Evaluative Research and Evaluation Capacity Building (EREC) AND Research on Learning and Education (ROLE)

Program Solicitation
NSF 03-542

National Science Foundation
Directorate for Education and Human Resources
Division of Research, Evaluation and Communication

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

May 15, 2003

EREC proposals -- Future Dates: May 15 annually

June 01, 2003

ROLE proposals -- Future Dates: June 1 annually

December 10, 2003

ROLE proposals -- Future Dates: December 10 annually

REVISIONS AND UPDATES

The ROLE component of the EREC and ROLE solicitation is currently being revised by NSF's Directorate for Education and Human Resources (EHR). **Proposals will not be accepted for the December 10, 2004 deadline.** It is anticipated that the revised ROLE component will have a deadline in January 2005. Specific deadline date(s) for 2005 and later will be posted at least 90 days after the revised ROLE component of the solicitation is posted.

This document replaces NSF 02-34 and NSF 02-023.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Evaluative Research and Evaluation Capacity Building (EREC) AND Research on Learning and Education (ROLE)
A joint solicitation of the Division of Research, Evaluation, and Communication (REC)

Synopsis of Program:

Evaluative Research and Capacity Building (EREC)

The EREC program seeks proposals that offer unique approaches to evaluation practice in the generation of knowledge for the science, technology, engineering, and mathematics (STEM) education community and for broad policymaking within the research and education enterprise. Successful proposals may focus on one or more STEM education programs or projects in order to examine major issues in STEM education and/or may focus on the development of capacity within the education evaluation field.

Research on Learning and Education (ROLE)

The ROLE program seeks to capitalize on important developments across a wide range of fields related to human learning and to STEM education. It supports research across a continuum that includes 1) the biological basis of human learning; 2) behavioral, cognitive, affective and social aspects of human learning; 3) STEM learning in formal and informal educational settings; and 4) changing educational systems to improve STEM learning. The ROLE Program aims to advance the knowledge base within and across the intersections of these multidisciplinary areas. It encourages projects that reconcile and integrate basic research and educational practice, and generate hypotheses from one disciplinary area that can be tested and refined in another.

Cognizant Program Officer(s):

- Please see the full text of this funding opportunity for contact information.

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

- 47.076 --- Education and Human Resources

Eligibility Information

- **Organization Limit:** None Specified.
- **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:** 15 to 30 - (5-10 for the EREC annual competition; 5-10 for each ROLE competition).
- **Anticipated Funding Amount:** $16,000,000 (Pending the availability of funds, $4 million for EREC; $6 million for each of two ROLE competitions.)

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from 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

- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
  May 15, 2003
  EREC proposals -- Future Dates: May 15 annually
  June 01, 2003
  ROLE proposals -- Future Dates: June 1 annually
  December 10, 2003
  ROLE proposals -- Future Dates: December 10 annually

Proposal Review Information

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

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

About NSF and EHR

The National Science Foundation (NSF) is charged with promoting the health and vitality of the Nation's scientific and engineering research and education enterprises. As one part of that mission, the Directorate for Education and Human Resources (EHR) has primary responsibility for NSF's efforts to provide national and research-based leadership in science, technology, engineering, and mathematics (STEM) education. EHR maintains four goals in fulfilling this responsibility:

1. Prepare the next generation of STEM professionals and attract more Americans to STEM careers.

2. Increase the technological and scientific literacy of all Americans so that they can exercise responsible citizenship in an increasingly technological society and acquire knowledge of science, mathematics and technology that is appropriate to the development of workforce skills and life-long career opportunities.
3. Broaden participation (diversity) and achievement in STEM.
4. Attend to critical workforce needs requiring significant math and science skills and knowledge, both by attracting new people to these STEM careers and by support for the development and retooling of the current STEM workforce.

To reach these goals, the Directorate sponsors programs in the Divisions of Elementary, Secondary, and Informal Education (ESIE), Undergraduate Education (DUE), Graduate Education (DGE), Human Resource Development (HRD), the Experimental Program to Stimulate Competitive Research (EPSCoR), and the Division of Research, Evaluation, and Communication (REC). The Directorate also supports the Math and Science Partnership (MSP).

About REC

In pursuit of the four EHR goals above, the Division of Research, Evaluation, and Communication (REC) (http://www.ehr.nsf.gov/rec) seeks to:

1. advance research on science, technology, engineering, and mathematics education and improve evaluative research on STEM education programs;
2. increase the capacity of the field to conduct high-quality, innovative, useful, and credible STEM education evaluation and research studies; and
3. increase the capacity of STEM education researchers and evaluators to communicate the results of their research.

The principal grant programs of REC are Research on Learning and Education (ROLE), Evaluative Research and Capacity Building (EREC), the Interagency Education Research Initiative (IERI), and Faculty Early Career Development (CAREER). The EREC and ROLE programs are the subjects of this program solicitation.

II. PROGRAM DESCRIPTION

A. EVALUATIVE RESEARCH and EVALUATION CAPACITY BUILDING (EREC)

Evaluation has gained currency throughout government and within the education enterprise as a part of a move toward greater accountability, oversight, and management of public resources. Until this time, however, evaluation has not been fully used as a research approach to generate knowledge about effective programmatic and policy features and strategies. While the community of evaluators who focus on STEM education remains small, the demands on it are growing. The EREC program is designed to support compelling evaluative studies that build the knowledge base about effective STEM education

policy and practice, and to increase the size and capacity of the evaluation community to respond to evolving challenges in STEM education.

REC expects to support EREC projects with the intent that knowledge will be built through the diversity of disciplinary perspectives, methods, and approaches to these problems. Therefore, representation of investigators with expertise in evaluation and/or education research, social science, and other sciences and engineering is strongly encouraged.

In general, the EREC program does not support projects focused on the development of assessments of student learning. Investigators interested in this topic are encouraged to consult a program director in the ROLE program; the Teacher Professional Continuum (TPC) program; or the Course, Curriculum, and Laboratory Improvement program (the latter two programs are referenced in section IX of this solicitation).

EREC proposals may address topics in evaluative research, evaluation capacity building, or both.

a. Evaluative Research Studies

The EREC program seeks proposals that offer unique approaches to evaluation practice in the generation of knowledge for the science, technology, engineering, and mathematics (STEM) education community and for broad policymaking within the research and education enterprise. Successful proposals may focus on one or more STEM education programs or projects in order to examine major issues in STEM education.

The objective of the evaluative research proposals should be to expand understanding of educational practices, policies, procedures, and outcomes that can make a strategic contribution to STEM educational improvement, to policymaking, and to the improvement of evaluation theory and methodology. REC expects that these studies will serve as innovative and exemplary models for the STEM education research and evaluation communities. Therefore, investigators are strongly encouraged to focus on topics of national importance with the expectation that results may generalize beyond the scope of the research context and may be broadly useful for STEM educational improvement and the development of the evaluation field in general.

b. Evaluation Capacity Building

The EREC program supports projects that increase the capacity of the field to conduct high quality, innovative, useful, and credible STEM education evaluation studies. There are two eligible topic areas for evaluation capacity building proposals: enhancing the capability and infrastructure and advancing the state-of-the-art in evaluation.

Enhancing Capability and Infrastructure

REC will support projects designed to enhance the capability and infrastructure of the education field to conduct evaluations through education and training, the development of evaluation knowledge and skills, and through the creation of evaluation resources useful for the field in general. The following broad examples are provided for illustrative purposes only. Applicants are encouraged to develop focused projects in these or possibly other areas of relevancy to this topic.

- The development of professional communities focused on specific innovative evaluation approaches and practices via workshops, electronic networks, or by other means;
- The pre-service and in-service education and training of evaluators, with special emphasis on preparation of those groups underrepresented in science, technology, engineering and mathematics;
- The provision of training in evaluation to appropriate audiences such as STEM education program administrators, instructors, policymakers, and others.
- The planning, organization, and initiation of high quality undergraduate, graduate, and professional STEM education evaluation experiences, degree and certificate programs, and degree concentrations;
- The provision of education and training to researchers from other disciplines who wish to refocus their professional careers on STEM evaluation through such means as postdoctoral or midcareer fellowships and specialized programs;
- The creation or enhancement of infrastructures to support the practice of evaluation, such as regional professional groups or education and training consortia; and

- The compilation, critique, and dissemination of resources useful for evaluation practice.

Advancing The State-of-The-Art In Evaluation

Public demands on improving quality and access to STEM education are requiring new evaluation approaches and methods. REC will support projects designed to advance the state-of-the-art of evaluation by developing innovative tools, models, theories, and techniques that will assist the field in addressing questions of complex causality, attribution of cause and effect, and the impacts of various educational interventions on educational systems and learning environments. The following broad examples are provided for illustrative purposes only. Applicants are encouraged to develop focused projects in these or possibly other areas of relevancy to this topic.

- The synthesis of existing evaluation and research results from multidisciplinary perspectives, the development of meta-analyses, and the organization of conferences to seek clarity and consensus among disparate bodies of literature on methods for evaluating STEM education activities;
- The development of effective new mixed, quantitative-qualitative methodologies derived from multiple disciplinary traditions;
- The development of methods that might increase the validity and reliability of measures, address issues of complex causality, and/or enhance the ability of evaluators to make causal or attributional statements;
- The development or refinement of conceptual or theoretical frameworks for innovative evaluation designs of STEM education programs;
- The development of cost-effective approaches to evaluation or approaches that reduce the time required to obtain credible and reliable preliminary results;
- The creation of new models and approaches for disseminating STEM evaluation findings and methods to various stakeholder audiences; and
- The development of new methods for evaluating complex programs in STEM, including the use of mathematical models, qualitative or multidisciplinary methods, and measurement techniques.

B. RESEARCH ON LEARNING AND EDUCATION (ROLE)

Advances in many related fields have transformed research on learning and education in recent years. These advances have contributed to an emerging, multidisciplinary science of learning that bears directly on the educational and research goals of the National Science Foundation (NSF). New opportunities promise to advance educational research and practice, and to improve the level, quality, and accessibility of STEM education.

The ROLE program supports strategically important research studies that advance progress toward the four EHR goals appearing in the Introduction. The ROLE program seeks to understand how to produce significant improvements in STEM learning through a comprehensive approach that contributes to research frontiers in both human learning and in the educational environments and systems that are structured to support STEM teaching and learning. It also seeks to increase the capacity and breadth of the research communities contributing to these frontiers.

The ROLE program supports research across a four-quadrant continuum that includes:

1. The biological basis of human learning;
2. Behavioral, cognitive, affective, and social aspects of human learning;
3. STEM learning in educational settings; and
4. Changing educational systems to improve STEM learning.

The purpose of this framework is to help enable the researcher to effectively integrate research on learning into an educational context and to build and strengthen cross-disciplinary communities of research. Each of these quadrants or emphasis areas comprises broad research topics with their own distinct characteristics and historical foundations. The ROLE program aims to advance the knowledge base within and across the intersections of these multidisciplinary areas. It encourages projects that reconcile basic research and educational practice, and that generate hypotheses from one disciplinary area that can be tested and refined in another. These bridging features, connecting research and practice, and connecting disciplinary traditions and approaches, are distinctive characteristics of the ROLE program. NSF's other directorates may participate in the review of proposals to the ROLE program, as appropriate according to proposal

content. Explicit connections between quadrants, though, while encouraged, are not prerequisites for successful proposals. ROLE seeks a solid balance of both "within-quadrant" and "across-quadrant" research in its portfolio.

1. The Biological Basis of Human Learning

The effort to understand the relationships among learning, intelligence, and the human brain is one of the most fundamental and profound journeys of basic science. Converging lines of research have begun to reveal how learning affects the brain's structure, activity, and organization, from infant development through adulthood. Fundamental aspects of visual and spatial cognition, language, and mathematics are beginning to be understood in terms of neural processes and biological context. Discoveries in these and other areas are influencing our understanding of behavior, cognition, and the nature of human learning.

ROLE will support studies focused on human learning drawing on a wide range of theoretical approaches and empirical techniques, including but not limited to biological neural networks, computational neuroscience, cognitive neuroscience, functional imaging, neuroplasticity, and adaptive systems. An important aspect of these activities is to build capacity in neuroscience related to complex human learning and education, and to identify trajectories by which multidisciplinary research anchored in the biological basis of human learning can inform educational practice. Therefore, submissions in this emphasis area will necessarily demonstrate credible potential connections between their specific proposed activities and current research issues in education as part of the scientific justification for seeking ROLE support.

2. Fundamental Research on Behavioral, Cognitive, Affective, and Social Aspects of Human Learning

The goal of this quadrant or concentration area is to enhance the multidisciplinary understanding of the foundations of human learning. NSF seeks proposals that formulate compelling and innovative bridges from cognitive science either to biological basis of human learning (Quadrant I) or to research on learning in educational settings (Quadrant III). ROLE strongly encourages multidiscipline, institutional, and researcher and educator collaborations. A sample of areas of interest includes:

- Modeling of cognitive processes and mapping of models to brain function in the context of human learning;
- Sociological, ethnographic, anthropological, economic, and organizational studies that address the special characteristics of educational environments; and
- Understanding the cognitive and pedagogical implications of new scientific and technological advances.

3. Research on STEM Learning in Educational Settings

Many educational approaches, curriculum materials, assessments, and technological tools have been developed to mediate the learning process without the benefit of a strong research foundation. In some instances, this is because the appropriate research does not exist. In other cases, this is because of insufficient exchange of information and knowledge between research, development and implementation communities.

A principal expectation for research related to this quadrant is to provide a stronger evidentiary base to support sustained improvement in STEM educational practice both in formal classroom settings and in informal learning sites (including the home). Additionally, ROLE seeks proposals that promise to build a stronger research base in adult workplace STEM learning and in other educational settings, such as e-learning or distributed environments.) All submissions should identify critical, practice-derived research questions and should provide a means for interacting significantly and in partnership with STEM educational practitioners. ROLE seeks significant national progress in the integration of research and practice.

ROLE seeks proposals that integrate research on STEM learning with areas of educational practice associated with programs in the EHR Divisions and especially welcomes research proposals that include collaborations with projects funded under such programs. *Through an initiative jointly sponsored by the Division of Graduate Education (DGE) and REC, proposals on STEM graduate education are encouraged in the June 2004 ROLE competition (see xxxxxx for more information).*

A catalog of current EHR programs and abstracts of funded awards appears at http://www.ehr.nsf.gov/award.asp.

4. Research On Changing Educational Systems To Improve STEM Learning

Few organizational studies have addressed the phenomena that drive successful transformation of educational systems into entities that optimize student learning. The development of theoretical frameworks, analytical tools, and deeper empirical understanding of these phenomena is essential to the advancement of educational policies and large-scale strategies to improve STEM learning.

The term "educational systems" refers to traditional entities (e.g. pre-K-12 school systems, post-secondary organizations and authorities), and to broader views of educational stakeholders, including research scientists, and policy makers, and the ways in which stakeholders interact.

ROLE welcomes proposals that study existing large-scale educational system change efforts that maintain the goal of significant improvement in STEM learning. Such studies may include uncovering the mechanisms for the transfer of research findings in to innovation-based curriculum reform, the use of significant system tools or strategies to stimulate increased STEM learning by all students throughout a system, the adoption of experimental STEM learning technology prototypes into scaled and sustained educational practice, or the conditions for widespread increases of the participation of learners in scientific research. Eligible research includes generalizable studies that involve testable hypotheses, studies that challenge current system reform strategies, and other research methods such as quasi-experiments, longitudinal data, and national and international comparisons.

Studies of large systems are also supported by other NSF programs. Prospective applicants for Quadrant IV research are encouraged to consider related opportunities for research in several programs previously referenced. The Math and Science Partnership (MSP) offers support in research, evaluation and technical assistance (RETA) related to the K-12 partnership reform model that undergirds MSP and that contributes to the MSP Learning Network. The IERI program offers support for research on the process of bringing K-12 science, mathematics and reading interventions that have a solid base of supporting evidence in pilot contexts to scale in large and more diverse contexts. IERI supports two phases of investigation. ROLE's Quadrant IV interest significantly intersects both MSP-RETA and IERI, but differs in that these two programs focus on either a single intervention that a proposal will identify for IERI, or on partnerships and related activities that MSP supports.

A sample of research areas that are appropriate for ROLE consideration of potential interest includes:

- Studies of reform strategies, including predictive modeling, frameworks for system change, and evaluations of costs and effectiveness;
- Innovation flow and organizational mechanisms conducive to policy changes and sustained, coherent improvements in practice;
- Interactions among accountability reforms, curricular reforms, textbook adoptions, technologies, teacher professional development opportunities, revised graduation requirements, schedules, and other reforms; and
- Modeling of large educational systems and their evolution in terms of multilevel adaptive systems, with possible theoretical parallels to issues and research in the first three quadrants.

C. *COMMON THEMES AND ISSUES FOR THE EREC and ROLE PROGRAMS*

Methodology

Proposals should reflect relevant advances in quantitative, qualitative, and mixed-methods research and evaluation methodologies and provide a compelling argument about how the methodologies proposed are appropriately matched with strategic research and evaluation questions. All proposals should demonstrate how the methods chosen will result in rigorous, cumulative, reproducible, and usable findings.

Technology

EREC and ROLE seek proposals that advance our understanding of how a broad range of technology can enhance learning

or help create more effective and efficient educational systems. ROLE recognizes that in order to study the effects of emerging and existing technology, developmental efforts are necessary. However, the development activities must be subordinate to the research on the efficacy of those technologies.

Knowledge Transfer

EREC and ROLE seek to accelerate the integration of high-quality research and evaluation findings into STEM educational practice and into the knowledge base. Proposals should discuss how the work will contribute to productive public or scholarly debate. As appropriate, proposals should describe mechanisms to effectively and efficiently transfer findings into educational practice. Requests for the preparation of critical literature reviews, workshops to develop new research networks and collaborations, and other forums to communicate results among appropriate constituencies are encouraged. In addition, proposals that focus on the potential utility of research and evaluation findings and their transfer into practice or use by other researchers and policymakers are encouraged.

Human Capacity Development

EREC and ROLE seek proposals that help to stimulate quality preparation of the STEM educational researchers and evaluators. Such projects may address the needs of undergraduate and graduate students and/or early- and mid-career researchers or evaluators, especially those who wish to transition from other science and engineering disciplines or those who wish to expand upon existing skills and knowledge. Proposers interested in undergraduate and graduate education should examine opportunities available through the Research Experiences for Undergraduates (REU) program and the Integrative Graduate Education Research Traineeship (IGERT) program. *In addition, non-academic institutions are strongly encouraged to develop collaborative arrangements with academic institutions for the purpose of human resource development as appropriate to the goals of the proposed project.*

Organizational Capacity Development

As appropriate to the goals of the project, EREC and ROLE seek proposals that establish and/or build on existing collaborative arrangements among graduate-degree granting institutions, two- and four-year predominantly undergraduate institutions, Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and Tribal Colleges.

High-Risk Research and Evaluation

EREC and ROLE welcome innovative and groundbreaking proposals that address critical issues in STEM learning and educational research and evaluation, particularly in areas where the knowledge base is underdeveloped (see section V.A).

D. *RESOURCES FOR APPLICANTS*

REC maintains a website that provides selected resources for prospective applicants such as a collection of successful ROLE and EREC proposals and other materials.

http://www.ehr.nsf.gov/rec/

Useful References:

Bransford, J., Brown, A. & Cocking, R. (1999). How People Learn. Washington DC: National Academy Press.

Kilpatrick, J., J. Swafford and B. Findell (Eds.) (2001) Adding It Up: Helping Children Learn Mathematics. Washington DC: National Academy Press.

Patton, M. (1986) Utilization-Focused Evaluation. Newbury Park: Sage. (Note: useful discussion of the definitions of evaluation and evaluation research).

Pellegrino, J. , N. Chudowsky and R. Glaser (2001). Knowing What Students Know: The Science and Design of Educational Assessment. Washington DC: National Academy Press.

President's Committee of Advisors for Science and Technology (PCAST) (1997). Report to the President on the Use of Technology to Strengthen K-12 Education in the United States. Washington DC: Office of Science and Technology Policy, Executive Office of the President.

President's Information Technology Advisory Committee (PITAC) (2001). Using Information Technology to Transform the Way We Learn. Washington DC: Office of Science and Technology Policy, Executive Office of the President.

Shavelson, R. and L. Towne (Eds) (2002). Scientific Inquiry in Education. Washington DC: National Academy Press.

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 Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 15 to 30 (5-10 for the EREC annual competition, 5-10 for each ROLE competition
- **Anticipated Funding Amount:** Pending the availability of funds, $4 million for EREC; $6 million for each of the two ROLE competitions.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

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.

Special Notice on Small Grants For Exploratory Research (SGER)

Proposers interested in submitting projects for up to $100,000 and whose goals are either organizing meetings or workshops, increasing the research capacity in the field, or exploring high-risk, high-gain ideas, may submit proposals under this Announcement. REC will also consider unsolicited proposals for Small Grants for Exploratory Research (SGER). Details for

SGER grant proposals, which may be submitted at any time, appear in the *Grant Proposal Guide.* Individuals interested in submitting a SGER proposal should discuss their ideas with a ROLE Program Officer prior to submission.

Proposers are reminded to identify the program announcement/solicitation number (03-542) 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:

EREC projects may receive up to 3 years of funding generally not to exceed $1.25 million in total award size. Depending on the availability of funding, between 5 and 10 proposals may be selected for support of each funding cycle. REC will consider planning, workshop and exploratory research grants up to $100,000 each. No predetermined allocation for funding applies across the priority areas of this solicitation.

ROLE projects may receive up to 3 years of funding generally not to exceed $1.8 million in total award size. Depending on the availability of funding, between 10 and 20 proposals may be selected for support of each funding cycle. REC will consider planning, workshop and exploratory research grants up to $100,000 each. No predetermined allocation for funding applies across the priority areas of this solicitation.

C. Due Dates

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

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

May 15, 2003
EREC proposals -- Future Dates: May 15 annually

June 01, 2003
ROLE proposals -- Future Dates: June 1 annually

December 10, 2003
ROLE proposals -- Future Dates: December 10 annually

If the deadline falls on a weekend or holiday, the proposal is due by 5 p.m. proposer's local time on the first business day thereafter.

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 Ad Hoc and/or 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.

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:

EREC Program

- James Dietz, Associate Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5156, fax: (703) 292-9046, email: jdietz@nsf.gov

- Gabriel Della-Piana, Program Director, Directorate for Education & Human Resources, Division of Research,

Evaluation & Communication, 855 S, telephone: (703) 292-5141, fax: (703) 292-9046, email: gdellapi@nsf.gov

- Elmima C. Johnson, Senior Staff Associate, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5137, fax: (703) 292-9046, email: ejohnso@nsf.gov

- Conrad G. Katzenmeyer, Senior Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5150, fax: (703) 292-9046, email: ckatzenm@nsf.gov

- Larry E. Suter, Statistician Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5144, fax: (703) 292-9046, email: lsuter@nsf.gov

ROLE Program

- James Dietz, Associate Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5156, fax: (703) 292-9046, email: jdietz@nsf.gov

- Janice M. Earle, Senior Program Director, Directorate for Education & Human Resources, Division of Elementary, Secondary, & Informal Education, 885 S, telephone: (703) 292-5097, fax: (703) 292-9044, email: jearle@nsf.gov

- Walter Ermler, Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5161, fax: (703) 292-9046, email: wermler@nsf.gov

- Finbarr C. Sloane, Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5146, fax: (703) 292-9046, email: fsloane@nsf.gov

- Gregg Solomon, Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-8333, fax: (703) 292-9046, email: gesolomo@nsf.gov

- Larry E. Suter, Statistician Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5144, fax: (703) 292-9046, email: lsuter@nsf.gov

- Elizabeth VanderPutten, Program Director, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5147, fax: (703) 292-9046, email: evanderp@nsf.gov

For questions related to the use of FastLane, contact:

- DeMonica L. Parks, Program Specialist, Directorate for Education & Human Resources, Division of Research, Evaluation & Communication, 855 S, telephone: (703) 292-5167, fax: (703) 292-9046, email: dparks@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

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.

The following programs may be of particular interest to EREC and ROLE proposers:

- Advanced Technological Education (ATE)
- Course, Curriculum, and Laboratory Improvement (CCLI)
- Information Technology Research (ITR)
- Integrative Graduate Education and Research Traineeship (IGERT)
- Interagency Education Research Initiative Program (IERI)
- Research Experiences for Undergraduates (REU)
- Teacher Professional Continuum (TPC)

See http://www.nsf.gov for the most recent program solicitations for these programs.

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.