Research on Gender in Science and Engineering FY 2005 (GSE)

Program Solicitation
NSF 04-608
***Replaces Document* NSF 03-588**

National Science Foundation
Directorate for Education and Human Resources
Division of Human Resource Development

Preliminary Proposal Due Date(s) *(required):*

October 18, 2004

Research Proposals - Preliminary

January 06, 2005

Gender in S&E Extension Service Proposals - Preliminary

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

November 16, 2004

Dissemination Proposals

February 01, 2005

Research Full Proposals

April 22, 2005

Gender in S&E Extension Service Full Proposals

April 22, 2005

Dissemination Proposals

REVISIONS AND UPDATES

The funding for Research and Dissemination is the same as FY 2004.

A new track is added for Gender in Science and Engineering Extension Services. The goal of the track is to support adaptation and implementation of evidence-based practices and the use of high quality information products already developed. It is assumed that the agents will serve a certain geographic region and specified communities within the region. They may have a specialization by content area (engineering or information technologies, for example) or by target population.

Proposals for GSE Extension Services will require a preliminary proposal.

The FY 2004 offering of Supplements to Integrate Research-Based Practices is not continued.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Research on Gender in Science and Engineering FY 2005 (GSE)

Synopsis of Program:

The program seeks to broaden the participation of girls and women in all fields of science, technology, engineering, and mathematics (STEM) education by supporting research, dissemination of research, and extension services in education that will lead to a larger and more diverse domestic science and engineering workforce. Typical projects will contribute to the knowledge base addressing gender-related differences in learning and in the educational experiences that affect student interest, performance, and choice of careers; and how pedagogical approaches and teaching styles, curriculum, student services, and institutional culture contribute to causing or closing gender gaps that persist in certain fields. Projects will disseminate and apply findings, evaluation results, and proven good practices and products.

The Research on Gender in Science and Engineering program has been funding these objectives since 1993, under the prior names "Program for Women and Girls" (PWG), "Program for Gender Equity in Science, Mathematics, Engineering and Technology" (PGE), and "Gender Diversity in STEM Education" (GDSE).

Cognizant Program Officer(s):

- Ruta P. Sevo, Program Director, Directorate for Education & Human Resources, Division of Human Resource Development, 815 N, telephone: (703) 292-4676, fax: (703) 292-9018, email: rsevo@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.076 --- Education and Human Resources

Eligibility Information

- **Organization Limit:**

There is no organization limit for proposals to any of the tracks.

- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 20 to 25 - grants per year; a mix of Research Awards, Dissemination Awards, and GSE Extension Services Awards. The duration of these full grants will be from 1 to 3 years. Extension Services grants are for five years, with years 4 and 5 depending on performance.
- **Anticipated Funding Amount:** $6,000,000 for new grants in all tracks, pending availability of funds

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Preliminary Proposals *(required)* :**
  October 18, 2004
  Research Proposals - Preliminary
  January 06, 2005
  Gender in S&E Extension Service Proposals - Preliminary
- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
  November 16, 2004
  Dissemination Proposals
  February 01, 2005
  Research Full Proposals
  April 22, 2005
  Gender in S&E Extension Service Full Proposals
  April 22, 2005
  Dissemination Proposals

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

Award Administration Information

- **Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

One of the National Science Foundation's (NSF) key strategic goals is to invest in People: "to enable the Foundation to meet its mission of promoting the progress of science, while facilitating the creation of a diverse, competitive, and globally-engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens." (see http://www.nsf.gov/od/gpra/start.htm). Investments are directed at programs that strengthen scientific and engineering (S&E) research potential and education programs at all levels. These outcomes are essential to the Nation as we progress toward an increasingly technological job market and a scientifically complex society.

The Division of Human Resource Development (HRD) manages a portfolio of programs that aims to broaden the participation of traditionally underrepresented groups in science, technology, engineering and mathematics (STEM) learning and in the STEM workforce. Programs are in place to address the learning, interest and participation of women, underrepresented minorities (African-American, Hispanic, Native American), and persons with disabilities, at all levels.

The program for Research on Gender in Science and Engineering seeks to build resources - developing the Nation's knowledge capital, social capital, and human capital -- toward the goal of broadening the participation of girls and young women in STEM education from kindergarten through undergraduate education.

- **Research projects:** investigate factors behind the underrepresentation of girls and women in STEM education;

societal, formal and informal educational systems' interaction with individuals that encourage or discourage interest and persistence in study or careers in certain fields.

- **Dissemination:** make known education program evaluation results and research findings to significant national audiences, especially to the broader education community.

- **Gender in Science and Engineering Extension Services:** provide consulting services to educators and institutions, to enable them to adopt and embed proven gender-inclusive policies and practices in pedagogy, the design of curriculum materials, student support programs, educator and faculty development.

II. PROGRAM DESCRIPTION

A. ISSUES

Issues of concern underlying the need for the Program include:

- Our society – as experienced in education through parents, the media, educators, counselors, and faculty -- tends to reinforce traditional assumptions about the capabilities, interests, and career options for girls and women, steering them away from STEM courses and majors.

- At the same time, the demand for science and technology literacy on the part of all citizens has never been higher, and the demand for domestic workforce capacity in engineering and computer fields is far exceeding supply.

- The history of S&E design shows that optimal performance of S&E in the service of society requires that inquiry, discovery, and design be informed by diverse points of view and diverse research questions. If significant populations are not represented, the results are often inadequate.

- Gender biases are still evident in gender gaps at many stages of the STEM educational continuum: enrollment in elective and advanced high school courses to prepare for college; expression of interest in majors at the undergraduate level; retention of students in certain fields during undergraduate study; graduation rates; and entry into the science and engineering workforce.

- Socially projected stereotypes about who should be scientists and engineers pose artificial limits on the participation of talented students. Gender is only one of the characteristics that shape personal and group identity. Other characteristics such as race, ethnicity, economic status, religion, and disability also bear on whether students are encouraged, neglected, or discouraged from developing certain skills and ambitions. Our educational systems must seek to develop talent and interest in science, mathematics, and technology in all children.

Statistical profiles of STEM participation, with analyses, are documented in **Trends in Educational Equity of Girls and Women** (National Center for Education Statistics, U. S. Department of Education, NCES 2000-030) and the biannual publication **Women, Minorities, and Persons with Disabilities in Science and Engineering** (National Science Foundation, NSF 04-317) among others. (See http://www.nsf.gov/sbe/srs/wmpd/start.htm.)

B. GOALS

The goal of Research on Gender in Science and Engineering (GSE) is to advance participation of women and girls in STEM fields where they continue to be underrepresented, in accord with NSF's goal of developing a diverse science and engineering workforce. In the context of that overarching goal, the GSE program supports activities that address the following types of objectives.

Research

- To discover and describe gender-based differences and preferences in learning science and mathematics in K-16 and factors that affect interest, performance, and choice of STEM study and careers in fields where there are significant gender gaps;

- To discover and describe how experiences and interactions in informal and formal educational settings inhibit or encourage interest and performance of students based on gender;

- To increase the knowledge about organizational models that lead to more equitable and inviting STEM educational environments in K-16;

- To increase the knowledge of the process of institutional change required to achieve more equitable and inviting STEM educational environments in K-16.

Dissemination

- To extend to significant audiences awareness and information about research-based and demonstrated strategies and practices to increase the participation of girls and women in STEM education and workforce, in order to inform educational practice;

- To catalyze new thinking and future action among educational institutions by convening conferences, workshops, or symposia that are not possible at regular meetings of professional societies.

Extension Services

- To integrate various findings about gender in science and engineering into a unified program of change; to facilitate the interpretation of research knowledge into practice;

- To providing consulting services in a certain geographic region, explaining in simple language the practical meaning and benefits of adopting programs, tools, or approaches that enhance the interest and persistence of female students in STEM studies through the undergraduate level, in those fields where they are underrepresented;

- To show educators how to adapt exemplary projects, research-based learning tools, pedagogical approaches, and service or support programs.

- To communicate back to researchers the problems that practicing educators find most urgent or troublesome in adopting the new methods or tools. (cf. Wilson & Daviss, 1994, pp. 17-20)

The goals of the GSE program, which originated in 1993 under the name "Program for Women and Girls" (PWG), parallel those of many other education and diversity programs at NSF except that they emphasize gender aspects.

C. DESCRIPTION - RESEARCH PROPOSALS

Proposals in the Research area may seek to enhance the multidisciplinary understanding of STEM learning to the extent that differences are evident based on gender. Behavioral, cognitive, affective, and social differences may be investigated using methods of sociology, psychology, anthropology, economics, and statistics disciplines.

Successful proposals will incorporate relevant advances in research methodologies and theoretical models. They should capitalize on the development of new instrumental, computational or statistical methods, models, and tools of observation and analysis.

Proposals for research projects should include testable hypotheses and carry the expectation that the results obtained will be

of sufficient significance to merit peer review and publication. They should present the disciplinary and conceptual framework for the study. If a population sample is used, the proposal should describe the sample, rationale for sample selection, and the project's access to the sample population. The proposal should address whether the design is premised on special needs and interests due to educational level, race, ethnicity, economic status, or disability, in addition to gender, and to what extent data will be disaggregated for multiple characteristics.

The effort should provide a research foundation for educational approaches, curriculum, and technological tools that are already developed or can be developed in the future, bridging research and educational practice in settings such as classrooms, informal learning sites, and technological learning environments. The research foundation is assumed to provide a strong base of support for sustained improvement in STEM educational practice. Strong research designs will produce rigorous, cumulative, reproducible, and usable findings.

Investigators might:

- Investigate whether students have gender-based learning differences that are not accommodated by traditional approaches to teaching science and mathematics. For example, different conceptual strengths and weaknesses in learning certain math skills, different timing needs, different retention patterns, different preferences among computer interface features, interests in social interaction while learning, and interests in the social relevance and application of science experiments.

- Explore whether social and psychological behavior patterns of boys or girls in our society affect learning.

- Explore the socialization of males and females in our society that precludes or inhibits access, encouragement, support, and acceptance for interest in math and science topics. For example, assumptions or "gender schema" about appropriate careers, assumptions about the use of tools and technology, assumptions about the difficulties of embarking on or succeeding in a science or technology career.

Research proposals should address dissemination of findings to a national audience, particularly to education practitioners. Since the goal of the program is to contribute to a national knowledge base, it is important to show that the investigator is aware of appropriate channels -- specific peer-reviewed journals, publications, web sites, professional association conferences -- and is committed (including allocating resources) to make sure that the investment in the project leads to this contribution and that peers in the community will benefit.

D. DESCRIPTION - DISSEMINATION PROPOSALS

Dissemination projects provide a mechanism for informing a wider audience about issues, research findings, and strategies for changing educational practice. Proposals for dissemination must justify a significant investment to reach a regional audience or national attention.

Investigators might:

- Organize a multidisciplinary meeting to consolidate knowledge about educational practice related to male or female students in K-16 STEM at a certain educational level. For example, a workshop on recruitment and retention in undergraduate engineering departments, a symposium on strategies for strengthening recruitment of students into computer science.

- Develop a media presentation (e.g., radio, TV, video, web) that educates the public about girls' or boys' education in STEM and factors contributing to interest, performance, or choice of careers.

- Significantly enhance distribution of an educational product (e.g., book, curriculum guide, seminar manual, web site) using economically and technologically strategic methods given the target audience.

- Target subgroups of educational practitioners, e.g. heads of science departments, deans, heads of research groups, teachers or faculty in a particular field.

Outcomes. Dissemination proposals should address how they will assess whether the method and content were successful, and budget for some assessment. Examples of measures are:

- A significant audience is reached and their knowledge and attitudes are changed
- The audience acquires new knowledge
- The audience plans to adopt new institutional policies and practices related to gender and diversity
- New information products are developed by the project team or participants to further advance dissemination (e.g., synthesis, topical summary, review of research)

E. DESCRIPTION - GENDER IN SCIENCE AND ENGINEERING EXTENSION SERVICES PROPOSALS

Extension Services will offer proactive dissemination, consulting, implementation assistance, and reporting on experience in the field. They will be a conduit for understanding of research and for adoption of research-based approaches on the participation of women in science and engineering.

The Services will concentrate access to the knowledge base so that they provide expert knowledge. They will integrate various findings into a unified program of change, and communicate it in simple language to educators within a specified region. The word “Center” is intentionally not used, so as to indicate that the “Services” must meet the business standards of the best customer services: proactive, responsive, quality, timely, customized for educators in the region, and informed by feedback. (Cf. Wilson & Daviss, 1994, pp. 17-20)

“Proactive” means that there is an explicit, communicated, ambitious plan for leading change. The plan should be developed following business best practices, for example, involving the customer. The “quality” aspect means that the services will show sophistication and credibility in advancing “a unified program of change.” They will utilize the latest peer-reviewed research and draw on the knowledge of researchers who have produced the knowledge base. “Responsive” means the services understand educators and methods of effective professional development of educators. “Customized” means that the services are in touch with the culture of the regional community and take advantage of opportunities and other resources unique to the region. “Informed by feedback” means the services are evaluated and improved continuously.

Investigators might:

- Create a coherent and credible “unified program of change” drawing on tested approaches with a specialized theme, for example, informal educational programs for middle school students, high school, undergraduate, K-12 teacher professional development, or a content such as engineering or information technology or mathematics learning.

- Initiate seminars, workshops, online courses, tutorials or other curriculum and approaches to introduce the target population to the wealth of research and research-based resources.

- Promote a regional learning community with web-based support to change organizational commitment, policy, and action. Tie the learning to actions and action research.

- Collect, digest, and provide information about the range of resources now available on gender in science and engineering.

- Visit implementation projects as consulting partners and allies, to assist with parts of the promoted program.

The target community may be a mix of teachers, counselors, parents, community leaders, administrators, faculty, and others. (Since the aim of the services is to change educational systems, direct services to students are not in scope.) The target community should be described, especially if the design of the services is premised on special needs and interests based on educational level, race, ethnicity, economic status, and disability, in addition to gender.

Dissemination. The Extension Services have a strong mandate to disseminate information to a regional community. In addition, there should be some plans to network with other educational improvement efforts and professional associations.

Outcome Measures. The goal of the Extension Services is not to prove a new model for dissemination or implementation. In the spirit of good management they should address methods for collecting formative feedback and for evaluating and reporting on the success of the services.

Summary of Key Characteristics. Extension Services are characteristically different from the other tracks in the following ways:

- The scope of services is clear and specific; there is a "unified program for change" developed from the latest knowledge.
- The marketing of best practices is based on rigorous and explicit criteria for defining a "best" practice, and awareness and leveraging of related efforts to define and identify "best" practices. The program takes advantage of dozens of products, guides, handbooks, tutorials, videos, and curricula already developed.
- The services have credibility for providing the best information available in education research and social science research from multiple sources.
- The team includes experts (research producers and education practitioners) in gender in science and engineering on the staff as well as through a network or partnerships. The expert credentials for peer-reviewed research and experience with programs, materials, or approaches are clear and relevant.
- The proposal shows awareness of the community and the region to be reached, its unique characteristics, and special opportunities for cooperation and leverage. The Extension Service is integrated into the geographically-based community to be served.
- The team includes expertise in consulting and customer service, and shows awareness of business standards for excellence.
- If there is a specialization or theme to the Extension Services, the rationale and resources are described.
- The scale of potential impact is proportional to the funding level.

F. REFERENCES

American Association of University Women (2000). *Tech-Savvy: Educating Girls in the New Computer Age.* See www.aauw.org

American Association of University Women (2004). *Under the Microscope: a Decade of Gender Equity Projects in the Sciences.*

Building Engineering and Science Talent (2004). *A Bridge for All: Higher Education Design Principles to Broaden Participation in Science, Technology, Engineering, and Mathematics.* See www.bestworkforce.org

Campbell, Patricia B., Eric Jolly, Lesli Hoey, Lesley K. Perman (2002). *Upping the Numbers: Using Research-Based Decision Making to Increase Diversity in the Quantitative Disciplines*. Commissioned by the GE Fund, January, 2002. Available at www.edc.org/spotlight/equity/upping.htm

Clewell, Beatriz Chu, Bernice Taylor Anderson, Margaret E. Thorpe (1992). *Breaking the Barriers: Helping Female and Minority Students Succeed in Mathematics and Science*. Jossey-Bass Publishers.

Clewell, B.C., & Campbell, P.B. (2002). Taking stock: Where we've been, where we are, where we're going. *Journal of*

Women and Minorities in Science and Engineering, 8(3-4), 255-284. See www.campbell-kibler.com

Committee on Equal Opportunities in Science and Engineering (2002). *Biennial Report to the United States Congress.* See www.nsf.gov/od/ceose

Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Develoment (September 2000). *Land of Plenty, Diversity as America's Competitive Edge in Science, Engineering and Technology.* See www.nsf.gov/od/cawmset

Darke, Katherine, Beatriz Clewell, and Ruta Sevo (2002). Meeting the Challenge: The Impact of the National Science Foundation's Program for Women and Girls. *Journal of Women and Minorities in Science and Engineering,* 8(3&4), 285-303.

Davis, Cinda-Sue, Angela Ginorio, Carol Hollenshead, Barbara Lazarus, Paula Rayman, et al (1996). *The Equity Equation: Fostering the Advancement of Women in the Sciences, Mathematics, and Engineering*. Jossey-Bass Publishers.

Dietz, James S., Bernice Anderson, and Conrad Katzenmeyer (2002). Women and the Crossroads of Science: Thoughts on Policy, Research, and Evaluation. *Journal of Women and Minorities in Science and Engineering*, 8(3&4), 395-408.

Ginorio, Angela and Michelle Huston (2001). *Si, Se Puede! Yes, We Can: Latinas in School*. AAUW Education Foundation. See www.aauw.org

Margolis, Jane and Allan Fisher (2002). *Unlocking the Clubhouse: Women in Computing*. Cambridge, MA: MIT Press.

National Center for Educational Statistics (2000). *Entry and Persistence of Women and Minorities in College Science and Engineering Education*. NCES 2000-601 See nces.ed.gov

National Center for Educational Statistics (2000). *Trends in Educational Equity of Girls and Women*. NCES 2000-030

National Council for Research on Women (2001). *Balancing the Equation: Where Are Women and Girls in Science, Engineering and Technology?* Written by Mary Thom. See www.ncrw.org

National Science Foundation (2003). *New Formulas for America's Workforce: girls in science and engineering.* Arlington, VA, 2003 (NSF 03-207 printed book, NSF 03-208 brochure+CD) See www.ehr.nsf.gov/ehr/hrd/pge.asp

Wilson, Kenneth G. and Bennett Daviss (1994). *Redesigning Education*.

G. INFORMATION ABOUT PREVIOUS AWARDS

HRD's web site provides links to abstracts for and other information about awards made by this program under prior names (http://www.ehr.nsf.gov/ehr/hrd/). Historically, the program has been called "Program for Women and Girls" (PWG), "Program for Gender Equity in Science, Mathematics, Engineering, and Technology" (PGE), and "Gender Diversity in STEM Education" (GDSE).

NSF's web site provides the ability to search awards using custom queries (http://www.nsf.gov/awardsearch/index.jsp). To retrieve only GSE-related awards, use the query:

- Element Code: 1544

To find more specific awards, it is possible to narrow the search:

- Element Code: 1544 and Keyword: mentoring
- Element Code: 1544 and Keyword: "learning community"
- Element Code: 1544 and Keyword: AZ
- Element Code: 1544 and Keyword: "middle school"

A compendium of profiles of projects funded in the first decade of the program, with a comprehensive index, is available as a printed book, CD-ROM, and, as an online PDF file. It may be accessed at http://www.ehr.nsf.gov/ehr/hrd/pge.asp , or, http://www.nsf.gov/pubsys/ods/ using one of the publication numbers:

National Science Foundation (2003). *New Formulas for America's Workforce: Girls in Science and Engineering.* Arlington, VA, 2003 (NSF 03-207 printed book, NSF 03-208 brochure+CD)

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

Anticipated funding for new grants in all tracks in FY 2005 is $6,000,000 pending the availability of funds.

Research proposals may request up to $500,000 for up to three years, pending availability of funds. The proposal should include a budget for each year and a summary budget if there are multiple years. (Awards may be fully funded in the first year.)

Dissemination proposals may request up to $200,000 for up to 24 months, pending availability of funds.

Gender in Science and Engineering Extension Services proposals may request up to $500,000 each year for five years, pending availability of funds. Continued funding in years four and five are contingent on performance. Funding will be cut if performance is not satisfactory.

NSF expects to fund 10 Research proposals, 10 Dissemination proposals, and 2 Extension Services proposals, depending on the quality of the submissions and availability of funds.

The proposed start dates should be at least seven months from the full proposal deadline.

Funds should be budgeted for the principal investigator to attend a two-day grantees' meeting in the Washington, D.C. area, each award year (February/March time frame).

A limited equipment request (<10% of total budget) is allowed for projects intensive in educational technology, for development. Equipment for participants in student or educator demonstration programs, and office equipment for project staff are expected to come from other sources.

GSE research projects are eligible for REU (Research Experiences for Undergraduates) supplements, which expressly support the participation of undergraduate students on the project research team, if funds are available. Please see the REU announcement for complete parameters and the method for making a request for an REU supplement (see http://www.nsf.gov/home/crssprgm/reu/start.htm). Proposers should consult the Program Director in advance of a request for REU supplements.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals *(required):*

A preliminary proposal is applicable for Research and GSE Extension Services proposals. It is required prior to the submission of a full proposal. It will be reviewed by NSF staff and/or external reviewers to provide input for developing a full proposal. A full proposal will be Encouraged or Discouraged based on the review of the preliminary.

The preliminary proposal must be submitted via Fastlane.

Cover Sheet: **Be sure to check the PRELIMINARY PROPOSAL box**. Select the program name "Research on Gender in Science and Engineering" in the Education and Human Resources Directorate, Human Resource Development.

PROJECT SUMMARY: A short abstract (one page or less, single spaced) that clearly identifies the major features of the project. Address each NSF criterion separately: intellectual merit and broader impacts.

PROJECT DESCRIPTION: The narrative is limited to 5 pages in length. It should sketch, in broad terms, the essential features of the project:

RESEARCH

1. What is the research goal? What is the research question?
2. What findings are expected?
3. What is the contribution to the knowledge base? Reference prior related work and explain the value added and the national benefit of the work.
4. What is the study population and the plan to reach the population?
5. Describe the conceptual or disciplinary framework and methods to be used.
6. Identify key team members, consultants, and advisors. Relate their qualifications and skills to specific components of the proposed work in one or two sentences.
7. Describe plans for broad dissemination.

GSE EXTENSION SERVICES

1. What is the scope of the service, in terms of geography, community, and intellectual specialization?
2. Briefly describe a unified program of change to be extended. How will "best" practices, products, or curriculum be chosen as part of the program?
3. What is the relationship between the extension service and the community to be served?
4. What research and practitioner expertise are on the extension team?
5. Describe the methods for extension -- how will the service reach leaders in education. What activities and products are planned for this community?
6. What is the potential impact given this scope?

BIOGRAPHICAL SKETCH of the PI and co-PI's is required. No budget pages are required; a requested total amount on the

cover sheet is sufficient. Supplemental materials or appendices are NOT permitted for preliminary proposals.

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

The following instructions supplement the GPG guidelines for full proposals.

FULL PROPOSALS

On the **COVER SHEET**, select the program name "Research on Gender in Science and Engineering" in the Education and Human Resources Directorate, Human Resource Development.

The **TITLE** should be prefaced with an abbreviation identifying the GSE goal supported by the proposal:

- RES - for research proposals
- DIS - for dissemination proposals
- EXT - for extension services proposals

The **PROJECT SUMMARY** should:

- Name and describe the proposed activity (what and how)
- Describe the research question (or hypothesis) or audience impact or service impact
- Describe the target research subjects or audience (who) or community
- State the organizations involved (who)
- Especially highlight the contribution to knowledge, social, or human capital (why)
- **Address each NSF review criterion in a separate paragraph with a heading: intellectual merit and broader impacts**

The **Research PROJECT DESCRIPTION** should address:

- What is the research goal? What is the research question?
- What findings are expected?
- What is the contribution to the knowledge base? Reference prior related work and explain the value added and the national benefit of the work.
- What is the study population and the plan to reach the population?
- What is the theoretical basis for the research question?
- Describe the conceptual or disciplinary framework and methods to be used.
- Identify key team members, consultants, and advisors. Relate their qualifications and skills to specific components of the proposed work.
- For prior grantees, a discussion of the results of prior work.

Common weaknesses in research proposals (according to Dietz, et al, 2002) are:

1. Poor formulation of research questions
2. Poor articulation of program design and theory
3. Failure to recognize multiple studies have been conceived as a single study
4. Failure to situate the study or its potential findings within prior work and literature
5. Failure to situate the study or its potential findings within a framework or theory
6. Weak links between research goals and proposed methodology

The **Dissemination PROJECT DESCRIPTION** should address:

- What will be disseminated?
- What is the goal of the dissemination, and what is the justification for the dissemination (meeting or media product)?
- What audience will it reach and what is the desired impact on the audience?
- What is the context of the dissemination; what other projects, events, or products exist and how does this project contribute national benefits?
- Describe the management plan and timeline.
- Describe the qualifications of key team members and suitability for their role in the project.
- A list of advisory committee members and description of their level of involvement, if an advisory committee is proposed.
- For prior grantees, a discussion of the results of prior work.

The **Extension Services PROJECT DESCRIPTION** should address:

- What is the scope of the service, in terms of geography, community, and intellectual specialization?
- What is the rationale for this scope? (Why this scope? What are advantages, benefits, strengths?)
- Describe a unified program of change to be extended. How will "best" practices, products, or curriculum be chosen as part of the program?
- What is the relationship between the extension service and the community to be served?
- What research and practitioner expertise are on the extension team ? How are they suited to the proposed scope of the service and what are their roles?
- Describe the methods for extension -- how will the service reach leader-practitioners in education. What activities and products will be provided to the community?
- Describe the business practices for providing good extension services to the community.
- What is the potential impact of this particular service over 3-5 years?
- Describe how the services will be networked with other educational improvement efforts or professional associations.
- Describe how the service will collect formative feedback and evaluate its success.

Proposers are reminded to identify the program announcement/solicitation number (04-608) in the program announcement/ solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required in proposals submitted under this Program Solicitation.

Other Budgetary Limitations:

Research budgets may be up to $500,000.

Dissemination budgets may be up to $200,000.

GSE Extension Services budgets may be up to $2,500,000.

Funds should be budgeted for the principal investigator or a project member to attend a two-day grantees' meeting in the Washington, D.C. area, each award year, in February/March. A limited equipment request (<10% of total budget) may be allowed. (See Section IV.)

C. Due Dates

Proposals must be submitted by the following date(s):

Preliminary Proposals *(required):*

October 18, 2004
Research Proposals - Preliminary

January 06, 2005
Gender in S&E Extension Service Proposals - Preliminary

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

November 16, 2004
Dissemination Proposals

February 01, 2005
Research Full Proposals

April 22, 2005
Gender in S&E Extension Service Full Proposals

April 22, 2005
Dissemination Proposals

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: http://www.fastlane.nsf.gov

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 (NSB 97-72). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued Important Notice 127, Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the Grant Proposal Guide Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In most cases, proposers will be contacted by the Program Officer after his or her recommendation to award or decline funding has been approved by the Division Director. This informal notification is not a guarantee of an eventual award.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of

Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/cgi-bin/getpub?gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at http://www.gpo.gov.

Special Award Conditions:

GSE Extension Services awards will be made for up to five years. Funding for years four and five is contingent on performance, as evaluated from annual reports and site visit reports. If performance is not satisfactory, then funding will be cut.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project reporting system, available through FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Ruta P. Sevo, Program Director, Directorate for Education & Human Resources, Division of Human Resource Development, 815 N, telephone: (703) 292-4676, fax: (703) 292-9018, email: rsevo@nsf.gov

For questions related to the use of FastLane, contact:

- Gloria Strothers, Lead Program Assistant, Directorate for Education & Human Resources, Division of Human Resource Development, 815 N, telephone: (703) 292-4718, fax: (703) 292-9018, email: gstrothe@nsf.gov
- Toni Edquist, Program Assistant, Directorate for Education & Human Resources, Division of Human Resource Development, 815 N, telephone: (703) 292-4649, email: tedquist@nsf.gov
- Victoria A. Smoot, Program Specialist, Directorate for Education & Human Resources, Division of Human Resource Development, 815 N, telephone: (703) 292-4677, fax: (703) 292-9018, email: vsmoot@nsf.gov

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at http://www.nsf.gov/cgi-bin/getpub?gp. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF E-Bulletin, which is updated daily on the NSF Website at http://www.nsf.gov/home/ebulletin, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's Custom News Service (http://www.nsf.gov/home/cns/start.htm) to be notified of new funding opportunities that become available.

Research on Gender in Science and Engineering is among NSF education programs, and among programs that promote the participation of under-represented groups. For a complete list of programs in Education and Human Resources see http://www.ehr.nsf.gov/. For a complete list of programs in the Division for Human Resource Development see http://www.ehr.nsf.gov/ehr/hrd/. Most of the programs listed below potentially support special emphasis on gender, minority, and disability issues. **Some are funding projects like those funded by this program in the past.**

Curriculum

- Course, Curriculum, and Laboratory Improvement (CCLI) (NSF 04-565)
- Instructional Materials Development (IMD) (NSF 04-562)
- CISE Educational Innovation Program (NSF 02-082, NSF 04-001)
- Engineering Education Program (PD 01-1340)

Teacher Preparation

- NSF Graduate Teaching Fellows in K-12 Education (GK-12) (NSF 04-533)
- Teacher Professional Continuum (TPC) (NSF 04-568)
- Centers for Learning and Teaching (CLT) (NSF 04-501)
- Information Technology Experiences for Students and Teachers (ITEST) (NSF 02-147)

Student Programs

- Math-Science Partnerships (MSP) (www.ehr.nsf.gov/msp) (NSF 03-605)
- Information Technology Experiences for Students and Teachers (ITEST) (NSF 02-147)
- Science, Technology, Engineering and Mathematics Talent Expansion Program (STEP) (NSF 04-548)
- Information Technology Workforce (NSF 03-609)

Informal Education

- Informal Science Education (ISE) (NSF 04-579)
- Information Technology Experiences for Students and Teachers (ITEST) (NSF 02-147)

Technology/IT

- Information Technology Experiences for Students and Teachers (ITEST) (NSF 02-147)
- Advanced Technological Education Program (ATE) (NSF 04-541)
- Computer Science, Engineering, and Mathematics Scholarships (CSEMS) (NSF 04-506)
- Information Technology Workforce (NSF 03-609)
- National STEM Education Digital Library (NSDL) (NSF 04-542)
- CISE Educational Innovation Program (NSF 04-001)

Research

- Evaluative Research and Evaluation Capacity Building (EREC) and Research on Learning and Education (ROLE) (NSF 03-542)
- Interagency Education Research Initiative Program (IERI) (NSF 04-553)
- Centers for Learning and Teaching (CLT) (NSF 04-501)
- Societal Dimensions of Engineering, Science and Technology (SDEST) (NSF 01-152)
- Research Experiences for Undergraduates (REU) Supplements and Sites (NSF 02-136)
- Science of Learning Centers (SLC) (NSF 03-573)

Engineering

- Bridges for Engineering Education (BEE) (NSF 03-561)
- Engineering Education Program (PD 01-1340)

Mathematics

- Enhancing the Mathematics Sciences in the 21st Century (NSF 04-600)

Addressing Under-representation

- ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (NSF 02-121)
- Program for Persons with Disabilities (PPD) (NSF 03-587)

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: pubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.