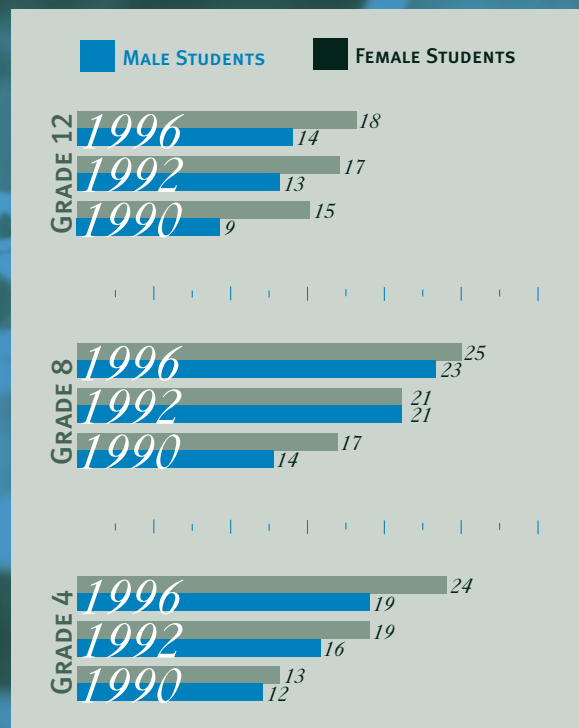
STATISTICS ON WOMEN IN SCIENCE

Mary Golladay presented statistics on the participation and performance of girls in K-12 and women in higher education and in the workforce. The statistics were very current, providing attendees with an advance look at trends up to 1996. They have subsequently been published in the latest biannual edition of *Women, Minorities, and Persons with Disabilities in Science and Engineering*: 1998, NSF 99-338.



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Statistics Program
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Percentage Attaining Mathematics Proficiency Levels on
the National Assessment of Educational Progress for
Grades 4, 8 and 12 by Sex, in Selected Years



HOW TO MARKET MATERIALS

“We used to think our job description was clear,” said Drs. Chasek and Campbell during their presentation at this year’s conference. “We conducted the research, designed the programs, developed the products, and considered the work complete.” Then one day, they made a major realization: If no one read their report, implemented their program, or tried their product, then the work was not only incomplete, but wasted. To address this concern, they developed *Making A Splash: A Guide to Getting Your Programs, Ideas and Products Out*. This short, easy-to-use manual was written with the assumption that the reader has little or no experience in marketing and the media. *Making A Splash* offers suggestions, insights and practical steps to getting the product out and the message heard, as the following excerpt demonstrates:

BEGINNING AT THE BEGINNING: GOALS

What is your goal?

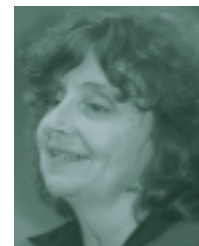
“What is your goal?” is simple to ask but hard to answer. Comedians and management gurus remind us of what can happen if we don’t have goals and don’t know where we are going. We all know that it is key

HOW TO MARKET MATERIALS

to have a direction, a purpose, a goal, to know what we want to happen. Thus, the first step is to determine what your goals are.

Goals may not all be altruistic. While staying employed is not the best primary goal for a social change project, it is realistic to acknowledge that if you stay employed, your project stands a better chance of success. Goals do need to be specific. While “to change the world” is a laudable goal, it is too broad and needs to be narrowed. In what ways do you want to change the world? In what areas? As part of your goals, it is important to ask who your primary audiences are. The answer may be quite different from what you first thought.

- If your major goal is to seek grants, your primary audience may be foundation and government program officers rather than teachers or educational decision-makers. If so, your efforts should be directed toward them.
- If your goal is to have teachers receive your training, your primary audience may be those people who do the teacher training or those who make the decisions about teacher in-service, such as science supervisors and other administrators, rather than the teachers themselves.



Remember while you may have many different audiences, your primary audiences are the one or two that are most important to your product and whose participation is key.

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New Brunswick
Development and Family
Involvement
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Tel: 908-445-2071
E-mail: Chasek@E-mail.rci.rutgers.edu

Dr. Patricia Campbell
Campbell-Kibler Associates, Inc.
80 Lakeside Drive
Groton, MA 01450
Tel: 978-448-5402
E-mail: ckassoc@tiac.net

Making A Splash can be downloaded for free from www.campbell-kibler.com or purchased in print from Campbell-Kibler Associates (campbell@campbell-kibler.com).

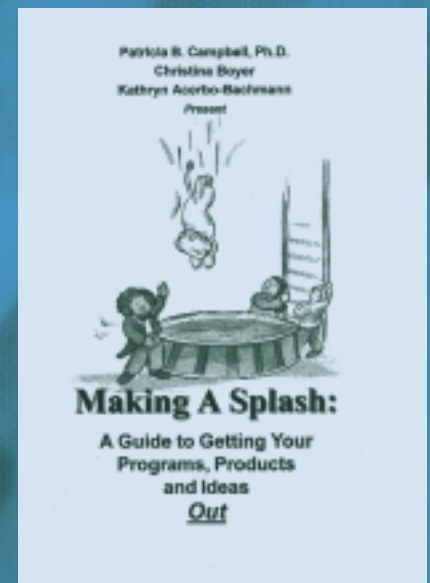
As you write your goals, pretend someone is sitting

right next to you saying: “What do you mean by that?”

So if your goal is to “create a community of learners,”

be ready to explain what that means.

- Making A Splash, p. 7



CD-ROM AND WEB SITE

PWG has supported more than 100 important curricular innovations, professional development efforts, and informal learning opportunities for women and girls in science, engineering, mathematics, and technology. EDC's Center for Children and Technology worked with NSF to develop *A Lifetime of Science, Engineering, and Mathematics*—an engaging CD-ROM of PWG project interventions and materials to increase awareness of the excellent work in gender equity that NSF has supported.

A Lifetime of Science, Engineering, and Mathematics was created in response to many principal investigators' requests for a means to gather and disseminate information about the broad range of innovations that have resulted from PWG over the years. EDC's Center for Children and Technology took on this task because much of the Center's work focuses on how to use new technologies to shape and share information in ways that are useful to educators. Furthermore, CCT was interested in gathering gender equity resources into one place and making them useful for different projects—such as EDC's own online mentoring program, funded by PWG.

The CD-ROM showcases how twelve projects have concretely addressed gender equity issues in

CD-ROM AND WEB SITE

mathematics, science and technology at every stage of development in the lives of girls and women. The CD-ROM highlights innovative solutions to the following four key gender equity challenges:

- Retention—how to sustain the interests of women and girls in math, science and technology.
- Engagement—how to develop curricula that offer alternative entry points for girls into math, science, and technology.
- Know How and Experience—how to provide necessary hands-on experience and knowledge needed for entry into science and technical fields.
- Awareness—how to promote sensitivity to the needs and concerns of women and girls in science and technical courses and careers.

Dr. Bennett demonstrated the CD-ROM and highlighted some of the design issues that arose in trying to represent the vast array of programs that have grown out of PWG. More specifically, her presentation offered insights into the following issues:

- Selecting a navigational metaphor that conceptually aids the user in seeing connections between projects.
- Deciding on how much information can be included with limited production resources.

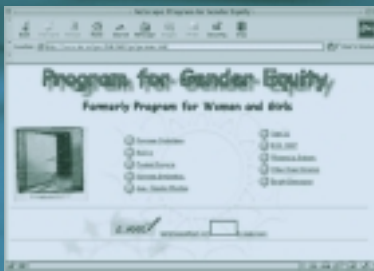


- Selecting a programming language that would make the CD timely and promote cross-platform use.

The audience for the CD-ROM includes K-12 teachers, university educators, parents, content developers, industry, and the research community. The CD-ROM is currently being offered for free by EDC's Women's Educational Equity Act Resource Center.

Dr. Dorothy Bennett
EDC/Center for Children
and Technology
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Seventh Floor
New York, NY 10014
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E-mail:
dbennett@confer.edc.org

For more information, visit
www.edc.org/CCT/pwg or send
a request for the CD-ROM to
WEEActr@edc.org.



In addition to feature projects, the CD-ROM also offers a directory of project fact sheets for PWG programs funded through spring of 1998.

MAKING THE MOST OF LISTSERVS

There are more than fifty discussion lists dealing with gender equity, and more than 200 lists that deal, at least in part, with issues of gender and science. Dr. Carolyn Carter of the Appalachia Educational Laboratory offered suggestions for becoming familiar with listserv capabilities, and for navigating through the many listservs that are currently available. Following is a short list of popular groups from Dr. Carter's presentation, along with brief descriptions and subscription information.

WISENET—WOMEN IN SCIENCE AND ENGINEERING NETWORK
Education and employment of women in the sciences, mathematics, and engineering. To subscribe: Send a message to listserv@UICVM.CC.UIC.EDU, no subject, with the message "subscribe wisenet first_name last_name."

WOMUNSCI—WOMEN UNDERGRADUATES IN SCIENCE
Increasing participation of undergraduate women in science. Membership is open to college science educators and administrators and women undergraduates interested in science. To subscribe: Send a message to majordomo@cs.umass.edu, no subject, with the message "subscribe womunsci_your e-mail address_your name."

WITI—WOMEN IN TECHNOLOGY
Aspects of women in technology. To subscribe: Send a message

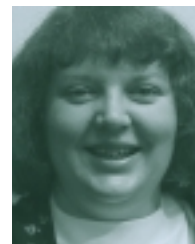
to witi-request@aero.org.
WIPHYS—WOMEN IN PHYSICS
Advice, networking, and issues of interest to women in physics. To subscribe: Send a message to majordomo@aps.org, no subject, with the message "subscribe wiphys."

GRADUATE WOMEN IN SCIENCE ELECTRONIC DISCUSSION GROUP—
Affiliated with Sigma Delta Epsilon/Graduate Women in Science (SDE/GWIS): Interested women scientists with access to the Internet. To subscribe: Send a message to sheri_cole@som-bsb.ucsd.edu.

FIST—FEMINISTS IN SCIENCE AND TECHNOLOGY Feminists in science and technology, feminist science and feminist critiques of science and technology. To subscribe: Send a message to listserv@dawn.hampshire.edu, no subject, with the message "subscribe first first_name last_name."

SYSTEMS—Issues of mutual interest to professional women in the field of computing. To subscribe: Send a message to systems-admin@systems.org with "subscribe" in the subject line.

EDEQUITY—Forum to discuss how to attain equity for males and females and how gender equity can be a helpful construct for improving education for all. To subscribe: Send a message to Majordomo@mail.edc.org, no subject with the message "subscribe edequity" and/or to sub-



scribe to the digest "subscribe edequity-digest."

WIGSAT—WOMEN IN GLOBAL SCIENCE AND TECHNOLOGY NETWORK International collaboration and coalition building for development among women scientists and technologists around the world. To subscribe: Send a message to: WIGSAT-L@list.ifias.ca, no subject, with the message "subscribe."

WMST-L—WOMEN'S STUDIES LIST Discussions of the instruction and development of Women's Studies courses and programs and the current research. This list does not allow discussions of gender, social, or political issues. To subscribe: Send a message to listserv@umdd.umd.edu with the message "subscribe to WMST-L."

Dr. Carolyn Carter
Appalachia Educational Laboratory
Box 1348,
Charleston, WV 25325-1348
Tel: 304-347-0470
E-mail: carter@ael.org

For information on other lists, see Diane Kovacs's Directory of Scholarly and Professional E-Conferences at <http://nzh2.com/KOVACS/>.



THE LISTSERV FOR WOMEN AND GIRLS (PWGLIST@AEL.ORG)

DR. CARTER DEVELOPED AND MAINTAINS THE PWG LISTSERV, AN ELECTRONIC DISCUSSION LIST FOR CURRENT AND PAST RECIPIENTS OF GRANTS FROM THE NSF PROGRAM

FOR WOMEN AND GIRLS, AND THOSE WHO HAVE A CLOSE

The complete list of PWG subscribers is included

WORKING RELATIONSHIP WITH THE PROGRAM. THIS LIST

as an insert to this brochure. To send a message

PROVIDES MEMBERS WITH A WAY TO SHARE INFORMATION,

to the PWG list, address it to pwglist@ael.org.

ASK QUESTIONS, AND DISCUSS ISSUES OR PROBLEMS WITH

To have your name added to the PWG list, contact

OTHERS WHO ARE DOING SIMILAR WORK.

Dr. Carter at 800-624-9120 or carterc@ael.org.

SEARCHING THE WEB ON WOMEN AND GIRLS IN SCIENCE

With the number of web sites growing exponentially every day, nobody has enough time to keep up with it all. Stephanie Bianchi, NSF's Librarian, shared tips on how users can make what is new on the web come to them, rather than going to find it themselves.

Her first suggestion was signing up for a newsletter that provides this service. One such newsletter is the Scout Report (www.scout.cs.wisc.edu/scout/report/), which comes out periodically on a number of subjects. Another approach is to visit one of the many sites on the web that regularly list new sites. Some of these are general interest (Yahoo "What's New" at <http://www.yahoo.com/new/>), and many are specific to a subject area ("Websurfers Biweekly Earth Science Review" at <http://shell.rmi.net/~michaelg/weeksreviews.html>). Users can bookmark a site that pertains to their interests, and visit it regularly for the latest information.

SEARCHING THE WEB

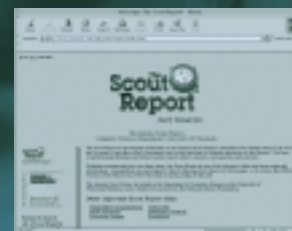
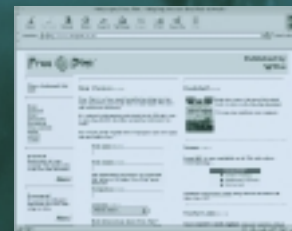
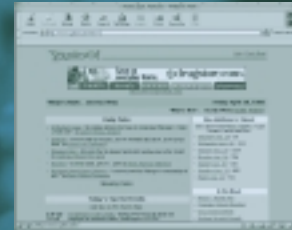
Some sites offer an e-mail feature that automatically alerts users to new information; Bianchi cited Blue Web'N (<http://www.kn.pacbell.com/wired/bluewebn/>) as one excellent example. Or, she suggested, users can try the Netminder service (<http://minder.netmind.com/>), which visits daily sites specified by the user, and sends e-mails whenever one of the sites changes.

Bianchi also suggested that users investigate the sites that are linked to their favorite sites. For more information on this process, Bianchi referred attendees to the article "Reverse Psychology - How to find more sites like the ones you love," written by William Hann and located at the Free Pint web site (<http://www.freepint.co.uk/>). The bottom line, according to Bianchi: "There is too much on the WWW for any one person to keep track of it. Make the web work for you!"



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For a listing of the web sites provided by Stephanie Bianchi during her presentation, see pages 47-52 in this brochure.



<http://www.yahoo.com/new/>

<http://www.kn.pacbell.com/wired/bluewebn/>

<http://www.freepint.co.uk/>

<http://www.scout.cs.wisc.edu/scout/report>

GOVERNMENT PERFORMANCE AND RESULTS ACT OF 1993: UPDATE ON NSF RESPONSE

Dr. William Sibley of NSF's Division of Research, Evaluation and Communication reviewed the major points in the Government Performance and Results Act of 1993 (GPRA), and discussed with attendees the implications of this Act for NSF. To comply with GPRA, NSF must:

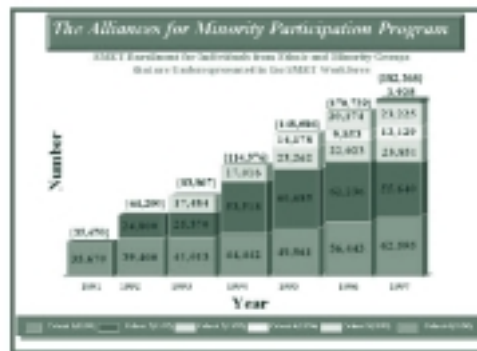
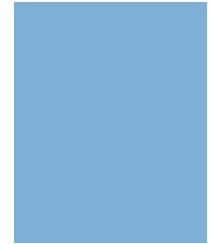
- Clearly define its mission.
- Establish annual performance goals that are objective, quantifiable, and measurable.
- Measure its performance against these goals.
- Report publicly how well it is doing.

Dr. Sibley stressed the importance of developing measurable results. In setting performance goals, he explained, NSF must develop tangible objectives against which actual achievements can be compared. These objectives should include goals that can be expressed as a quantitative standard, value, or rate. Dr. Sibley then defined some key vocabulary used in the GPRA. "Inputs" are the raw materials and human and physical capital required for the research process. "Outputs" are the immediate, observable products of research and activity. Dr. Sibley defined "outcomes" as the longer-term results to which the program

UPDATE ON NSF RESPONSE

contributes, and "impacts" as the total consequences of a program, including the intended benefits and the unintended results—both positive and negative.

To demonstrate outputs as defined by GPRA, Dr. Sibley presented these examples from the Louis Stokes Alliances for Minority Participation Program:



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For more information on the Government Performance and Results Act, see www.nsf.gov/od/gpra/.



THE EVALUATION OF NSF'S PROGRAM FOR WOMEN AND GIRLS

Drs. Toni Clewell and Lindsay Tartre of The Urban Institute presented an overview of the ongoing impact study of the Program for Women and Girls. The impact study endeavors to measure PWG's impact on the knowledge base, infrastructure, and individual participants in the area of women and girls in science, mathematics, engineering, and technology. The study focuses on the 119 PWG projects awarded between 1993 and 1996, a random sample of which is being studied closely.

The design of the impact study is segmented into modules, with each module addressing relevant questions about the program.

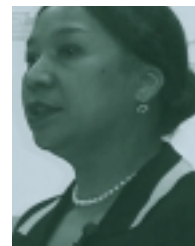
MODULE ONE: CONTRIBUTIONS TO THE KNOWLEDGE CAPITAL Are the instructional products that resulted from PWG of high quality and have they been effectively disseminated and used by other parties? Have they effectively filled any particular niche in science and mathematics education reform? How has PWG contributed to the scholarly body of work or led to greater levels of understanding about effective strategies to employ in the area of women and girls and science and mathematics?

THE EVALUATION OF PWG

MODULE TWO: CONTRIBUTIONS TO SOCIAL CAPITAL What has been PWG's impact on the educational infrastructure? What partnerships have been formed and what have they yielded? What policies and practices were altered because of PWG? Have PWG project innovations been replicated elsewhere?

MODULE THREE: CONTRIBUTIONS TO HUMAN CAPITAL What has been the impact of PWG on the participants or other target audience members of the projects? Was the experience of high quality and lasting duration? What types of experiences seemed to succeed or fail in having an impact on women and girls?

MODULE FOUR: PROJECT EVALUATION META-ANALYSIS AND ASSESSMENT What is the overall frequency, methodological soundness, and quality of project-level evaluation? What types of interventions seem to produce similar outcomes?



The study will assess PWG's success at meeting its programmatic goals. It will do this by collecting and analyzing data pertaining to the questions outlined under each of the four modules above. Interviews of principal investigators, evaluators, and others involved in the sample of PWG projects are currently underway, and a report will be delivered to PWG in late summer of 1999.

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By aggregating data from all the sample projects, the impact study will be able to measure the collective impact of PWG projects.

WORKSHOP ON EVALUATION

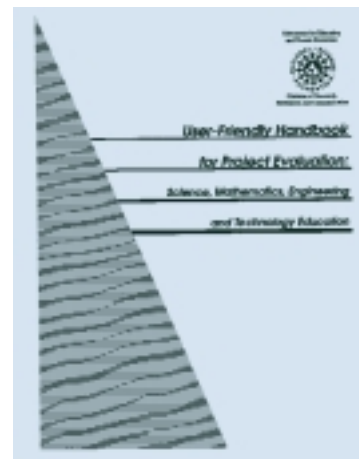
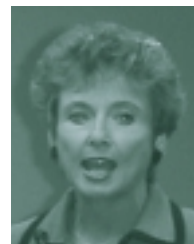
Dr. Joy Frechtling of Westat provided an orientation to project evaluation. She reviewed the importance of the different types of evaluation—planning, formative, and summative—and explained the value and importance of each to the program, as well as to NSF. Her presentation focused on how to develop measurable objectives by defining outcomes as behaviors or observations that can be assessed and, in most instances, quantified. The strengths and weaknesses of quantitative and qualitative data collection methods were also discussed.

For more information, see the following publications by Dr. Frechtling, used in her presentation and available through NSF.

NSF 93-152 (reprinted 6/92)
User-Friendly Handbook for Project Evaluation: Science, Mathematics, Engineering and Technology Education. Ed. by Joy Frechtling, Westat, Inc.


NSF 97-153
User-Friendly Handbook for Mixed Method Evaluations. Ed. by Joy Frechtling and Laura Sharp, Westat, Inc.

WORKSHOP ON EVALUATION



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See the back of this brochure
for information on how to order
NSF Publications.

A woman with curly hair and glasses is looking at a tablet. A young girl with blonde hair is looking at the tablet. The image is overlaid with a teal color and contains text in white boxes.

Evaluations can serve many different needs and provide critical data for decision-making at all steps of project development and implementation. Although some people feel that evaluation is an act that is done to a project, if done well, an evaluation is really done for the project.

–User-Friendly Handbook for Project Evaluation, p. 10

FASTLANE DEMO AND Q&A

Evelyn Baisey-Thomas, a member of the FastLane Team in NSF's Division of Information Systems, educated conference attendees about the use of FastLane (www.fastlane.nsf.gov) for electronic communication with NSF. The purpose of FastLane is to use the web to facilitate business transactions and the exchange of information between NSF and its client community—researchers, reviewers, research administrators, and the general public. Several colleges and universities nationwide are assisting NSF in the design and evaluation of FastLane.

Baisey-Thomas' presentation reviewed a range of features that are accessible via FastLane, including:

- NSF Award Search—Users may query the NSF database by state, institution, NSF program, and fiscal year within each category. FastLane also provides lists of recent awards by week.
- Budget Internet Information System—Provides detailed financial information on grants.
- Graduate Research Fellowships—Application, accompanying forms, and letters of reference for NSF Graduate Research Fellowships can be created and submitted using this feature.

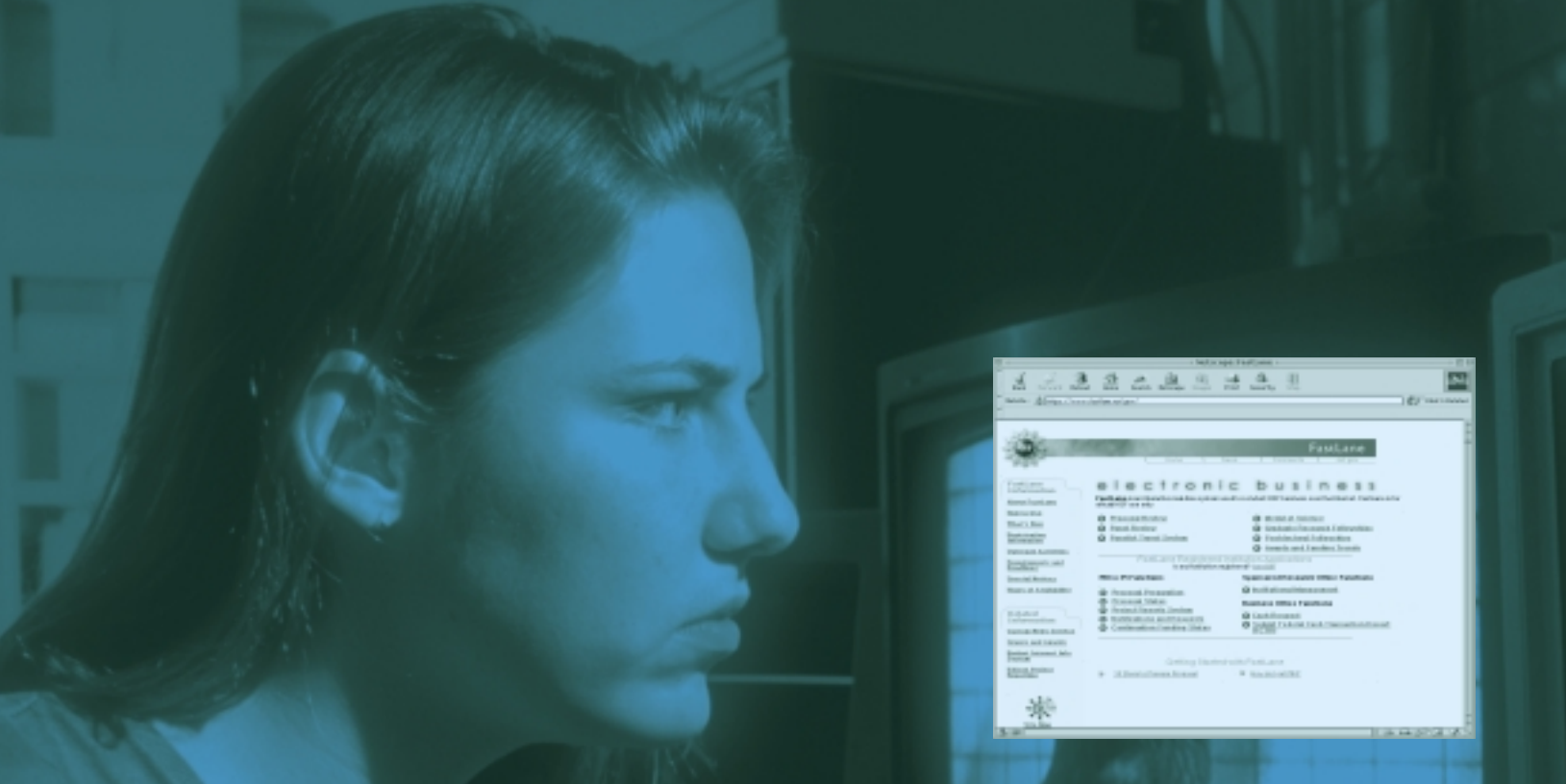
FASTLANE DEMO AND Q&A

- Medal of Science—Nominations and letters of support for recipients of the Medal of Science can be created and submitted here.
- Proposal Review—NSF reviewers can submit ratings and comments on proposals. Using a special PIN, the reviewer can access a template for recording comments and other required information.
- Panel Review—Panelists can submit one or more reviews of NSF proposals using a password and panel ID.
- Proposal Status—Grant applicants can check on the receipt and status of the proposals they have submitted. FastLane provides information including the date NSF received it, the NSF program name, and the assigned Program Officer.
- Proposal Preparation—Principal Investigators can prepare all required NSF standard proposal forms using this option. FastLane checks forms for completeness before allowing them to be submitted.
- Final Project Report—Provides Principal Investigators with report template for submission of Final Project Reports to NSF.



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Nonregistered users can visit the FastLane Development web site at www.fldev.nsf.gov to simulate most FastLane features and provide reactions and comments.



FastLane



SMALL GROUP DISCUSSIONS

PLAN VERSUS ACTUAL: SURPRISES IN PROJECT DESIGN AND MANAGEMENT

- If circumstances prevent you from following the project design exactly, brainstorm and improvise to find alternative ways to follow the intent of the grant, if not the letter.
- Recognize that staff changes at every level are inevitable and that a project cannot be dependent on any one individual. Build in focused communication activities to provide continuity across staff changes, whether administrators, project staff, or partner staff.

Suggestions:

- Write a clear and complete memorandum of understanding outlining the nature of the partnership and the specific conditions of the agreement, such as a payment timeline.
- Each year, write a letter to the partners with a project progress report; include a copy of the memorandum of understanding.
- Meet with partners and advisory council once a month so it is easier to “pass the baton” when staff changes occur.
- Plan for administration “from afar,” by building in costs for part-time salary, trips back to the project site, e-mail costs, and weekly conference calls.
- Keep everyone “on track” through interaction and com-

SMALL GROUP DISCUSSIONS

- munication, such as newsletters, nonstaff meetings, staff outings, and opportunities to learn more about the individual collaborators.
- Be aware that, sometimes, with success comes jealousy; some people may be inclined to replace subordinates and acquire for themselves some of the credit for those individuals’ successes.
 - When faced with the challenges of surprises, focus on the positive. Example: At the end of one girls’ summer program, two project notebooks were found in the trash. Rather than focusing on those two, the program team focused on the 68 out of 70 participants who did not throw away the notebooks or the experience.
 - Encourage faculty participation in diversity issues. One program put together a faculty institute on the subject; department heads selected faculty and required that they participate. The next year, under a new administrative leader, faculty members were encouraged to volunteer. The result was a smaller group with better dynamics and none of the negativity experienced the year before.
 - Make participation in institutes a requirement for other desirable outcomes, such as eligibility for mini-grants and opportuni-

ties for student assistants. Enlist the dean to support the institute and faculty participation.

- Faculty can be hard to recruit without carefully crafted incentives to secure their involvement and to keep them engaged in the project.
- Recruitment strategies need to be shifted and refocused as project staff and partners develop a better understanding of the wider audience needs.
- Partnerships and collaborations are often more difficult to sustain over time than participants anticipated.
- Some have more difficulty than others in encouraging the involvement of parents. The distinction seems to relate to the characteristics of the specific program, and whether or not it was both attractive to parents and accepting of them.
- Rapid technological change is an ever-present challenge. Schools and teachers are often unprepared to use the technology planned for in the project. Some project plans fail to address the lack of skills and equipment available, such as the high level of skills required to create effective web pages.
- It is often necessary to redesign parts of a project “on the fly” to correct aspects that are not working and that must be fixed before the project can continue.

- Institutional and individual difficulties arise when greater and/or broader expertise is called on for managing large grants and multifaceted projects.
- When scientists are used as role models, it is important to consider their presentation skills in particular when speaking to students. In some cases, the students themselves may be more effective role models because other students can relate to them more easily.
- The life complexities of the participants need to be addressed by building in support for handling the wide variety of needs and skills that participants will have.
- Curriculum materials must be customized to suit the specific needs of the project and the participants. Otherwise, they are less effective in supporting the learning process.
- A good strong contract or subcontract, outlining what is needed and when, can be an effective tool in managing a project according to its intended design.
- Having a good evaluator—and listening to what this person says—can make the difference between success and failure.
- Pilot test materials and improve them based on the test results and feedback.
- Attend to the care and feeding

of volunteers; they are an invaluable resource that needs to be managed effectively.

- The enormity of the grantee's workload can come as a surprise. This is a particularly difficult challenge when the project grant is in addition to a full-time job.
- The field is moving from a deficit model—based on changing the girls—to a model that calls for changes in pedagogy and in science. These changes need to address not only professional jobs in the field, but technical ones as well.
- Take a wider view of the issues: Rather than centering on the gender issue, broaden the effort to one of transforming the curriculum, while keeping to the core goals of gender equity. Some have found it effective to address equity issues up front; for others, success has begun with a focus on specific teaching strategies. In all cases, establishing a common vocabulary early on is key.
- Serious gender-related issues continue to create challenges, even in the classrooms and venues of successful programs for girls.
- When a successful and independently funded program is ready to be institutionalized, new sets of challenges and

issues arise, often to the detriment of the gender equity aspects of the program.

- It is surprisingly difficult to make co-ed settings girl-friendly, especially at the middle-school level. The classroom setting, even when predominantly female, often perpetuates long-learned stereotypes and behaviors. There is hope that this will change as the younger generations of university women become the teacher trainers. It must be acknowledged that we so often teach “how we were taught.”
- When presenting exciting new ideas to the traditional educational community, many people are surprised at how little interest they are able to generate.

Facilitators:

Mary Anderson-Rowland,
Arizona State University
David Snyder, Gallaudet
University
Patricia Campbell, Campbell-
Kibler Association, Inc.
Carol Burger, VA Space Grant
Consortium
Michael Froning, Alabama
School of Fine Art

SMALL GROUP DISCUSSIONS

STRATEGIES FOR FUNDING, PARTNERSHIPS, COLLABORATIONS: LESSONS LEARNED

- A project funded by multiple sources is likely to require an approach to accounting that accommodates not only the needs of the project itself, but also the needs of the various funding agencies. Project-based software systems, such as Costpoint, offer some technical solutions. Nevertheless, problems can also arise related to attitudes within universities, where funding for human resource development is not valued as highly as funding for research projects.
- Many sources exist for funding and partnership opportunities. Examples:
 - The American Association of University Women at the state level.
 - National sources such as PBS, industry groups and businesses with a vested interest in attracting and retaining women.
 - School districts looking for professional development.
 - Women's organizations and other groups with similar agendas and missions.
 - Women in corporations, university public affairs and development offices.
 - Women in local political office
- In-kind funding must not be overlooked. Examples:
 - The U.S. Department of Agriculture will provide

SMALL GROUP DISCUSSIONS

- meals if 50 percent of the children in the program come from low-income families. This can be arranged through the school.
 - The Children's Defense Fund has a low-cost guidebook for establishing summer food programs, available by calling 202-628-8787.
 - Similar programs exist for after-school snacks.
- To secure funding opportunities in community-based organizations, city and county governments, and from the private sector, you must identify organizations with similar interests, determine how they might best contribute, and show them what is in it for them. For example, national businesses might be particularly interested in supporting a program in an area where they have local offices. Keep in mind that the private sector typically expects results in a shorter time frame than is typical in academia and the government.
- Programs that provide aid for children with disabilities can benefit all participants in a qualifying program.
- While often essential for funding, partnerships can be a mixed blessing. Personalities of individuals are as important as compatibility of missions and

- agendas. Partnerships should build on joint success, strive for visibility in the right professional and local communities, and invite the "right people" to participate. Partnerships with the best chances for success are those where the people really want to work together and are committed to building solid and sustained relationships. NSF funding is seen as an important leverage point in beginning and developing partnerships.
- Working in collaboration with partners requires developing an equitable, long-term relationship. While the interpersonal interactions may be informal, the partnership arrangement, or agreement, should be formalized so that all parties know what is expected of them.
- Document the progress of a collaboration by collecting notes and project artifacts along the way. To help this process, set clear deadlines and make it easy for others to provide input to the collaborative record.
- Ways to keep a partnership working smoothly include defining responsibilities, helping all partners to feel fully vested in the program's success, letting others co-lead, and keeping everyone informed. These approaches can help resolve the typical challenges of time, follow-through, varying organizational

structures and cultures, and systems of support.

- Learning how to collaborate is a common challenge. Suggestions:
 - Define roles up front.
 - Recognize and respect cultural differences—ethnic, professional, and organizational, as well as gender-based.
 - Resist the temptation to rely heavily on any one individual.
 - Establish an effective organizational structure—consortium vs. prime and sub-contractor arrangement.
 - Clarify the actual financial “buy-in” of each partner.
- It is important to recognize that there are different levels and degrees of collaboration. Some partners may well have larger and longer roles than those held by other partners.

As long as the roles, responsibilities, and expectations are clarified, there isn’t any reason why such a collaboration can’t succeed.

- In every collaboration, there must be support from “the top.” Each partner must market the program within his or her organization so that this type of fundamental support continues throughout the life of the partnership.
- Two key watchwords for success are communications and flexibility. Frequent, multi-mode (e-mail, telephone, face-to-face) communications are critical for success throughout the project. Flexibility is called for when actual events do not follow the plans, no matter how well thought out they were.

Facilitators:

Sally Hare, Coastal Carolina University

Karen Thomson, Wildlife Conservation Society

Mary Aleta White, Arizona State University

Judy Brown, Museum of Science, Inc.

RESEARCH FRONTIERS FOR WOMEN & GIRLS IN SMET: MIDDLE SCHOOL

- First-generation college students lack role models, mentors, knowledge of how the system works, and an understanding of the consequences of the decisions they made when selecting courses at the middle level. Girls that lack these advantages are often the most economically challenged and educationally underserved, as well. They need many different types of support, including assistance in developing reading, writing and speaking skills, and in increasing social capital. School experiences fail to prepare them sufficiently for planning long-term goals and taking the initiative to get what they need to succeed. Many colleges resist the idea that math and science programs should also address these skills.
- In many communities, sports and other activities—not academics—are viewed as the important paths to gaining recognition. Girls are often socialized to achieve through supporting the sports activities of the boys in their schools.



SMALL GROUP DISCUSSIONS

- Girls often face life factors such as poverty, neglect, and abuse—factors that have powerful impact on their academic and personal lives. Even advantaged girls may lack self-confidence and specific skills. Highly motivated girls often have different interests than their peers and as such may face the social challenges of not fitting in. Programs for girls must address these life experiences.
- Girls are still being subtly discouraged in schools, or, at best, simply not encouraged to pursue their interests in science and math.
- We still don't know what things motivate adolescent girls to academic success.
- Teachers are often already demoralized by the circumstances of their profession; addressing equity is often seen as just one more thing to do. Because of this, teachers are often not able to make the substantive changes that need to be made, either in their own practice or in their efforts to encourage their colleagues. They need to have opportunities to see girls excel at science and math, both as motivation and as models of success.
- Girls often fail to take seriously the decisions they make in middle school, not realizing how these decisions will impact their futures. At this

SMALL GROUP DISCUSSIONS

- age, they are not fully aware of either their potential or the range of options available to them in terms of education and career choices. Too many parents at the middle-school level turn such decision-making over to counselors, or to the girls themselves, without realizing the consequences of these decisions. Parents need to know that they must be advocates for their daughters as they move into adulthood. Our programs need to work with parents and counselors, who are often the gatekeepers, to help girls keep their options open. We need to help demystify middle-school students so the adults can truly help them.
- Girls face sexism, racism, and adultism. They believe adults don't take them seriously or see them as real people. Our work with partners, schools and others needs to help them hear girls' voices and look at what they have to offer.
 - We need to focus on implementing gender-equitable strategies in regular classrooms, not just in programs for girls. In doing this, we need assistance on how we can measure changes in teachers' attitudes and behaviors in the classroom.
 - We need longitudinal studies—and funding for them. Intervention at the middle-school level is important, but

middle-school girls are a long way away from making career choices.

- We need to study the special factors that make calculus and physics so resistant to change.
- Grades often don't reflect achievement. Whether too high or too low, they can set girls up for failure, either leading them to believe that their skills are better than they actually are or by convincing them that they aren't smart enough. Girls' grades may reflect expectations, behavior, neatness, etc., rather than their level of understanding. This can be very harmful, particularly when young people are making transitions, such as from middle school to high school.
- Videotaping classroom activities can be a powerful tool for girls, boys, and teachers, by helping them observe classroom dynamics and the effect they have on the students.
- Scaling up and the need to diversify a program's funding base are two difficult issues for many programs.
- NSF needs continuity in PWG.

Facilitators:

Carolyn Carter, Appalachia
Educational Lab Inc.
Mary Crowe, Coastal Carolina
University

RESEARCH FRONTIERS FOR WOMEN & GIRLS IN SMET: HIGH SCHOOL

- Research shows that girls have more success in theoretical or academic science than in applied science, but the research is as yet inconclusive on explaining why this is the case. Boys are more often exposed in informal ways and there are not formal introductions to science in school that would capture girls' attention. Girls' achievement in the subject matter tends to be greater during school, with their frontier stopping at graduation. Formal education needs to address the problem of nonexposure of girls to the value and benefits of careers in science and engineering. Students tend to be unaware of salaries for various professions, and don't realize that applied technologies are a part of science as well.



- The definition of science and technology must be expanded to include applied science; otherwise, the field will be just for middle and upper-middle class women.
- Recent emphasis on “all students” circumvents strategies that would improve equity for girls, or for other specific populations. The only effective way to address this is to think of people—including all students—as individuals rather than as members of groups.
- Where programs are single-sex and not co-ed, questions of legality are typically resolved as long as participation is voluntary.
- Single-sex education is not without challenges. The girls-only physics class was established in one school district and differences in learning began to be noticed. However, the program became a problem for the district because it is not legal to exclude anyone from participation. Another school district ran a program for girls, and there were no boys who even tried to join in.
- More research is needed in understanding what drives girls' decisions: What are their key experiences? How do they weigh those? How do ethnicity and culture affect their decisions? What are basic differences between how girls and

boys make decisions? What effect does parental influence have? How do we ensure that teachers continue strategies they learn in workshops and how do we assess outcomes?

- The field needs a database of successful projects with documentation of the interventions that produced the success. Longitudinal data would also be helpful, and NSF's PWG might do well to provide this.
- Changing people's minds takes awareness, concern, and action. To overcome resistance, you must spend a minimum amount of time on awareness and concern and most of the time on the course of action for change. It may be that repeated contacts over time are necessary. But what are the characteristics of teachers who actually carry out strategies for change?

Facilitators:

**Jo Sanders, Washington
Research Foundation
Mary Gregory, Harbor Branch
Ocean Institute**

SMALL GROUP DISCUSSIONS

RESEARCH FRONTIERS FOR WOMEN & GIRLS IN SMET: UNDERGRADUATE

- Involving women in undergraduate research requires strategies for both recruitment and retention. Focusing on the content of what is being taught is one strategy. Another is identifying what is cutting-edge in research in the field.
- Many successful activities are currently being used to carry out these strategies. Some focus on teaching the value of life-long learning. Others develop specific products—such as CD-ROMs and seminars—to engage undergraduate women in research and to teach them how to understand and evaluate choices.
- Participating on NSF review panels provides a unique perspective on research frontiers for women.
- Both quantitative and qualitative analyses are important in measuring results, as is independent evaluation. Quotes and comments from student surveys and pre- and post-program focus groups are effective in advertising the program.
- Activities in the dorm, organized programs, specific-subject study halls, and career nights are other ways to generate interest and allow students to explore options. Some schools organize freshman science and engineering dorms and have theme-houses on or off campus to create interest groups.

SMALL GROUP DISCUSSIONS

Programs and activities initiated and run by students are among the best attended.

- There exists concern that girls do not receive enough support early in their freshman year. It is incumbent on us to “bullet proof” girls on the challenges of this time in their academic career, and to teach them to be effective self-advocates. Establishing mentor relationships is valuable, and can be done by involving older students. Creating social settings for networking adds personal interaction and develops effective career-related social skills.
- Senior professors often claim that “there is nothing a freshman can do” as part of their research programs. A program at Penn State shows results that refute this claim. The Women in Science and Engineering Program (WISE) uses research as part of the recruitment and retention program for women. The program takes students who are primarily rural and brings them into the global economy by having them work with international women and learn about the gender issues they face. This prepares these students for multinational research settings and programs. Faculty members who participate receive additional supplies budgets for bringing freshmen students into the laboratory. As



- a result of this program, there was a 50 percent increase in students retained in the program and about one-third of the participants built on their participation by staying on to do further research in the same lab. The program also produced significant experience and exposure for the freshmen students, including:
- Connections and interactions with science graduate students.
 - A sense of self that says, “Yes, I am a scientist!”
 - Academic credit and wage income.
 - Laboratory experience to help build a good resume.
- Space Grant, a national NASA program, promotes undergraduate research across math, science and engineering disciplines. Through this program, each state can offer undergraduate research scholarships.
 - Encouraging students with potential to stay involved over the summer has been shown to strengthen interest and improve grades. Summer fellows can be invited to conduct

- colloquia for undergraduate students. Inviting faculty members can help generate interest in serving as faculty advisors. Formal research presentations engage both undergraduate and graduate students and, by demonstrating actual research missions (balloon research, sounding rockets, aviation design), can allow students to become involved in real-world applications. Graduate students can mentor undergraduates in student-managed research projects. The relationship benefits both the undergraduates and the graduates, who then have the opportunity to see how far they have come.
- Colloquia and other venues provide valuable practice in public presentation of research. It is important to provide as many public speaking opportunities as possible throughout the students' training. Harbor Branch Ocean Institute has students conduct poster sessions and presentations. At other locations, faculty is encouraged to engage students in their work and to take them to professional conferences.

Facilitators:

Sandra Cooper, Washington State University
Gayle Slaughter, Baylor College of Medicine
Suzanne Austin, Miami Dade Community College

LESSONS LEARNED IN EVALUATION

- An effective evaluation requires an appropriate control group. For longitudinal evaluations in particular, self-control does not guarantee good results. It is important to also control the environmental conditions. For example, wait list control may not be equivalent if you are selecting participants for maximum impact.
- Data from Educational Testing Service (ETS) can be used for comparisons.
- It is wise to pre- and post-test on the attitudes and knowledge of children and on approaches to handling gender equity issues. One evaluation revealed that group leaders had a need for training in gender equity; this finding led to the development of three-day training sessions and follow-up activities.
- Concern is increasing for the need to conduct longer-term evaluations of programs, especially when it comes to compliance with behavioral objectives for projects within a school setting. One project withheld the planned \$200 stipend until the project was completed and the survey was returned.
- When evaluating web sites, you can count hits to measure exposure and use Internet communication to conduct follow-up interviews. Online surveys are consistently completed.
- E-mail is an effective device for conducting process evaluations.
- For local or regional projects, on-site visits and ongoing development of personal relationships enhance the use of material. Thinking of the sites as entities that need to be nurtured and involving administrators at the sites are also ways to improve results.
- Any mail surveys should be accompanied by stamped or postage-paid envelopes to maximize the return. Follow-up telephone calls can also keep people on track.
- Having teacher leaders assist colleagues enhances the presence of the program within the school setting. A modest honorarium is a small price to pay for this added support.
- Teacher training is an important and ubiquitous activity of most projects.
- A typical evaluation plan includes three components:
 - Pre-test and post-test with girls.
 - Conduct interviews with participants and parents. Program graduates can serve as interviewers.
 - Use valid and reliable methods (instruments, questions) to assess impact. Use pictures rather than words, use longer Likert-type response formats, and make sure

SMALL GROUP DISCUSSIONS

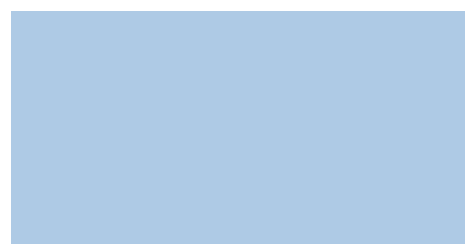
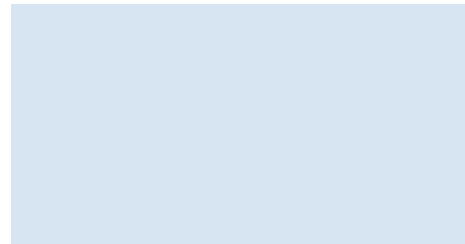
- “stems” are clean and match the program.
- Qualitative methods can reveal meaningful information.
Suggestions:
 - Conduct focus groups (weakness: one negative participant can influence the results).
 - Review participant journals.
 - Develop case studies with a small number of participants (can be videotaped).
 - Have “draw a scientist” or “write a poem” sessions where you can access attitudes that might not otherwise be revealed.
 - Use comment cards at the end of each day or throughout the day and use them to begin the next day’s session.
 - Distribute, collect, and review daily evaluation check sheets.
 - Lay out butcher paper or post “sticky pads” for anonymous comments in a private location where participants will feel comfortable.
 - Qualitative evaluations pose specific challenges, such as establishing a control group and dealing with absences and lateness. To encourage individuals to participate, offer them the option of being in the experimental group the next time. Even with these concerns, focus group research continues to be considered a strong and effective tool.
 - Several strategies have proven useful as standards for evaluation. Suggestions:
 - Have a second evaluation.

SMALL GROUP DISCUSSIONS

- Conduct an evaluation class, making it a class project.
 - Conduct a research design class.
 - Collect questions from teachers as part of the evaluation.
 - Check changes in participant journals.
 - Videotape activities and sessions.
- Specific challenges:
 - Do you keep using a “bad” initial instrument?
 - How does self-selection affect differences in the control and experimental groups?
 - How do you do a longitudinal study within the life of the grant?
 - How do you avoid contamination in longitudinal studies?
 - What do you do if the evaluators are not good at what they do?
 - How do you write up failures?
 - Scientists often are not accustomed to interviewing people.
 - How do you encourage others to become and stay involved?
 - NSF could assist in evaluation by putting out realistic project results.

Facilitators:

Allan Fisher, Carnegie Mellon University
Sharon Robinson Kurpius, Arizona State University
Lawrence Sher, CUNY Borough Manhattan Community College



LESSONS LEARNED IN DISSEMINATION

- Include dissemination activities in the project design and establish a relationship between dissemination and evaluation. Design aspects of self-perpetuation into the project or program, capitalizing on the enthusiasm of people who not only become involved but who establish a commitment to the project on an ongoing basis.
- On the one hand, it is important always to have a product that results from the project; on the other, you must be realistic about your capacity to conduct the project and produce this legacy.
- The financial costs of dissemination must be addressed rationally, although emotional costs should be anticipated as well. For example, while it is great to end up with a successfully commercialized product, it can be very difficult to let go of your personal involvement.
- You must address both internal and external audiences, considering factors such as educational level, when tailoring both message and medium. For example, a grade school administrator and a university administrator will respond quite differently and these differences can affect the success of your dissemination program.

- Partnering with 4H clubs can increase the effectiveness of a program and generate community support for it. This kind of partnering makes science more fun.
- Taking students to conferences, using student interns, and getting parents involved are ways to generate more enthusiasm, support and commitment.
- Several specific strategies are used frequently:
 - Hire a professional marketing consultant.
 - Find or develop expertise in packaging.
 - Within your own institution, rely on communications and public affairs departments, students in communications and telecommunications classes, and leaders at the highest level possible.
 - Use the “outside” audience to help develop messages and get the word out about your program or product. Use quotes or testimonials in promotional materials, conduct train-the-trainer sessions, and ask people how they found out about the program.
- Use the Internet to your advantage. Listservs can be more effective than web sites because you are sending the message out to the audience rather than waiting for them to come to you. If you choose this

- approach, learn about and be sensitive to the listserv culture, and be sure to include appropriate subject lines to attract the attention you need.
- Mailings are an established standard, but direct mail is costly, both in production and in postage.
 - Review relevant newsletters and send clips to a selected list, asking them to send the clips along to their colleagues.
 - Use clearinghouses such as Women’s Education Equity Act Resource Center, part of Educational Development Center, Inc. Also consider attendance at conferences as a kind of in-person clearinghouse opportunity.
 - If you develop a product for sale, establish discount structures for bulk orders. Establish credit card purchasing to record information about purchasers.
 - Many agree that they would rather impact the girls’ lives, even if that means that valid research data would be lost.

Facilitators:

Ann Sigford, College of St. Scholastica
Barbara Kerr, Arizona State University
Judy Meuth, Washington State University

RECENT FINDINGS IN GENDER EQUITY/SMET

- There is a need to increase the willingness of engineering departments to accept women and minority faculty.

Suggestions:

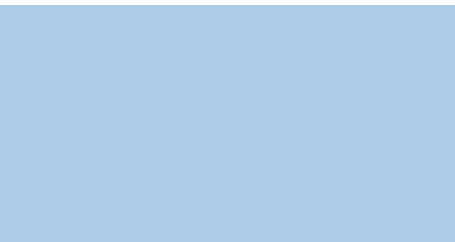
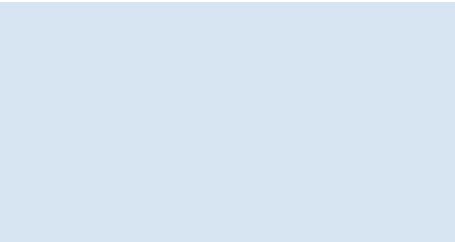
- Encourage local industry leaders to become involved in supporting the diversity aspects of your program. Industry has already learned to value a diverse work force.
- Identify faculty who have daughters and encourage both daughters and parents to become involved.
- Establish incentives for faculty to take diversity workshops.
- Single-sex vs. co-educational settings present both challenges and opportunities.
- Restrictions for single-sex programs limit the opportunities in public school settings. To work around these limitations, consider using museums and community centers for after-school programs.
- Pre- and post-tests have indicated the need to incorporate exercises and activities related to stereotyping in each day of a five-day faculty training program. The tests also demonstrated the effectiveness of this approach in increasing awareness.
- It can be helpful to develop UWIBs—unconscious, well-intentioned behaviors—by modeling desirable behaviors seen in others.

SMALL GROUP DISCUSSIONS

- One middle-school program demonstrated that a ratio of 70 percent girls to 30 percent boys was still not enough to break down stereotypes for girls vs. boys in the use of tools. When the program was repeated, with a 50-50 ratio, the boys again took over.
- Another program that crosses middle-school, high-school and community college levels, includes thirty girls and five boys in gender equity activities. The boys are learning more about girls' abilities and how girls think. They are realizing that girls "can do it" too.
- All-girls programs (such as scouting) allow girls to assume leadership roles. These programs create opportunities to talk about careers, what it is like for women in the field, and what these women liked doing when they were at a similar age.
- There is a need for good research on the relationships between socio-economic class, ethnicity, and gender equity issues. Some research of this type has shown that families of girls of color are not as stereotypical, in terms of occupation, as might be expected.
- Research has shown that, in the last five years, some of the gender equity programs are paying off in areas such

as trends in course selection. For example, girls are now taking calculus in the same numbers as boys.

- Advance placement physics and chemistry remain boy-dominated. The National Center for Educational Statistics addresses this and related issues in their publication, *Men and Women on the Engineering Tract*. More work must also be done in engineering to develop a better curriculum and to place more emphasis on girls at an earlier age.
- Increasingly, people are asking the question: As the status of and opportunities for girls are improving, should we be looking at the boys? Many feel that while conditions for girls certainly are improving, there remains a good deal of work to be done before equity can be achieved.
- The notion of "working with the boys" is an emerging recurrent theme.
- Role models are important elements in a girl's development, and there are ways to make the most of their impact. Interviewing role models ahead of time, before inviting them to participate, can help you keep them on target and at the right level for the girls in the program. It is particularly helpful to find stories of perseverance, and personal stories that focus not



just on the science and engineering, but on the people who have been involved in the lives of the role models from girls to adults. Role models who are nearer in age to the girls in the program can have a particularly strong impact and can lead to close personal and perhaps professional relationships.

- Research has identified some of what today's college students think about gender equity issues:
 - There is an emerging backlash among men in the freshmen age group of eighteen to twenty; they are more concerned than their counterparts just five years ago about who would stay home with the children.
 - Women are increasingly intimidated in competitive situations: They are less likely to stand up for themselves than their counterparts were a decade ago.
 - Girls still hide their abilities from the boys.

- Both men and women tend to deny that there is any equity problem.
- In some ways, stereotypes of women have worsened over the last few years due to influences such as MTV and similar programming.
- Some see that America remains a white-male society, that something must be done to help girls step out of the constraints, and that we need to begin working with the boys to change attitudes that will affect future generations. Research shows that boys can change their ideas if they are exposed to role models.

Facilitators:

**Patricia Wilkinson, CUNY
Borough Manhattan
Community College
Arlene Chasek, Rutgers
University**

EXHIBITS

There were several exhibits on display at the conference, highlighting PWG project accomplishments, research and products:

ADVOCATES FOR WOMEN IN SCIENCE, ENGINEERING AND MATHEMATICS (AWSEM)

Contact: Gail Whitney,
gwhitney@admin.ogi.edu.

THE ASSOCIATION FOR WOMEN IN SCIENCE (AWIS), AWIS MENTORING

Contact: Kate Durocher, 202-326-8940, awis@awis.org; www.awis.org.

EDUCATIONAL EQUITY CONCEPTS INC.

Contact: edequity@admin.con2.com.

GENDER-EQUITY IN SCIENCE, ENGINEERING AND MATHEMATICS

EDUCATION: MAKING CONNECTIONS FOR 3RD TO 5TH GRADE GIRLS

Contact: Sara A. Cohen, 303-556-5315, SACohen111@aol.com.

MATHEMATICAL EXPLORATIONS FOR GIRLS ACHIEVEMENT (MEGA) CAMP

Contacts: Julie Glass, JGLASS@gauss.sci.csuhayward.edu; Kathy Hann at khann@mcs.csuhayward.edu.

PLUGGED IN!

Contact: Sue Metzler, 816-358-8750, smetzler@plugged-in.org; www.plugged-in.org.

PORTFOLIOS TO INCREASE THE NUMBER OF WOMEN IN MATHEMATICS

Contact: Lawrence A. Sher, lawsher@yahoo.com.

PROJECT EFFECT

Contact: Judy Meuth, 509-335-4382.

TEACHING SMART

Contact: Pat Jonas, 800-529-1400, tsmart@rapidnet.com.

EXHIBITS • EXHIBITS • EXHIBITS

TRANSACTIONAL WRITING: EMPOWERING WOMEN AND GIRLS TO WIN AT MATHEMATICS

Contacts: Dr. Janet Rich, 305-237-7489; Dr. Suzanne S. Austin, saustin@kendall.mdcc.edu.

WILDLIFE SCIENCE CAREERS PROGRAM

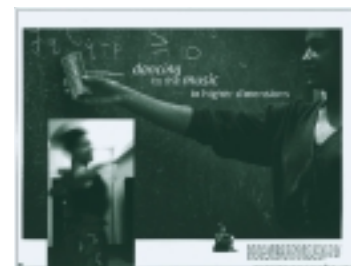
Contact: Annette Berkovits, 718-220-8144.

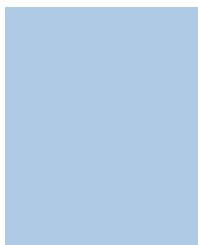
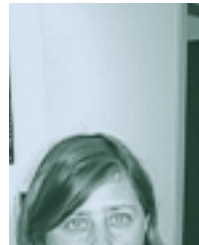
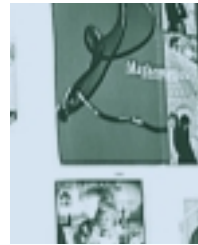
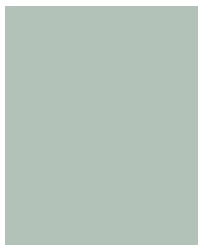
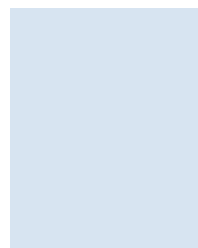
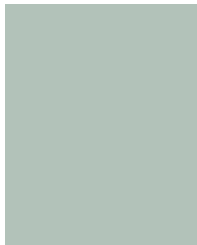
WOMEN WHO WALK THROUGH TIME

Contact: Dr. Marjorie A. Chan, 801-581-6551, machan@mines.utah.edu; www.mines.utah.edu/geology/video.

EXHIBIT HIGHLIGHT

Pam Davis' information dissemination project, *Visualizing Women in Mathematics, the Physical Sciences, and Technology: The Role of Personal Choice and Inspiration in a Scientist's Life*, targets young women, particularly at the high-school level. Davis' work on this project includes a series of gallery-quality posters of women in SEM, a study guide targeted at high-school girls with biographical information about those depicted, along with educational hands-on activities related to their respective fields of expertise, and other educational resources. Information in the study guide is to be made available on the World Wide Web. Short videotaped interviews with the women also are to be produced. The project seeks to humanize the image of science and the scientist to encourage young women students to see science and research as possible careers for them. The use of high-quality, attractive and accessible contemporary art and graphics, along with the use of other media, is expected to further the perception of science and technology as inviting, exciting, rewarding career choices for women.





ABOUT THE DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES

The Directorate for Education and Human Resources (EHR) invests hundreds of millions of dollars annually in support of ambitious programs designed to improve science, mathematics, engineering, and technology education; to cultivate the science and technology work force; and to elevate the public's scientific literacy.

EHR is unique among NSF's Directorates, each of which has a special purpose and is designed to meet a distinctive need. While all the discipline-specific Directorates support a variety of education projects that pertain to their respective fields, EHR is dedicated solely to furthering education and developing human resources in science and technology as a whole.

Working closely with the other NSF Directorates—as well as cooperating with federal, state, and local entities—EHR builds its education and human resources agenda according to three broad principles:

- 1 All children can and should learn challenging science, mathematics, and technology content.
- 2 No individual's talents, dreams, and hard work should be discounted. Our nation's most valuable resource is the diversity of its people.
- 3 Science, mathematics, engineering, and technology are relevant not only to those who practice research in these fields, but to all people. They contribute to our nation's future and enrich our personal lives.

Guiding EHR in its programmatic activities are five long-term strategic goals:

- 1 To help ensure, through a nationwide effort known as “systemwide reform,” that first-rate science, mathematics, and technology education is available to every elementary and secondary student in the United States, regardless of gender, race, ethnicity, disability status, or linguistic background.
- 2 To help ensure access to the best possible post-secondary education for those who elect to pursue careers in science, mathematics, engineering, and technology and to provide opportunities for nonspecialists to broaden their general scientific backgrounds.
- 3 To ensure that colleges and universities yield the well-qualified and versatile scientists, mathematicians, engineers, and technologists we need to meet the demands of the nation's workplaces.
- 4 To ensure the training of a highly qualified new generation of teachers of science, mathematics, engineering, and technology at all levels and to

support the continuing efforts of those already in the work force to broaden their knowledge base and to improve their teaching skills.

- 5 To further the scientific and technological knowledge of the U.S. public and to broaden public awareness that science, mathematics, engineering, and technology are no longer the exclusive province of professional practitioners in those fields, but are significant factors in all of our lives.

With these five goals as its foundation, EHR enables organizations and individuals to undertake innovative reforms aimed toward shaping a society in which all citizens are well prepared for the present and the future.

Visit the Directorate for Education and Human Resources' web site at www.ehr.nsf.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

Created in 1950 as an independent federal agency, the National Science Foundation (NSF) promotes and advances progress in science and engineering in the United States by investing in research and education in all fields of science, mathematics, and engineering.

NSF is committed to advancing exploration and inquiry in science and engineering research and education. Our focus is on the leading edges of all fields and disciplines of science and engineering and on the very promising areas between those fields and disciplines. NSF funds basic research and education seeking the following outcomes:

- 1 Discoveries at and across the frontier of science and engineering;
- 2 Connections between discoveries and their use in service to society;
- 3 A diverse, globally-oriented workforce of scientists and engineers;
- 4 Improved achievement in mathematics and science skills needed by all Americans; and

5 Relevant, timely information on the national and international science and engineering enterprise.

NSF is the only federal agency responsible for strengthening the overall health of U.S. science and engineering across all fields. Over the years, NSF has supported the work of leading educators and researchers; colleges, universities, and other institutions of higher learning; school systems; informal education centers and programs; and others involved in science and engineering in the United States. Such investments have resulted in historic contributions to U.S. national security and economic competitiveness, as well as in improvements in the lives of people everywhere.

NSF also is the primary federal agency dedicated to improving science and engineering education in the United States. To

meet the challenges of the future—to sustain the nation's economic strength and the well-being of its citizens into the 21st century—the United States requires a strong cadre of scientific leaders, a diverse work force that is mathematically and technologically literate, and a public that fully understands basic concepts of science and engineering. These are the priorities as NSF works to achieve excellence in U.S. science, mathematics, engineering, and technology education at all levels, from pre-kindergarten through graduate school. NSF has supported notable contributions in developing curriculum and instructional materials, in professional development of teachers, and in improving the participation of women, minorities, and individuals with disabilities in science and engineering.

INQUIRIES FOR THE PROGRAM FOR WOMEN AND GIRLS/GENDER EQUITY

For web information about the PWG, go to www.ehr.nsf.gov/EHR/HRD/ge/ge-index.htm. Select “Program for Gender Equity.” Current information is provided as well as Frequently Asked Questions, and a few selected external links.

For information on prior grants in the PWG, go to www.nsf.gov/verity/srchawd.htm. In the search dialog window, type 1544. You will see a list of projects funded by the PWG. Each project gives public information, including the Principal Investigator, amount granted, an abstract, contact information, and more.

E-mail inquiries should be addressed to hrdwomen@nsf.gov, or you may telephone the PWG staff at 703-306-1637. The mailing address is:

Program for Women and Girls/Gender Equity
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FEATURED RESOURCES: WOMEN AND MINORITIES IN SCIENCE AND ENGINEERING

PREPARED BY STEPHANIE BIANCHI, NSF LIBRARIAN

Society for Advancement of Chicanos and Native Americans in Science	www.sacnas.org/
American Indian Science and Engineering Society	bioc02.uthscsa.edu/aisesnet.html
Advocates for Women in Science, Engineering, and Mathematics	www.awsem.com/
Gender, Science and Technology: International Policy Issues	www.ifias.ca/gsd/gsdinfo.html
Caltech Links Page to Women in Science	www.cco.caltech.edu:80/~wcenter/groups.html
Distinguished Women of Past and Present	www.netsrq.com/~dbois/
Women & Minorities in Science & Engineering from SciCentral	www.scicentral.com/W-02womi.html
Maintaining Diversity in Science (a Science/AAAS feature)	sci.aaas.org/nextwave/print/minorities/
International Gender, Science and Technology Information Map (GST Map)	www.Wigsat.org/GSTPMap.html
CRA Committee on the Status of Women in Computer Science and Engineering	cra.org/Activities/craw/
Encouraging Women in Science and Engineering (National Research Council Directory)	www2.nas.edu/cwse/Organizations
Women and Minorities in Science and Engineering (MIT)	www.ai.mit.edu/people/ellens/Gender/wom_and_min.html
Women in Science, Math, and Engineering PhDs.org Links Page	www.phds.org/index.cfm?theTopicID=63
4000 Years of Women in Science	crux.astr.ua.edu/4000WS/4000WS.html
Women in Science, selected biographies from UCSD	www.sdsc.edu/Publications/ScienceWomen
Women in Science	library.advanced.org/20117
Women in Science from Encarta	encarta.msn.com/schoolhouse/womensci/womensci.asp
Archives of Women in Science and Engineering	www.lib.iastate.edu/spcl/wise/wise.html
Climbing the Ladder: An Update on the Status of Doctoral Women Scientists and Engineers. (NAS Report)	www.nap.edu/readingroom/records/0309033411.html
Women Scientists and Engineers Employed in Industry: Why So Few? (NAS Report)	www.nap.edu/readingroom/records/0309049944.html
Minority Colleges and Universities	web.fie.com/web/mol/text/minlist.htm
A Woman's Career in Science	www.advancingwomen.com/grrls2.phtml
AWIS: Association for Women in Science	www.awis.org/
Advocates for Women in Science, Engineering, and Mathematics	www.awsem.com/
Sex Differences in Research Productivity Revisited	www.psc.lsa.umich.edu/~yuxie/soc310/slide21.htm

FEATURED RESOURCES: WOMEN AND MINORITIES IN SCIENCE AND ENGINEERING

Specific Disciplines

ASTRONOMY

[Women in Astronomy](http://www.stsci.edu/stsci/service/cswa/women/) www.stsci.edu/stsci/service/cswa/women/

ARTIFICIAL INTELLIGENCE

[Women in Artificial Intelligence](http://www.ai.mit.edu/people/ellens/Gender/ieee/ieee.htm) www.ai.mit.edu/people/ellens/Gender/ieee/ieee.htm

COMPUTER SCIENCES

[Women in Computer Science](http://www.ai.mit.edu/people/ellens/gender.html) www.ai.mit.edu/people/ellens/gender.html

[The Ada Project: Internet resources for women in computer science](http://www.cs.yale.edu/HTML/YALE/CS/HyPlans/tap/tap.html) www.cs.yale.edu/HTML/YALE/CS/HyPlans/tap/tap.html

ENGINEERING

[Society of Hispanic Professional Engineers](http://www.shpe.org/) www.shpe.org/

[IEEE Women-In-Engineering Home Page](http://www.ieee.org/ieee_women_in_eng/women.html) www.ieee.org/ieee_women_in_eng/women.html

[The Society of Women Engineers](http://www.swe.org/) www.swe.org/

[Women in the Engineering Industry](http://www.webfoot.com/advice/women.in.eng.html) www.webfoot.com/advice/women.in.eng.html

MATHEMATICS

[Women Mathematicians](http://www.scottlan.edu/lriddle/women/women.htm) www.scottlan.edu/lriddle/women/women.htm

[Women in Mathematics](http://www.teleplex.bsu.edu/home/nshadle/web/wmmain.htm) www.teleplex.bsu.edu/home/nshadle/web/wmmain.htm

[Women in Math Project](http://darkwing.uoregon.edu/~wmmmath/) darkwing.uoregon.edu/~wmmmath/

PHYSICS

[Women in Physics](http://www.physics.ucla.edu/~cwp/) www.physics.ucla.edu/~cwp/

[Contributions of 20th Century Women to Physics](http://www.physics.ucla.edu3/~cwp/) www.physics.ucla.edu3/~cwp/

FEATURED RESOURCES: WEB DIRECTORIES AND SITES FOR SCIENCE AND SCIENCE EDUCATION

PREPARED BY **STEPHANIE BIANCHI, NSF LIBRARIAN**

WEB DIRECTORIES FOR SCIENCE RESOURCE STUDIES

www.tc.cornell.edu/Edu/MathSciGateway/

Cornell Math and Science Gateway for Grades 9-12
150.216.8.1/roadmap/scimath.htm

K-12 Educator's Roadmap to the Internet
medinfo.wustl.edu/~ysp/

Young Scientists Program (Washington Univ. School of Medicine)

home.unicom.net/~warnerr/

Mr. Warner's Cool Science
www.hudmark.com/schoolnet/science.html

SchoolNet Science Links
www.li.net/~ndonohue/sci.html
Science Internet Resources

www-sci.lib.uci.edu/SEP/SEP.html
Frank Potter's Science Gems

www-hpcc.astro.washington.edu/scied/science.html
SciEd: Science and Mathematics Education Resources

WEB DIRECTORIES WITH SCIENCE CATEGORIES

www.mcli.dist.maricopa.edu/tl/
Teaching and Learning on the World Wide Web—
Also contains a teaching resource web search engine.
www.kn.pacbell.com/wired/bluwebn/categories.html
Blue Web'N

SITES FOR COOL SCIENCE LINKS

sln.fi.edu/tfi/jump.html

Online Exhibits Hotlist
csa.clpgh.org/Links/index.html

Carnegie Science Academies Cool Links
www.keysites.com/

New Scientist Planet Science: Key sites—Hot Internet Issues and Cool Sites

SCIENCE FOR GIRLS

www.beloit.edu/~gwsoci/gws.html

The Girls and Women in Science Project
library.advanced.org/20117/
Women in Science—Directory, mentoring, links, interviews, and more.

www.hopper.com/hopper/scigirl.html
Science is for Girls Internet Scavenger Hunt

www.backyard.org/
The Backyard Project for High School Girls
Exploring a Career in Computer Science

weber.u.washington.edu/~rural/
Rural Girls in Science

www.sig.net/~scicomp/twist/kidFun.html
Fun Educational Stuff for Girls

www.bess.net/science_and_nature/
Bess' Science & Nature

www.academic.org/
Expect the Best from a Girl

www.girltech.com/
GirlTech

genderequity.vsgc.odu.edu/
Virginia Space Grant Consortium Gender Equity Web page

FEATURED RESOURCES: WEB DIRECTORIES AND SITES FOR SCIENCE AND SCIENCE EDUCATION

TEACHING RESOURCES: BIOLOGY

lenti.med.umn.edu/~mwd/courses.html

Virtual Courses in Biology

www-hpcc.astro.washington.edu/scied/biology.html

Biology Education Resources

esg-www.mit.edu:8001/esgbio/

The MIT Biology Hypertextbook—introductory resource including information on chemistry, biochemistry, genetics, cell and molecular biology, and immunology.

www.biology.arizona.edu/

The Biology Project—University of Arizona online interactive resource for learning biology.

arnica.csustan.edu/

CSUBIOWEB—consolidates existing WWW biological science teaching and research resources and creates and distributes original multimedia resources for the teaching of biology.

www-sci.lib.uci.edu/SEP/life.html Frank Potter's Science Gems-Life Science, K-12

www.tc.cornell.edu/Edu/MathSciGateway/biology.html

Cornell Theory Center Math and Science GatewayBiology, Grades 9-12

www.bio.brandeis.edu/biomath/top.html

Mathematics and Biology—The purpose of these pages is to press our noses against some of the windows that look upon biological systems, and to do it in as interactive and stimulating a way as possible.

biodidac.bio.uottawa.ca/

Biological Images for Educational Use

www.floridaplants.com/Scott/

Scott's Botanical Link of the Day—This service is organized by Dr. Scott Russell through the Department of Botany and Microbiology of the University of Oklahoma, US. The purpose is to compile useful botany education resources for the advanced high school (AP-biology) and college level.

nlu.nl.edu/bthu/nlu/eight/es/Homepage.html

Earth Sciences Emporium—A variety of interesting sites for the earth science educator and enthusiast.

www.tc.cornell.edu/Edu/MathSciGateway/environment.html

Cornell Theory Center Math and Science Gateway Grades 9-12: Earth and Environmental Science

www-sci.lib.uci.edu/SEP/earth.html

Frank Potter's Science Gems-Earth Sciences

www.tc.cornell.edu/Edu/MathSciGateway/meteorology.html

Meteorology

www.hic.net/hicpersonal/j/jbutler/update/cit.htm

Geology and the Environment—An Internet-Based Resource Guide. This Internet-based resource guide contains all the links cited in the print version of the same name by Pipkin and Trent. Contains text, graphics, and in some cases, slide shows for over 100 resources in twenty-four categories, including environmental geology, water, and remote sensing.

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www.mtnswest.com/ores/geo-ed/index.htm

ORES Earth Science Education Links

www.mtnswest.com/ores/geo-ed/sites.htm

Links to Earth Science Education Directories

www.uh.edu/~jbutler/anon/anonfield.html

The Virtual Geosciences Professor

[www.kn.pacbell.com/cgi-](http://www.kn.pacbell.com/cgi-bin/listApps.pl?Earth&Science)

[bin/listApps.pl?Earth&Science](http://www.kn.pacbell.com/cgi-bin/listApps.pl?Earth&Science)

Blue WebN Earth Sciences Sites. Rated hot sites.

TEACHING RESOURCES: SOCIAL, BEHAVIORAL SCIENCES AND ECONOMICS

www.math.uah.edu/~stat/

Virtual Laboratories in Probability and Statistics Interactive, web-based modules for students and teachers of probability and statistics. Most pages have one or more Java applets designed so that the student can run random experiments or generate data quickly and easily. The text component of a page is a discussion of the underlying mathematical theory, together with an set of exercises that are faithful to the rules of three. Indeed, most of the text consists of (hopefully bite-sized) exercises that guide the student through the development of the mathematical theory and the development of probabilistic intuition.

psych.hanover.edu/APS/

Teaching Resources Links from the APA in the following categories: General Material; Behavioral Biological; Psychology; Clinical Psychology; Cognitive Psychology; Developmental Psychology; Educational Psychology; Evolutionary Psychology; Forensic Psychology; Health Psychology; History and Systems; Research Methods; Sensation and Perception; Social Psychology; Statistics;

WORLD LECTURE HALL SERIES, BY DISCIPLINE:

The World Lecture Hall (WLH) contains links to pages created by faculty worldwide who are using the web to deliver class materials. For example, you will find course syllabi, assignments, lecture notes, exams, class calendars, multimedia textbooks, etc.

www.utexas.edu/world/lecture/

World Lecture Hall

www.utexas.edu/world/lecture/agriculture/

Agriculture

www.utexas.edu/world/lecture/ant/

Anthropology and Archaeology

www.utexas.edu/world/lecture/bch/

Biochemistry

www.utexas.edu/world/lecture/bio/

Biology and Botany

www.utexas.edu/world/lecture/biotech/

Biotechnology

www.utexas.edu/world/lecture/earthsci/

Earth Science

FEATURED RESOURCES: WEB DIRECTORIES AND SITES FOR SCIENCE AND SCIENCE EDUCATION

www.utexas.edu/world/lecture/eco/
Economics

www.utexas.edu/world/lecture/envsci/
Environmental Science

www.utexas.edu/world/lecture/linguistics/
Linguistics

www.utexas.edu/world/lecture/mic/
Microbiology

www.utexas.edu/world/lecture/psy/
Psychology

www.utexas.edu/world/lecture/soc/
Sociology

www.utexas.edu/world/lecture/statistics/
Statistics

www.utexas.edu/world/lecture/zoology/
Zoology

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Design: Low + Associates Inc.

NSF 99-150

www.ehr.nsf.gov/EHR/HRD/ge/ge-index.htm



www.nsf.gov