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ELEMENTARY, SECONDARY, AND INFORMAL EDUCATION

Program Announcement and Guidelines

Informal Science Education
Preliminary, No Later Than—*March 1;* **Full—***June 1*
Preliminary, No Later Than—*August 1;* **Full—***November 15*

Instructional Materials Development
Preliminary, No Later Than—*May 1;* **Full—***August 15*

Teacher Enhancement
Preliminary, No Later Than—*April 1;* **Full—***August 25*

Presidential Awards for Excellence in Mathematics and Science Teaching
Applications Due—*February 27*

Advanced Technological Education
Preliminary—*April 15;* **Full—***October 15*

NATIONAL SCIENCE FOUNDATION
Directorate for Education and Human Resources

INQUIRIES

Inquiries regarding NSF activities for pre-kindergarten through grade 12 education that are not addressed in this publication may be directed to:

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Requests for limited numbers of copies of **ESIE publications**, the NSF ***Grant Proposal Guide*** **(NSF 99-2)**, and the NSF ***Guide to Programs*** can be obtained directly by **Telephone:** (703) 306-1620 or can be read and downloaded from the **World Wide Web:** http://www.nsf.gov.

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Program Area	Telephone No.
Informal Science Education (ISE)	(703) 306-1616
Instructional Materials Development (IMD) **Advanced Technological Education (ATE)** **Teacher Enhancement (TE)**	(703) 306-1620
Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST)	(703) 306-0422

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PREFACE

EDUCATION MISSION OF THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) has a mandate to ensure the vitality of science and technology in the United States. Recognizing the important link between research and education in these fields, the NSF enabling legislation explicitly gives it responsibility for the quality and effectiveness of the Nation's underlying human resource base. Stimulating quality education in science, mathematics, engineering, and technology is vitally important to ensure economic success in a global economy that is characterized by increasing technological sophistication. The Foundation has a cohesive and comprehensive set of education and human resources activities addressing every level of education, including early career development.

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES

Programs within the Directorate for Education and Human Resources (EHR) promote student, teacher, and faculty development, as well as improved public science literacy through the support of projects that operate on national, regional, and local levels.

The Directorate's five major long-term goals center on the delivery of quality science, mathematics, and technology (SMT) education to ***all*** students. These goals are to ensure that:

- high-quality SMT education is available to every child in the United States, enabling all who have interest and talent to pursue scientific and technical careers at any level and supporting scientific literacy of all citizens;

- educational pipelines carrying students to careers in science, mathematics, engineering, and technology yield sufficient numbers of well qualified individuals to meet the demands of the technical workplace;

- those who select careers in science or engineering disciplines have high-quality educational opportunities available to them;
- interested non-specialists have opportunities to broaden their scientific and technical knowledge; and,

- the larger public has opportunities to develop an understanding of scientific and technological developments and processes.

While all NSF research directorates support SMT education activities, EHR assumes primary responsibility for the Foundation's education mission, especially in elementary, secondary, and lower-division undergraduate levels, as well as public science literacy. The above-mentioned goals provide the focus for the activities of EHR organizational units:

Division of Elementary, Secondary, and Informal Education (ESIE).....(703) 306-1620

Division of Undergraduate Education (DUE).....(703) 306-1670

Division of Graduate Education (DGE).....(703) 306-1630

Division of Educational System Reform (ESR).....(703) 306-1690

Division of Human Resource Development (HRD).....(703) 306-1640

Division of Research, Evaluation, and Communications (REC).....(703) 306-1650

Office of Experimental Program To Stimulate Competitive Research (EPSCoR).....(703) 306-1683

This Program Announcement covers all programs within the Division of Elementary, Secondary, and Informal Education (ESIE) and replaces the previous *Program Announcement and Guidelines* (NSF98-4). Brief supplements may be issued to announce relevant changes or additions, and special solicitations may be issued for new, developing initiatives.

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

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or telephone:	(301) 947-2722
To Locate NSF Employees:	(703) 306-1234

INTRODUCTION

DIVISION OF ELEMENTARY, SECONDARY, AND INFORMAL EDUCATION

Goals. Programs of the Division of Elementary, Secondary, and Informal Education (ESIE) support projects designed to enable ***all*** students, pre-Kindergarten through grade 12 (preK-12), to succeed in science, mathematics, and technology (SMT) and to increase the scientific and technological literacy of students and adults of all ages. Its programs provide the educational foundation for future generations of scientists, engineers, and technologists; for those pursuing post-secondary education in other disciplines; and for those who enter the workforce directly from secondary school. ESIE programs promote the achievement, competency, and literacy considered essential to inform citizens about the SMT issues that impact their lives, as well as promote effective advocacy for high-quality education in these fields.

Objectives. To provide leadership and to promote development of the infrastructure and resources needed to improve SMT education throughout the United States, ESIE programs:

- Strengthen skills of the teacher workforce by:
  - — expanding and deepening the understanding of content, pedagogy, and educational technologies,
  - — heightening awareness and deepening understanding of the diverse experiences and needs of students,
  - — grounding continued professional development in the context of the school structure and organization, and,
  - — developing a cadre of teachers and administrators who can effectively lead reform in these fields.
- Develop alternative models of instructional materials aligned with standards for content, teaching, and assessment that:
  - — enhance the knowledge, thinking skills, and problem-solving abilities of all students;
  - — incorporate the recent advances in disciplinary content, research on teaching and learning, and educational technologies; and,
  - — can be implemented broadly and in diverse settings.
- Promote transitions between secondary school and the workplace, as well as transitions within the workplace, through the development of exemplary materials, varied instructional environments, and other activities.
- Provide stimulating opportunities outside school to:
  - — increase understanding of, and participation in, SMT disciplines by individuals of all ages, interests, and backgrounds, informing them of its impact in their daily lives and aiding them in making responsible decisions about science policy issues;
  - — establish linkages with formal education to improve education in all learning environments; and,
  - — stimulate parents and others to become informed proponents for quality and universally available education in these fields and enable them to support their children's science and mathematics endeavors.
- Capitalize on educational technologies and electronic networking in the development of all materials and instructional strategies in a manner that ensures accessibility to a quality education for all students.

To achieve these objectives, ESIE supports the development of high-quality course and curriculum materials for all students through its **Instructional Materials Development (IMD) Program;** strengthens teachers' content knowledge and pedagogical skills and creates an infrastructure of professional educators, educational researchers, and administrators to support SMT education reform through its **Teacher Enhancement (TE) Program;** provides research experiences for students and their teachers under a special component of the TE Program; creates a nationwide network of teacher leaders recognized for career achievement under the **Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program;** provides stimulating opportunities outside of school to promote appreciation, interest, and understanding of science, mathematics, and technology for youth and adults through its **Informal Science Education (ISE) Program**; and strengthens the SMT preparation of students who will enter the advanced technological workforce through its **Advanced Technological Education (ATE)[1] Program.**

[1] The ATE Program is co-managed by the Division of Elementary, Secondary, and Informal Education and the Division of Undergraduate Education.

EMERGING AREAS

In addition to the established programs in ESIE, the National Science Foundation seeks to support a small number of higher risk projects that develop and test new paradigms. It is expected that these will primarily be pilot or proof-of-concept studies. Projects should be related to one or more of the division's programs and have the potential for significantly impacting TE, IMD or ISE by developing materials or designing professional development in such areas as:

- Supporting the teaching of emerging areas of study (e.g., computational science, systems science, life in earth's extreme environments)

- Using technology in innovative ways for the delivery of teacher enhancement, with particular attention to improved teacher knowledge of content and pedagogy, cost effectiveness, and sustainability.

- Furthering the implementation of new and innovative formal or informal teaching methods based on current research in teaching and learning.

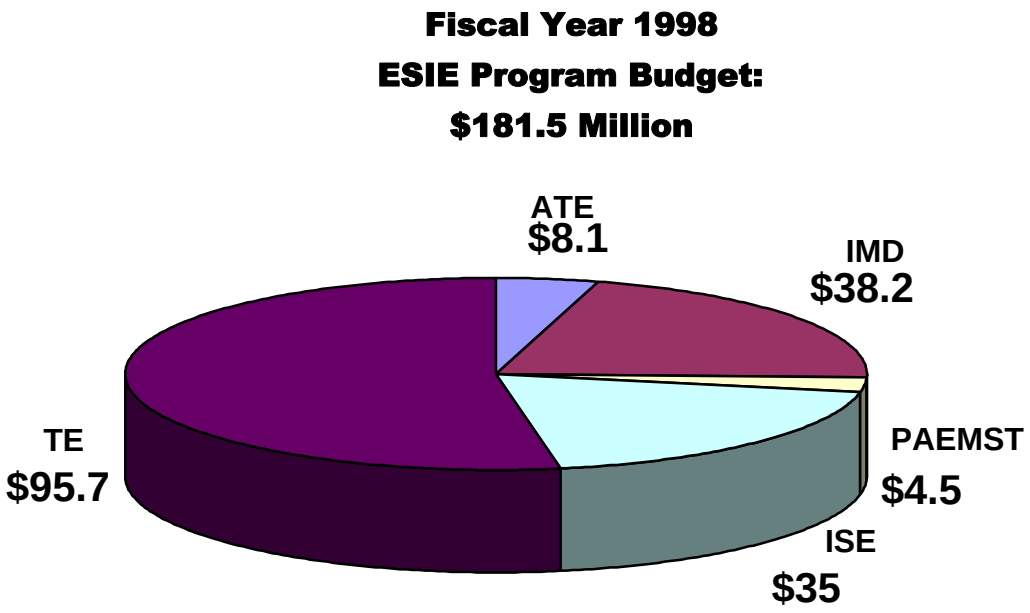
A proposal must delineate carefully the aspects of the project that make it innovative, cite relevant and related work, define expected outcomes in comparison with traditional approaches, and describe the potential for national impact. Given the nature of these projects, they must include a comprehensive evaluation with an appropriate experimental design that investigates the effects of the intervention on teachers' content knowledge, teachers' instructional decision making and classroom practice, and/or learning by students or the public.

PIs who anticipate submitting such a proposal should submit a preliminary proposal early to allow for detailed comments, but no later than the preliminary proposal date for the most appropriate program.

FY 1998 PROPOSAL SUBMISSION and AWARD STATISTICS

PROGRAM	FULL PROPOSALS RECEIVED	NO. OF AWARDS	FUNDING RATE	AWARD RANGE (thousands)	DURATION (years)
Informal Science Education	131	53	.41	$ 25 - 3,000	1 - 5
Instructional Materials Development	152	39	.26	$ 10 - 2,794	1 - 4
Teacher Enhancement (TE)	271	74	.27	$ 19 - 5,999	1 - 5
Presidential Awards for Excellence in Mathematics and Science Teaching *	648	216	.33	$ 7.5	3
Advanced Technological Education	127	42	.33	$ 50 - 3,000	1-3

* Number of proposals includes only those pre-selected by States and territories for the national competition.



SPECIAL ATTENTION TO MATHEMATICS

Approximately ten years ago, the publication of the Principles and Standards for School Mathematics from the National Council of Teachers of Mathematics (NCTM) provided a special opportunity for the mathematics education and mathematics research communities to thoughtfully examine many of the facets surrounding the teaching and learning of mathematics in grades K-12. That examination directly led to the development of the NSF-supported comprehensive elementary, middle, and high school instructional materials in mathematics.

Now, with the advent of the revised NCTM Principles and Standards for School Mathematics, the general availability of the NSF-supported comprehensive instructional materials, experience with the classroom implementation of exemplary materials through the special NSF initiatives for Local Systemic Change through Teacher Enhancement, and the recently released studies and findings from the Third International Mathematics and Science Study (TIMSS), there is again a time "of special opportunity" for reflection and action in the *arena* of K-12 mathematics. The Division of Elementary, Secondary and Informal Education, therefore, especially invites thoughtful proposals that address the following:

- Development of exemplary, supplemental materials for K-12 mathematics that will assist schools and districts as they make transitions to exemplary, comprehensive materials.
- Establishment of special sites that can assist schools and districts in selecting and implementing comprehensive instructional materials in mathematics.
- Building and development of national capacity for leadership in mathematics and the delivery of professional development to K-12 teachers.
- Alignment of professional development with curricular implementation through Local Systemic Change projects, with special attention to the middle grades. Projects may target middle school teachers of mathematics only, or middle school teachers with mathematics teachers of other grades (e.g., middle and high school teachers of mathematics, or all K-12 teachers of mathematics).
- Partnerships that promote greater focus on K-12 mathematics through informal education.
- Professional development materials that disseminate findings about exemplary practice or evoke creative approaches to the teaching of mathematics for all students.

SPECIAL ATTENTION TO PARENT INVOLVEMENT

Parents, including individuals serving as parent surrogates (e.g., other relatives, foster parents, and day-care providers), play a critical role in ensuring their children's interest and achievement in science, mathematics, and technology. Well-informed parents have many opportunities to teach their children, reinforce their curiosity, and provide encouragement and support for learning. In addition, parents are instrumental in supporting local education resources of a quality education system that meets the needs of all children.

Through the Informal Science Education Program, ESIE funds projects that are designed primarily to reach parents. More important, however, is the inclusion of parenting components within the more comprehensive IMD, TE, and ISE projects. For instance, where appropriate, projects to develop instructional materials should include materials to help parents understand those materials and their place in the curriculum. Teacher enhancement projects might include strategies and materials that will help teachers understand how to engage parents productively in the learning process. There could be materials and mechanisms in informal science learning projects to engage parents and to enable them to continue the informal science learning after a museum or media experience.

The ultimate goal of these projects and parenting components of projects are to: (a) stimulate parents to become informed, active proponents for high quality and more universally available science, mathematics, and technology education in both school and informal settings; and (b) to provide strategies, materials, and resources that assist parents in supporting their children's science, mathematics, and technology education in both formal and informal settings.

EXECUTIVE SUMMARY OF PROGRAMS

INSTRUCTIONAL MATERIALS DEVELOPMENT

Instructional Materials Development (IMD) projects create instructional materials and student assessments that change classroom instruction in grades preK-12, enabling students to acquire a sophisticated understanding of mathematics, science, and technology. These materials incorporate investigative, hands-on science, mathematics, and technology (SMT) education activities and align with recently developed standards for content, teaching, and assessment. IMD-supported materials promote the success of ***all*** students, regardless of background or ability, and promote positive student attitudes toward science, mathematics, and technology. Projects range from the major revision of existing materials to the creation of entirely new ones; from a few modules at a single instructional level to comprehensive curricula for several school years; from a focus on a single topic to the integration of several SMT disciplines; and from assessments embedded in classroom materials to the creation of assessment items and full assessment programs that can be used by districts and states. All projects include comprehensive plans for national dissemination and implementation to ensure the use of the materials in numerous and diverse settings. In cooperation with the Teacher Enhancement (TE) Program, IMD will support implementation sites to assist districts in the selection and implementation of curricula and the development of assessment tools.

INFORMAL SCIENCE EDUCATION

Informal Science Education (ISE) activities provide rich and stimulating opportunities outside formal school settings, where individuals of all ages, interests, and backgrounds increase their appreciation and understanding of science, mathematics, engineering, and technology. ISE projects take place in diverse environments (e.g., museums of all types, community centers, and the home) and involve the use of various media (e.g., broadcast, film, interactive technology, print, and exhibits). Projects typically are designed to reach large audiences or to have the potential for significant national or regional impact. To broaden its impact, ISE promotes collaborations among organizations that have similar goals, especially when such projects bridge the informal and formal education communities. Through collaborations, partners combine their resources and expertise to develop effective strategies for reaching target audiences.

TEACHER ENHANCEMENT

Teacher Enhancement (TE) projects provide professional development opportunities to broaden and deepen the disciplinary and pedagogical knowledge of teachers, improving their ability to deliver rich and challenging education in science, mathematics, and technology (SMT) education to **all** students. Through active involvement of administrators, projects encourage school organizations and cultures that provide requisite resources and support to implement classroom improvements through sustained professional development. TE supports projects that: 1) develop the capacity of schools and teachers to implement a high-quality, standards-based SMT program for all students; 2) develop leaders in content, pedagogy, and professional development; 3) engage teachers and students in meaningful research experiences that can be translated back to classrooms; 4) create professional development materials; and 5) provide cost-effective access to quality SMT resources and in-service training to implement innovative applications of educational technologies. Emphasis is placed on projects that focus on the professional development of teachers as the primary driver for implementing SMT education reform in entire school districts. In cooperation with IMD, TE will support implementation sites to assist districts in selecting and implementing exemplary instructional materials.

PRESIDENTIAL AWARDS FOR EXCELLENCE IN MATHEMATICS and SCIENCE TEACHING

The NSF administers the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program on behalf of the White House. PAEMST rewards career excellence for teachers at both elementary and secondary grade levels. Awards are made in each state and four jurisdictions: Washington, DC; Puerto Rico; the Department of Defense Dependent Schools (DoDDS); and US Territories (American Samoa, Guam, the Commonwealth of the Northern Marianas, and the Virgin Islands) taken as a group. Teachers submit applications to state or jurisdiction selection committees, which, in turn, select three candidates from each of the four disciplinary/grade-level award groups. These state finalists are then forwarded to a national selection committee, comprised of prominent scientists, mathematicians, educators, and past awardees. The national committee recommends four national finalists (one from each of the four disciplinary/grade-level categories) from each state and eligible jurisdiction. PAEMST teachers constitute a national network of outstanding leaders in science and mathematics education and are a rich resource for the improvement of science and mathematics education

throughout the Nation. (See 1999 PAEMST Application Packet)

ADVANCED TECHNOLOGICAL EDUCATION

Ensuring internationally competitive manufacturing, protection of the environment, and effective development and use of new technologies requires technicians who are well-educated in science, mathematics and engineering. This program promotes the exemplary education of technicians at the two-year college level and quality preparation at the secondary level. Projects require partnerships of two-year colleges with four-year colleges and universities, secondary schools, business, industry, and government. The program supports instructional materials development, professional development for faculty and teachers, technical experiences for students and teachers, and instrumentation and laboratory improvement. The ATE Program features a few national and regional centers that combine all these aspects, as well as projects that concentrate on one or more aspects. The program also accepts proposals for activities that lead to better understanding of issues surrounding advanced technological education. ATE is jointly managed by ESIE and the Division of Undergraduate Education (DUE).

GUIDELINES FOR PROPOSAL DEVELOPMENT

PRELIMINARY PROPOSAL REQUIREMENT

All programs in ESIE (except Presidential Awards for Excellence in Mathematics and Science Teaching) require submission of a preliminary proposal. Preliminary proposals give NSF staff the opportunity to comment on a proposal's responsiveness to program goals and priorities and its potential to compete successfully with other proposals in the merit review process. See the Preliminary Proposal section on page 41 for the general and program-specific submission requirements. Preliminary proposals must be postmarked on or before their listed target dates for a resulting full proposal to be eligible for submission to the next competition. **PI's should submit preliminary proposals as early as possible prior to the cut off date to ensure adequate time to consider staff reviews.**

PROPOSAL SUBMISSION

Requirements for proposal submission in response to these *Guidelines* are detailed in the section *"Preparation and Submission of Proposals."* Unless otherwise specified in this publication, proposals should follow requirements set forth in the ***Grant Proposal Guide (GPG)*** **(NSF 99-2).** Single copies of the ***GPG*** are available at no cost from the Forms and Publications Unit, via electronic mail at pubs@nsf.gov, or can be read and downloaded from the World Wide Web at http://www.nsf.gov.

PROPOSAL SUBMISSION DATES*

Program	Preliminary Proposal no later than	Full Proposal
Informal Science Education	**March 1** **August 1**	**June 1** **November 15**
Instructional Materials Development, including Assessment and Implementation and Dissemination	**May 1**	**August 15**
Teacher Enhancement	**April 1**	**August 25**
Advanced Technological Education	**April 15**	**October 15**

*****Proposals must be postmarked on or before these dates. If a date falls on a weekend or legal holiday, the following workday will be the effective date.

ELIGIBILITY

A PI may submit only one full proposal to each program per closing date. Requests for exceptions must be made directly to the program. PI's may, however, submit multiple preliminary proposals to an individual program.

Eligible Fields and Disciplines: Proposals may be submitted for projects in any field of science, mathematics, engineering, and technology typically supported by NSF. Projects involving fundamental concepts within technical, professional, or pre-professional programs are eligible. Multi-disciplinary and interdisciplinary proposals are encouraged.

NSF does not support projects that address clinical fields such as medicine, nursing, clinical psychology, and physical education, and those that primarily involve social work, home economics, business, the arts, and the humanities. Innovative projects that link scientific and technical study

with the humanities are permissible. For further information, please consult the ***GPG (NSF 99-2)***.

Eligible Institutions and Departments: Organizations with a scientific or educational mission are eligible to submit proposals. These include: colleges and universities, state and local education agencies, school districts, professional societies, museums, research laboratories, media producers, private foundations, private industry, publishers, and other public and private organizations whether for profit or not-for-profit. Proposers are strongly encouraged to involve participation from other sectors. See program descriptions for specific requirements.

COORDINATION WITH NSF SYSTEMIC INITIATIVES

To the extent possible, the EHR Directorate seeks coordination of program activities in the field to ensure that projects reinforce and complement each other whenever possible. Of particular interest is coordination of projects with large-scale systemic reform efforts, including, Local Systemic Change (LSC) projects [TE Program, ESIE]; Statewide Systemic Initiatives (SSI), Urban Systemic Programs which includes the Urban Systemic Initiatives (USI), and the Comprehensive Partnerships for Mathematics and Science Achievement (CPMSA). Rural Systemic Initiatives (RSI) [Division of Educational System Reform (ESR)]; and Collaboratives for Excellence in Teacher Preparation (CETP) [Division of Undergraduate Education (DUE)]. Prior to proposal submission, prospective PI's must consult with PI's of relevant systemic projects if they intend to operate in the same geographic area. Proposals should ensure that this contact has been made and describe the character of anticipated interaction between the projects. If applicants feel that interaction with systemic projects is not appropriate, they must provide an explanation to that effect in their proposal. (A list of systemic initiatives is provided on page 63 of the Appendix.)

INFORMAL SCIENCE EDUCATION PROGRAM

Target Dates for Proposals
Preliminary, No Later Than--*March 1;* **Full--***June 1*
Preliminary, No Later Than--*August 1;* **Full--***November 15*

Telephone: 703-306-1616

GOALS AND OBJECTIVES

Informal Science Education (ISE) supports projects in which learning is voluntary and self-directed, life-long, and motivated mainly by intrinsic interests, curiosity, exploration, manipulation, fantasy, task completion, and social interaction. Informal learning can be linear or non-linear and often is self-paced and visual- or object-oriented. It provides an experiential base and motivation for further activity and learning. The outcomes of an informal learning experience in science**,** mathematics, and technology (SMT) include a better understanding of concepts, topics, processes, and thinking in scientific and technical disciplines, as well as increased knowledge about career opportunities in these fields.

In order to produce significant positive changes, the ISE Program pursues the following goals:

- to increase the number of youth, particularly underrepresented (e.g., minorities, girls, the physically disabled) and underserved (e.g., rural communities), who are excited about SMT and who pursue such activities both in and out of school;

- to promote linkages between informal and formal education resulting in improved and creative SMT education in all learning environments;

- to stimulate parents and other adults to become effective proponents for better quality and more universally available SMT education in both formal and informal settings and to encourage them in the support of their children's (SMT) endeavors in the home and elsewhere;

- to bring informal science education programs and activities to relatively large areas currently without, or minimally reached by, such opportunities, e.g., rural areas and inner-city environments; and,

- to enrich the quality of life by improving the scientific and technological literacy of children and adults so they are informed about the implications of SMT in their everyday lives; are motivated to pursue further experiences in these areas; and are aided in making informed, responsible decisions about related policy issues having societal implications.

The ISE Program especially encourages projects that are creative and innovative informal learning activities and reflect and apply recent research in SMT education; contribute to strengthening the infrastructure of informal science education through such activities as electronic networking, technical assistance, and professional development; and conduct research on the informal education process to determine the effectiveness of innovative techniques for motivating and informing the public about topics in SMT. Community based programs may want to incorporate new material into existing programs so as to increase the science, mathematics, and technology interests and literacy of their audiences.

PROJECT CHARACTERISTICS

ISE projects provide rich and stimulating opportunities outside formal classroom settings where individuals of all ages, interests, and backgrounds can increase their appreciation and understanding of science, mathematics, and their applications. Supported projects include, but are not limited to: television series and programs for youth or for the general public; films on SMT topics; exhibits or educational programs at science and natural history museums, science-technology centers, aquaria, nature centers, botanical gardens, arboreta, zoological parks, and libraries; and educational programs and activities at community and youth centers.

Most ISE projects are designed to reach large audiences and to have a significant regional or national impact. The program encourages development of projects that address critical needs for informal science education in less populated regions of the country. When appropriate, projects are expected to use the relevant science and mathematics standards to help guide the content of the activities and to promote linkages with formal education. All projects are expected to disseminate effective designs or materials in order to maximize their impact. All ISE projects should also include plans for rigorous evaluation, based on comprehensive quantitative and qualitative information, in order to document program impact and demonstrate potential for dissemination and replication. *ISE does not support local*

projects that reach relatively few people, nor does it support general operating expenses or capital development costs.

NEW DIRECTIONS

In FY 1999, the Program encourages the field to strengthen its many current positive approaches to informal education for the American public. There also is the opportunity to challenge the field to expand the scope of informal science education activities in order to have greater impact in areas of particular need. Specifically, the ISE Program hopes that the informal science education institutions will become more significant players in the total science and mathematics education endeavor for the nation's youth, to establish new relationships with major research efforts, and to explore new means to inform the public about science and mathematics education. Beginning in FY 1999, the ISE Program encourages projects in the following areas:

- Where informal science education institutions establish or have in place long-term, formal agreements with schools in their service area to serve as a resource center for those schools, the ISE Program will support aspects of that endeavor that are unique to informal education. For instance, the Program will support development and testing of materials and educational programs that are complementary to the informal education endeavors and directly fit the curriculum and teacher education needs of the schools. These materials and programs also should be designed and used to inform the general public and, in particular, parents about the curricula and educational reform practices in the schools. The funds for on-going implementation, operation, and delivery of these services to the schools need to be provided by the schools, the informal education institution, or raised from other sources.

- Projects that link with major national and international science research efforts in order to inform the public about the purposes, progress and findings to date, and implications of the research. Proposed projects should be designed to reach significant segments of the American public and, because of the on-going nature of the research, should be designed so they can be updated periodically to incorporate new findings or to report progress in the research endeavor.

- Coordinated, wide-reaching efforts that identify key elements of the NCTM Prinicples and Standards for School Mathematics that are particularly appropriate for presentation in the informal education arena and develop means to inform the public of these aspects of the standards. For instance, a relatively small public exhibit might be developed that explains one or more important areas of the standards and engages the public in mathematics activities. If the project were inexpensive to replicate and could be simultaneously implemented at sites across the nation accompanied by a coordinated national and local promotion campaign, such a project could be a cost-effective means of informing parents and the public about the mathematics reform effort.

- Innovative and creative informal education projects that develop new approaches and/or delve into new science content areas would have the potential to open new opportunities for the informal science education field. The potential of such high risk projects to reach new audiences or to develop new strategies to engage the public in science should be significant but, because of the untested approach being proposed, the applicant may have limited documentation or data on the effectiveness of the approach toward reaching the science leaning goals. Such projects must include strong evaluation and dissemination plans.

AREAS OF SPECIAL INTEREST

ISE will place special emphasis in the following areas:

- ***Collaborations Linking Informal and Formal Education Communities*:** Successful collaborations, through the effective combination of diverse resources and expertise, can promote creativity and significantly broaden the impact of a project. ISE encourages development of collaborative projects that bring together individuals and organizations from the formal and informal education communities. Such collaborations include, but are not limited to those: 1) among organizations with informal education missions; 2) between organizations with formal and informal education missions; and, 3) among organizations in a common geographic area with similar goals and interests.

- ***Increasing Opportunities for Underrepresented Groups:*** Informal science education plays an important role in motivating the interest and participation of groups traditionally underrepresented in SMT and in increasing their access to quality materials. ISE encourages development of projects across a variety of performers (e.g., community-based organizations, museums, media) that will develop and implement new and innovative strategies to increase participation of minorities, girls/women, and youth from economically disadvantaged areas (e.g., inner cities, rural communities) in these disciplines.

- ***Increasing Involvement of Parents in SMT*:** Parents can be effective proponents for science and mathematics education reform and play a critical role in promoting the success of their children in SMT through encouragement and understanding of their children's activities at home, in school, and in informal learning settings. ISE encourages development of projects that integrate components for improving parent understanding of, and attitudes toward, science, mathematics, and technology, as well as those that increase awareness of new approaches to teaching and assessing performance in these disciplines. Materials for parents should teach them effective ways to support their children's work in science and mathematics and actively involve them in inquiry-based, experiential activities that demonstrate the importance of these disciplines to everyday life.

OTHER CONSIDERATIONS

Cost-sharing. Expectations for cost-sharing depend on the scope and nature of the project. In most media projects, NSF may contribute up to one third of the total project cost. For museum and community/youth-based projects, NSF generally supports up to two-thirds of total project cost. The listed cost-share amount is integral both to the review and award decision for the proposal and becomes a condition of any resulting award. The proposed cost sharing must be shown on line M on the proposal budget (NSF Form 1030). The amount of cost sharing must be shown in the proposal in enough detail to allow NSF to determine its impact on the proposed project. Documentation of availablility of cost sharing must be included in the proposal. Only items which would be allowable under the applicable cost principles, if charged to the project, may be included as the grantee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in-kind (see OMB Circular A-110, Section 23.) It should be noted that contributions counted as cost-sharing toward projects of another Federal agency may not be counted towards meeting the specific cost-sharing requirements of the NSF grant. All cost-sharing amounts are subject to audit. Failure to provide the level of cost-sharing reflected in the approved grant budget may result in termination of the NSF grant, disallowance of grant costs and/or refund of grant funds to NSF.

Evaluation: Competitive proposals submitted to the ISE Program will have a well-developed beginning-to-end evaluation plan. When appropriate, ISE projects will include three stages of evaluation commensurate with the nature and scope of the proposed project: front-end, formative, and summative. Applicants are reminded to provide adequate time at the end of a project to conduct summative evaluation. The proposal narrative should clearly detail the evaluation goals, methodologies, and indicate the individual or individuals responsible for conducting evaluations. The budget should clearly reflect the evaluation costs including the external evaluation and/or the in-house staff effort that will be given for evaluation work. There must be a letter of commitment from any external evaluator and this should include a summary of the planned work. It should be clear what the external evaluator is responsible for and to whom the evaluator reports.

PROPOSAL REQUIREMENTS

Preliminary Proposals. A preliminary proposal that describes the project is required for submission of a full proposal. Requirements for preliminary proposal submissions are included in *"Preparation and Submission of Proposals,"* page 41.

Full Proposals. General information on submission of full proposals (including planning grants, conference grants, and Small Grants for Exploratory Research (SGER)) is contained in the *Guidelines* section, *"Preparation and Submission of Proposals," page 41*. For the ISE Program, the narrative should include results from prior NSF support, a project overview, goals and objectives, general project description, qualifications to conduct the project, anticipated results, as well as evaluation and dissemination plans. Substantive information essential to understanding the details of complex projects should be placed in supporting appendices with explicit reference in the narrative. Using the example of a television series, the narrative would outline the scope of the series, briefly describing the programs (outlines, treatments, or scripts would be included in an appendix); provide a general description of evaluation plans (detailed plans would be in an appendix); and describe major elements of outreach plans (detailed plans would be in an appendix). A copy of any ancillary material submitted, such as videocassettes, should be included with each copy of the proposal. While NSF does not require reviewers to read appendices, ISE reviewers are asked to read any materials explicitly referenced in the proposal narrative.

Information about **Planning Grants, Conference Grants,** and **Small Grants for Exploratory Research** can be found in "Special Categories of Full Proposals," page 46.

ISE Supplements for Public Understanding of Research. *ISE will fund as many as 30 supplements of up to $50,000 to NSF research directorate grants.* These supplements are intended to inform the general public about the content, process, and relevance of state-of-the-art research. Interested PI's with active research grants should contact their Program Officer in the research directorate for information about the requirements for these supplements and procedures for applying. Additional information can be found in the special guidelines for the supplements ***(NSF 97-70.)***

INSTRUCTIONAL MATERIALS DEVELOPMENT PROGRAM

Target Dates for Proposals
Preliminary, No Later *Than*--*May 1;* **Full--***August 15*

Telephone: 703-306-1620

GOALS AND OBJECTIVES

The Instructional Materials Development (IMD) program supports the development of instructional materials and assessment tools to improve science, mathematics, and technology (SMT) education for all students at all levels (pre-Kindergarten through grade 12). Projects range from the substantial revision of proven materials to the creation of entirely new ones; from the development of a single module for one grade level to the development of comprehensive curricula for several school years; from addressing a single topic to the integration of several disciplines; and, from the development of assessments embedded in instructional materials to the creation of items and assessment programs for use by districts and states. While IMD projects focus on the development of student materials, they also include related instructional guides for teachers, educational leaders, and parents to promote the adoption and implementation of the instructional materials. Materials designed primarily for the education of practicing teachers are supported by the Teacher Enhancement Program.

The IMD Program supports projects that are national in scope and significance and that produce materials appropriate for use by all teachers and students. A broader cross section of students may pursue SMT education if the materials use real-world contexts and provide an understanding of the workplace. The IMD Program also supports innovative, high-risk projects that develop and test prototypes of instructional materials and learning technologies that apply the most current research on teaching and learning. Proposals for such high-risk projects must demonstrate promise for advancing the state-of-the-art in curriculum development and for testing the limits of instructional materials in promoting student understanding of SMT.

The **goal** of the IMD Program is the development of high-quality instructional materials to enhance the SMT knowledge, and the thinking skills and problem solving abilities of ***all*** students, regardless of background, ability, or future educational plans. They should promote students' positive attitudes toward SMT and positive perceptions of themselves as learners.

PROJECT CHARACTERISTICS

The IMD Program expects that proposed materials will exhibit a coherent content framework that is aligned with national standards; fosters inquiry, includes critical thinking, problem solving, decision making, and communication at increasing levels of complexity; and focuses at each grade level on a few appropriate and challenging topics that are informed by practicing scientists, mathematicians, engineers, and SMT educators. Projects also should be grounded in the most recent advances in teaching and learning and further the understanding of the connections between science, mathematics, and technology. Incorporation of instructional technologies should be considered when they provide learning experiences that enhance student understanding and application of key disciplinary concepts. Strategies for assuring equity should be part of the development and implementation process. In addition, when appropriate, instructional materials development projects should include products designed to help parents understand the materials and their place in the curriculum. It is important that projects include methodologies and instruments to assess the impact of the instructional materials on students. Accompanying materials should provide the supports needed for teachers to implement the exemplary practices embedded in the instructional materials and assure that assessment is regularly and appropriately conducted.

The project evaluation should document changes in student learning; improvements in the performance and the participation in SMT of female and minority students; and modifications in instructional approaches effected by the new instructional materials. This data should be useful to schools in making informed decisions about new adoptions.

AREAS OF SPECIAL INTEREST

The IMD Program will place special emphasis in the following areas:

- **Development of comprehensive science curricula at the middle and high school levels.** The IMD Program particularly encourages proposals for comprehensive projects at the middle or high school level that develop

discipline-based courses in earth science, chemistry, physical science and life science particularly for the middle school or that develop materials for a thematic approach that integrates content across science disciplines and that connects science with other disciplines (e.g., mathematics), particularly at the early high school level.

- **Early Childhood Education (ages 3-5).** The IMD Program is interested in supporting several prototypes that develop and test innovative instructional materials that provide science, mathematics, and technology curricula for young children.

- **Extended student inquiry.** The IMD Program will support leading scientists and SMT educators in developing standards-based modules for student research activities that are age-appropriate and rich in disciplinary content. Such materials, for example, may involve students in global research projects that include gathering, manipulating, and communicating data from natural phenomena or may involve students in long-term, in-depth investigations within the classroom.

- **History and nature of science, mathematics, and technology (HNSMT).** IMD will support projects that include the development of student understanding of the history and nature of science, mathematics, and technology within the context of basic instruction in those areas.

- **Technology education.** The IMD Program will support projects that address technological literacy or school-to-career issues related to technical fields.

PROPOSAL REQUIREMENTS

Preliminary Proposals. A preliminary proposal to the IMD Program is required for submission of a full proposal. Requirements for preliminary proposal submission are included in *"Preparation and Submission of Proposals"*, page 41.

Full Proposals. For information on requirements for proposal submission, see section, *"Preparation and Submission of Proposals,"* page 43. Major sections of the proposal are as follows. The project description should present the following information that determines whether or not a grant will be awarded:

- ***Results of prior NSF support*--**a section describing the results of prior NSF support for educational projects in which senior personnel have been involved. For projects that have developed materials that relate to the proposed work, the proposal must include a summary of the project evaluation that provides compelling evidence of the quality and effectiveness of the materials developed.

- ***Need/content area*--**a clear and concise description of the relevant issues to be addressed that relate to instructional materials within the broader context of elementary, middle, and/or secondary education. This section should provide evidence that the proposed materials fill a need of students, teachers, and schools throughout the nation better than materials currently available to schools. The proposal should reference relevant literature to show knowledge of disciplinary and pedagogical issues. The proposer should describe how the instructional materials build on, and relate to, previous and on-going efforts in the field. (A search of the Eisenhower National Clearinghouse (ENC) database is highly recommended. It can be found at: http://watt.enc.org/nsf.html)

- ***Goals and objectives*--**a description of project goals and objectives.

- ***Anticipated products*--**a description of the materials to be produced (e.g., workbooks, textbooks, software, videos, CD-ROMs, scholarly publications, monographs).

- ***Content and pedagogical strategies*—-**the major part of the proposal that describes the content and pedagogical strategies embedded in the materials and their alignment with national and state standards. This section describes how the proposed instructional materials will build on the student's prior knowledge and will prepare and motivate him/her to continue study in SMT at higher grade levels. Relevant experts should be able to judge the suitability of the materials for the intended audience in the academic setting described. The proposal should describe the specific learning activities to be developed, including experiments, student projects, course work, and assessment materials.

- ***Developmental process*--**the process to be used for writing, content review, pilot tests, field tests, formative and summative evaluation, and production of final materials, including a work plan and timeline. This section should describe the specific learning activities, including experiments, student projects, course work, assessment materials, new modes of instruction, and required resources (e.g., computer expertise) at the school level to implement them. If the materials are to be modules or supplemental in nature, they must target particular areas of study; clearly identify SMT research questions to be addressed; utilize appropriate scientific, computational, and educational technologies and demonstrate the connections to comprehensive curricula. They also must include appropriate professional development materials for teachers. Specific examples of materials should be included in an appendix. Materials must be pilot tested with master

teachers with evaluation results reflected in revisions. Field tests must include a broad range of teachers serving students with backgrounds representative of the nation's diversity. The results of field tests, presented in a format that can be used for marketing materials, must be submitted to NSF for review.

- ***Personnel*--**the expertise and experience of the Principal Investigators, key personnel, collaborating scientists, science educators, and classroom teachers who will be contributing to the development and review of the materials.

- ***Potential impact and significance*--**justification for the impact and significance of the proposed products, including an explanation of why those products will be of interest and useful to a nationwide community of educators. The proposal should delineate the expected impact on student learning, especially the learning of groups that are underrepresented (e.g., women, minorities, persons with disabilities) and underserved (e.g., rural, inner city). The proposal should identify mechanisms for ensuring market penetration of the products. The IMD Program will assess the project with respect to its anticipated long-term impact on SMT education.

- ***Assessment*--**the proposal should describe the tools and strategies for student assessment that will be included with the instructional materials. Ideally, there should be a variety of assessment materials that teachers can use to plan instruction and to assess the impact on students' achievement.

- ***Evaluation*--**a description of the evaluation plan, including the key questions, data collection and analysis framework, and assessment tools. The proposal should include criteria for evaluating the quality and impact of the project (e.g., assessment of student learning, results of pilot and field-testing) and procedures for collecting and analyzing quantitative and qualitative information. Evaluators, with some independence from the project, should have assisted in developing the plan. The proposal should provide evidence of the qualifications of the individuals who are part of the overall evaluation team.

- ***Dissemination*--**a description of plans to disseminate project results and products to other professionals in SMT education communities, during and after the project. All instructional materials projects must be commercially published and distributed. Proposals should present a timeline for securing a publisher within the first two years of development. Projects must have contracted with a publisher by the third year of the grant. Dissemination plans that include potential sales income should describe the disposition of that income in the proposal.

Budget. For IMD projects, NSF expects the majority of project costs to support personnel time and personnel-related costs; modest requests to support acquisition of materials, supplies, equipment, and computing services are allowable. Equipment costs must be matched by non-federal funds greater than the funds requested from NSF. Performers are expected to have the computing facilities, most of the equipment, and physical environment to achieve project goals. The IMD Program will not fund purchase of classroom equipment necessary to implement instructional materials.

Cost-sharing. The level of cost-sharing depends upon the scope and nature of the project. Commitments may be in the form of funds, equipment, personnel time, etc., and may be provided from the submitting institutions and schools/school districts where the materials are to be implemented or from other non-federal sources. The listed cost-share amount is integral both to the review and award decision for the proposal and becomes a condition of any resulting award. The proposed cost sharing must be shown on line M on the proposal budget (NSF Form 1030). The amount of cost sharing must be shwon in the proposal in enough detail to allow NSF to determine its impact on the proposed project. Documentation of availability of cost sharing must be incuded in the proposal. Only items which would be allowable under the applicable cost principles, if charged to the project, may be included as the grantee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in-kind (see OMB Circular A-110, Section 23). It should be noted that contributions counted as cost-sharing toward projects of another Federal agency may not be counted towards meeting the specific cost-sharing requirements of the NSF grant. All cost-sharing amounts are subject to audit. Failure to provide the level of cost-sharing reflected in the approved grant budget may result in termination of the NSF grant, disallowance of grant costs and/or refund of grant funds to NSF.

Final reports/materials submission. Two complete sets of materials are to be submitted to IMD along with the final report. When they become available, a final published copy must be submitted to the Eisenhower National Clearinghouse. At any time, IMD staff may request interim drafts of materials for review.

ASSESSMENT PROJECTS

Goals and Objectives. Accurate assessment of student learning is a critical component in judging the effects of education reforms. Ultimately, as a result of new instructional materials, new partnerships, and changes in teacher enhancement, students should improve their learning in mathematics, science and technology. For example, all IMD projects must now include attention to student learning outcomes as part of the development process. As new materials are incorporated into district reform strategies, it is important that the assessments be compatible with them.

Assessment projects should be national or multi-state in scope.

The NSF's IMD Program encourages the development and implementation of various levels of new directions in the assessment of student learning in mathematics and science. Projects of interest include:

- development of various tools (e.g., portfolios, item banks, performance tasks, and new technologies in the service of assessment) to assess **and guide** student learning at the classroom level;

- research on the effectiveness of various "authentic" measures such as performance tasks;

- exploration of how "authentic" assessments closely tied to the actual work done by students in classrooms can be integrated with district or state assessment programs;

- exploration of the role of assessment in improving classroom performance and student progress;

- measures for monitoring gains in student progress in mathematics and science at the classroom, district, and state level and/or across reform sites.

  [NOTE: Projects that focus on assessment as a strategy for professional development should be submitted through the TE Program.]

Funding and Duration. Project duration is expected to be from two-to-five years, with an award amount not to exceed $1.4 million annually. The maximum total request of any project may not exceed $6 million.

Information about **Conference Grants, Small Grants for Exploratory Research, and Planning Grants** can be found in "Special Categories of Full Proposals," page xx. A program officer should be contacted before any such submission.

IMPLEMENTATION AND DISSEMINATION PROJECTS

Goals and Objectives. Science and mathematics education reform requires classroom implementation of high-quality, standards-based instructional materials, together with a comprehensive program of professional development for teachers and the alignment of school district policy, practice, and resources. The IMD and TE Programs[2] (refer to page 17 for more information on Teacher Enhancement Programs) seek to establish implementation sites that will provide information and technical assistance to decision-makers who are responsible for selecting materials and ensuring their implementation in those districts that have decided to implement NSF-supported exemplary materials. These sites should increase awareness of alternatives; identify strategies for selection of materials that are appropriate for local needs; and provide the technical assistance necessary for broad-scale implementation.

Projects should be national or multi-state in scope and must provide multiple curriculum offerings. The site should be defined in terms of: 1) content areas (i.e., science, mathematics, and technology); 2) grade levels (i.e., elementary, middle, secondary); and, 3) instructional materials to be supported. Sites must have the capability of assisting schools/districts with needs assessments that enable the selection of appropriate materials. Depending on its focus, a site would provide some or all of the following:

- assistance in assessing the alignment of the instructional materials with national standards and school district, and/or state curricular frameworks;

- assistance in assessing the alignment of instructional materials across grade levels and, as appropriate, among science, mathematics, and technology;

- assistance in determining the critical local factors entering into the selection and adoption of the instructional materials;

- assistance in determining the critical factors needed to make decisions about appropriate educational technologies and student assessments to implement the new instructional materials;

- identification or development of resources that support the necessary teacher enhancement;

- planning of professional development that prepares and supports teachers in the use of the instructional materials;

- assistance with identification of and access to resources (e.g., demonstration sites, videos, simulations) for observation of teachers and students in classroom settings that model the exemplary implementation of the materials;

- strategies to identify and build the partnerships needed to support school change that enables the adoption and implementation of exemplary instructional materials; and,

[2] Note: The Teacher Enhancement (TE) Program deadlines for Prelimary Proposals and Full Proposals vary from the IMD Program deadlines. Please be sure to follow the appropriate deadlines when applying to each program in the areas of implementation and dissemination.

- enhancement of potential staff developers in the implementation of the curricular materials.

Sites are expected to provide some of the above services directly, but serve only as a clearinghouse for others. Project partners should include local and state education agencies, institutions of higher education, publishers, and/or other organizations that can demonstrate a record of educational excellence and leadership in curriculum implementation and related teacher enhancement, as well as knowledge of school district policy and practice that affects curriculum adoption and implementation. Sites are expected to obtain a significant part of their funding through cost-sharing supplied by publishers of the instructional materials, through school districts served by the site, and other appropriate organizations. Proposals should include plans for development of funding sources sufficient to sustain the project beyond the expiration of the NSF grant.

Eligible Institutions and Departments. Organizations with a science and/or mathematics education mission are eligible to submit proposals. These include: colleges and universities, state education agencies, professional societies, private foundations, private industry, publishers, and other public and private organizations whether for profit or not-for-profit. Proposers are strongly encouraged to build meaningful partnerships.

Funding and Duration. Project duration is expected to be from three-to-five years, with an award amount not to exceed $1.4 million annually. The maximum total request of any one project may not exceed $6 million. Costs of participating in site activities are generally expected to be borne by the districts or agencies served. In cases where costs are to be borne by the project, proposals must provide a rationale for the necessity of such support.

Special Review Criteria. Proposals will be reviewed in accordance with established procedures, the NSF merit review criteria described in "Review Criteria" (page 48), and the following special criteria:

- well-articulated objectives and rationale for selecting clients, instructional materials, and the range of activities to support dissemination adoption and implementation of the materials;

- potential for establishing effective working relationships with school districts that (1) are in the exploratory phase of an educational reform initiative and need information on state-of-the-art instructional practices and curriculum content, (2) need assistance in understanding differences in alternative instructional models and materials in order to design and implement their own project, (3) would benefit from mentoring by leaders of model projects, and/or (4) need advice and support as they implement their own initiative;

- potential of the partnership to provide technical assistance informed by a broad knowledge base including state-of-the-art information on curricular models and the related needs for professional development, student assessments and application of educational technologies, and research in teaching and learning;

- demonstrated awareness of alternative strategies for achieving equity and outreach directed to areas with high minority or underserved populations; and,

- well-developed plans for formative and summative evaluation, as well as project monitoring that demonstrate progress, center effectiveness, and further understanding of issues relating to local adoption and implementation of standards-based instructional materials.

PROPOSAL REQUIREMENTS

Preliminary Proposals. A preliminary proposal is required for submission of a full proposal. Requirements for preliminary proposal submission are included in *"Preparation and Submission of Proposals,"* page 41.

Full Proposals. For information on submission of full proposals, see "*Preparation and Submission of Proposals*" in these *Guidelines*, page 43.

TEACHER ENHANCEMENT PROGRAM

Target Date for Proposals
Preliminary, No Later Than--*April 1;* **Full—***August 25*

Telephone: 703-306-1613

GOALS AND OBJECTIVES

The Teacher Enhancement (TE) Program supports professional development projects to broaden and deepen the content and pedagogical knowledge of teachers of science, mathematics, and technology (SMT). Projects typically also involve administrators and others who play significant roles in promoting school organizations and cultures that enable teachers to engage all students in rich and challenging learning environments.

The TE Program encourages the following major categories of proposals: 1) local systemic change for SMT education, grades K-12; 2) educational leadership projects; 3) teacher and student development through research experiences; 4) professional development materials; and, 5) professional support for the teaching workforce. Proposals that target communities with the greatest need (e.g., geographic areas with high percentages of underrepresented and underserved populations--urban, rural, and resource-poor school districts) are especially encouraged. It should be noted that the TE Program requires that professional development is aligned with the curriculum and instructional materials used in participating schools and that the instructional materials being implemented are of high quality and aligned with national standards. **TE does not support the development of curriculum or instructional materials for students.**

GOALS

To improve the science, mathematics, and technology education program in schools, TE pursues the following goals:

- strengthen the teacher workforce by:
  - expanding and deepening understanding of content, pedagogy, curriculum, and assessment;
  - increasing understanding and use of appropriate and effective applications of educational technologies;
  - heightening awareness and deepening understanding of the diverse experiences, strengths, and needs of students;

- develop a cadre of teachers, administrators, teacher educators, and staff developers who have developed an understanding of state and national education standards and can lead reform in science and mathematics education effectively;

- develop a school culture supportive of professional development and reform in SMT;

- develop the system components necessary to support the implementation of a standards-based SMT curricular program;

- improve achievement of all students in science, mathematics and technology education; and

- integrate scientific research with SMT education.

AREAS OF SPECIAL INTEREST

- **Building the Capacity for K-12 Mathematics:** TE will support projects to develop national leaders and professional developers for K-12 mathematics, drawn from university and college faculty in mathematics or mathematics education, well-prepared supervisors of mathematics in school districts or at state levels, and well-prepared teachers with national experience.

- **Professional Development of Middle School Mathematics Teachers:** TE invites both Leadership and Local Systemic Change (LSC) projects submitted under K-8 or 7-12 guidelines, that focus on professional development aligned with implementation of exemplary instructional materials for middle school mathematics. Substantial commitments of Eisenhower, Goals 2000, Title I and/or cost-sharing from state/local funds are expected.

- **Professional Development of Secondary Science Teachers:** The TE Program also is especially interested in projects that focus on the systemic reform of secondary science.

- **Innovative High Risk Projects**: The TE Program will support a **few** projects with a potential to make substantial and sustainable gains for the improvement of SMT education. Such projects would develop and test new models that show promise of advancing the state-of-the-art in the professional development of teachers, teacher leaders, and/or professional developers. Of particular interest are projects that use technology to reach large numbers of teachers and make exemplary instructional materials available to them.

PROJECT CHARACTERISTICS

All TE projects should address well-defined needs; deliver professional development that incorporates state and national standards for content, instruction, and assessment in science and mathematics education; and recognize the critical role of teachers in promoting student competence, interest, and enthusiasm for study in these fields. The following design characteristics are considered essential for all TE projects:

- teacher education that leads to improved understanding of disciplinary content, instructional practice, and the use of assessment for enhancing student learning;
- engagement of schools, parents, and communities as proponents for the support of long-term educational improvement and continued professional development of teachers;
- commitment of key members of the school community to ensure local and state support for education, for policies necessary for education reform, and for incentives for teachers to pursue continued professional development;
- a plan to develop the organization and culture of schools necessary to support professional development and effective SMT education;
- integration of appropriate educational technologies and networking in order to increase access to high quality resources and adapt instruction to different learning styles;
- a cost-effective strategy (based on reasonable cost-per-teacher given the duration and quality of professional development) that ensures potential for replication and scale-up and that contributes to program accountability;
- a plan for sustainability; and
- an evaluation plan that includes the assessment of participants' improved disciplinary knowledge and instructional skills. Where possible, the resulting impact on classroom instruction and student achievement should be measured.

1. LOCAL SYSTEMIC CHANGE

Local systemic change (LSC) projects support school systems and their partners in reforming the delivery of science and/or mathematics education, grades K-12. Such projects are expected to initiate systemic efforts that will make significant progress in implementing recognized standards for content, teaching, and assessment.

LSC projects represent a shift in focus from professional development of individual teachers to that of all teachers within an entire school organization. Projects should result in the establishment of professional communities that empower teachers to change practice and to reflect on their own teaching and learning. In these projects, new beliefs, skills, and behaviors are learned and explored within a supportive school culture, which is engaged in renewal.

LSC Project Characteristics.

- ***Eligibility*--**School districts or coalitions of school districts in partnership with at least one organization with a scientific or educational mission may submit proposals. Among the latter are the following: colleges and universities, state and local education agencies, professional societies, research laboratories, private foundations, and other public and private organizations whether for-profit or not-for-profit.
- ***Focus*--**While projects must clearly be placed in the context of a comprehensive strategy of reform for grades K-12, they may address a component of that system. For example, LSC projects could target all K-8 teachers of science and/or mathematics or a subset (e.g., all teachers, grades K-5; all middle school mathematics and/or science teachers; all science and mathematics teachers in a particular set of schools within a large system).[1] In addition, LSC projects, for grades 6-12, could target all mathematics or science teachers at those grade levels or a subset (e.g., all mathematics teachers, grades 9-12, or all science teachers, grades 6-12 in a particular set of schools within a large system).
- ***Coverage*--** Projects for science and mathematics education, grades K-12, must include at least 100 teachers, each receiving no less than 130 hours of intensive professional development activities. (Small school districts are encouraged to form consortia with other districts and outside partners.)
- ***Duration*--**Duration of LSC projects is expected to be from three-to-five years.

[1] A site with an NSF Urban Systemic Initiative (USI) or a Rural Systemic Initiative (RSI) award is eligible to apply for an LSC project provided that it proposes large-scale professional development and instructional materials implementation integral to the overall USI or RSI reform strategy and that it is strongly endorsed by the PI of the USI project. (USI and RSI projects are not eligible to submit planning grants.)

- ***Funding Levels***--LSC projects for grades K-12 may request up to $1.2 million for each year of the project--the maximum determined by multiplying the total number of teachers reached over the course of the project by $4,500. Not all teachers need the same type of professional development, nor will all professional development require the same amount of NSF support; the allowable cost-per-teacher can therefore be an **average** across those project participants who engage in at least the required experiences of 130 hours within the duration of the grant. For example, strategies may vary by investing heavily in development of mentors or lead teachers or in providing additional resources to strengthen content background of under-prepared teachers.

- ***Budget Requirements***--NSF funds are intended to support teacher enhancement activities, not the actual costs of providing selected instructional materials for classroom use. Proposals must indicate the amount and source of funding for the following: classroom instructional materials, equipment, and supplies (none of which may be supported with NSF funds); ongoing support for teachers beyond the NSF funding period; and long-term evaluation. In situations where networking technology would help sustain professional development opportunities for teachers, equipment purchase will be considered within the allowable funding level (i.e., as determined by the product of total number of teachers and average cost-per-teacher over the course of the project) so long as other requirements are met.

- ***Cost-sharing***--Cost-sharing from school systems, state funds, the private sector, higher education, and other partners is required for all projects. Cost-sharing often equals or exceeds the amount of the request from NSF. In general, only items allowable under applicable cost principles, if charged to the project, may be included as the grantee's contribution to cost-sharing (see ***GPG (NSF 99-2)***). However, classroom materials, equipment, and supplies--the purchase of which may not be supported by NSF funds--will be allowed as cost-sharing. While other federal funds are not an acceptable source of cost-sharing under NSF reporting regulations, it is anticipated that LSC projects will leverage and complement activities supported with other federal funds, in particular Title I, Goals 2000, and/or the Eisenhower Program. Use of these funds should be described in the budget explanation, separate from the cost-sharing information. The listed cost-share amount and the use of other federal funds are integral both to the review and award decision for the proposal and become a condition of any resulting award. Documentation of actual cost-share, signed by the authorized institutional representative, must be submitted with each annual report and will affect the decision made regarding the next funding increment.

LSC Core Evaluation.[3] Local Systemic Change (LSC) Projects must participate in a standardized core evaluation that provides a framework for data collection. This set of instruments and procedures allows the Foundation to evaluate individual projects, aggregate data and information across projects, and produce a cross project analysis for reporting on the quality and impact of the LSC teacher enhancement program as a whole. The core evaluation thus ensures program accountability and provides a basis for assessing the progress upon which continued funding for individual projects depends.

The current evaluation design requires approximately 50 total days of staff time annually and includes a number of project-level evaluation activities that provide information for formative evaluation, as well as for summative purposes. These activities include project team interviews, professional development and classroom observations, and principal and teacher interviews and questionnaires. Projects are encouraged to add other evaluation components to assess special features of the projects. Data on student achievement and retention in SMT courses are particularly encouraged.

While a project may choose an evaluator with credentials and experience primarily in program evaluation, it is important that s/he also have appropriate expertise in science/mathematics and education. The LSC core evaluation requires professional development observations, and the project's lead evaluator is expected to observe at least some of these activities. It may also be desirable to have an evaluation team that includes one or two additional individuals with expertise in mathematics/science education to conduct classroom observations.

Some of the instruments being used for data collection in the core evaluation can be viewed on the web at http://www.horizon-research.com

LSC Special Proposal Review Criteria. The reform strategy employed in LSC projects should be aligned with nationally recognized content, teaching, and assessment standards for science and mathematics education, as well as with existing state frameworks, as appropriate. Successful projects must also align policy and practice. Proposals will be reviewed using the NSF review criteria, described on page 48 of this announcement, as well as the following specific criteria:

- ***Vision***--The project must be based on a shared, comprehensive vision of SMT education reform among major stakeholders ***and*** on a professional

[3] No continuing grant increments will be made for LSC projects unless the PI remains current with requirements of the core evaluation.

development strategy that is clearly articulated for grades K-12. The vision should include goals and objectives for student learning and incorporate national and state standards for curriculum, teaching practice, assessment, programs, and systems. The project must encourage changes in the educational system that are needed to support improved SMT (e.g., district-wide assessment systems, procurement, distribution, and replenishment of materials). LSC projects, whether for grades K-5 or grades 6-12, should address science and/or mathematics comprehensively by articulating a coherent vision for K-12 science, mathematics, and/or technology education.

- ***Needs Assessment*--**The proposed strategy must be based on a realistic assessment of the system's strengths and weaknesses. Such assessments should identify: teacher needs based on the current status of instruction and the chosen curriculum; staff and material resources available to support the reform effort; related activities (both NSF and others) impacting the system; and state and local policies directly influencing instruction.

- ***Curriculum Implementation*--**Participating school districts must delineate the curriculum framework for their LSC project. Instructional materials to be implemented must be aligned with science and mathematics education standards, and must have been extensively field tested and shown to be effective. The proposal must identify the instructional materials to be implemented or must submit a list of instructional materials to be considered for adoption, accompanied by criteria for selection. The selection process must be completed during the first year of the grant. If these materials are not nationally recognized, representative samples should accompany the proposal to demonstrate content accuracy and soundness of instructional practice. The professional development strategy, program support, and resource levels delineated and committed to in the proposal must be sufficient to implement the selected instructional materials throughout the school system.

- ***Strategic Plan*--**Project design must be consistent with the articulated vision for K-12 SMT education. The strategic plan should be grounded in a needs assessment of the targeted system(s) and should be based on: current research on teacher and system change; effective teacher enhancement models; the exemplary instructional materials and programs selected; appropriate student assessment; effective use of technology for students and teachers; follow-up and ongoing support for teachers; and strategies for institutionalizing the new programs and sustaining newly established partnerships, and involving parents.

- ***Cooperative Relationships*--**The project should forge partnerships among higher education, business and industry, museums, media, and other parts of the private sector that will support quality SMT education. Reasonable working relationships must be established and clearly evidenced in the proposal. The project should, whenever possible, capitalize on, and coordinate with, NSF investments in related education projects (e.g., other large-scale TE projects (current or recent past), State Systemic Initiatives, Urban Systemic Initiatives, Rural Systemic Initiatives, NSF Collaboratives for Excellence in Teacher Preparation).

2. EDUCATIONAL LEADERSHIP PROJECTS

Through leadership projects, participants can obtain a thorough background in appropriate content and pedagogical knowledge, knowledge of quality instructional materials and educational technologies, knowledge of the process of educational change, and knowledge and skills of leadership. Where appropriate, participants also receive follow-up support to implement classroom improvements and to conduct leadership, outreach, and/or staff development activities.

Categories of Projects. Opportunities will be provided to: 1) build a core of leaders who can provide professional development opportunities to those who will be staff developers and leaders of school reform on a regional basis, and prepare teachers and other educators to serve as members of teams that provide professional development for SMT teachers, and, 2) prepare teachers to serve as school or district mentors and/or change agents responsible for supporting program improvement. The two categories are:

a. Capacity Building: These projects support the development of national, state, and local leaders, as well as professional developers for K-12 SMT. Participants, drawn from university and college faculty, supervisors in school districts or at the state level, and master teachers of SMT should come to the programs with strong disciplinary expertise. Participants will be expected to engage in intensive experiences that develop the expertise and skills needed to: 1) plan and implement professional development for K-12 SMT teachers; 2) support the implementation of exemplary instructional materials in K-12 SMT; 3) provide advice and technical assistance to districts on the important components

of school-wide reform in SMT and resources needed; and 4) be effective communicators on behalf of high quality SMT education. It is anticipated that they will become part of the infrastructure for SMT education reform and will possess the necessary knowledge and skills to engage in the planning, implementation, and evaluation of professional development activities that support such education reform efforts. Projects should provide participants with opportunities to develop knowledge of advanced disciplinary content and related pedagogy, leadership development, adult learning, program development, supervision, and the process of educational change. Projects should also provide follow-up support to participants as they implement staff development activities. To adequately prepare such leaders and providers of professional development, there is particular interest in supporting projects housed at institutions of higher education that offer opportunities for graduate degree programs and internships.

b. Mentor Teachers/Teacher Leaders: These projects are intended to develop master teachers and/or intellectual leaders who have the preparation in content, pedagogy, and assessment necessary to actively support high quality SMT education. These teachers would take on the additional responsibility of acting as intellectual resources and mentors or supporting their colleagues with the implementation of high quality instructional materials. Participants should both learn and practice the skills necessary to facilitate change as they engage in SMT education improvements. In addition to teachers, leadership teams may also include building and district administrators, and other appropriate support personnel. The support requested from NSF should be commensurate with the anticipated involvement of teachers (the number of days, learning, assessment and impact) and the commitment of the school or community to participate in subsequent activities. Generally, each participant's school or district is expected to provide sufficient time and resources to enable the participant to apply the leadership knowledge and skills gained from the project to support reform of SMT education. Typical leadership projects are the equivalent of about six weeks in duration. They may involve multiple-year work through summer institutes and/or academic year programs. Projects must include adequate time for in-depth study, reflection, and guided practice and should model effective approaches to teaching and assessment.

3. TEACHER AND STUDENT DEVELOPMENT THROUGH RESEARCH EXPERIENCE PROJECTS

The integration of research and education is a powerful paradigm for SMT education. Providing teachers and students with exciting opportunities to work beside practicing scientific and technical personnel results in personal growth and the development of research activities that can be transported back to classrooms.

Categories of Projects. TE will support projects that involve teachers where research is a means of professional development and projects that involve teachers and students in research. Categories of projects include Research Experiences for Teacher Projects and Research Experiences for Teachers and Students Projects.

Research Experiences for Teachers Projects--Teachers gain insight into scientific and technological processes when given the opportunity to work beside practicing scientists, engineers, mathematicians, and technologists in a research-rich environment. These opportunities refresh and deepen the teachers' understanding of SMT concepts and scientific processes.

- **Eligibility.** Higher education institutions and advanced federal and industrial research and development (R&D) facilities may submit proposals individually and/or in collaboration.

- **Staff.** Senior staff (e.g., those with major responsibility for teacher selection, supervision of research and pedagogical activities) should be college or university faculty; active researchers in science, mathematics, engineering, and technology employed in academia, industry, or Federally Funded Research and Development Centers (FFRDCs); educators in these disciplines; or education researchers. Staffing levels must allow for substantive one-on-one or small group interactions with participants. [NOTE: Any proposals under this category that originate from federal agencies and FFRDCs may not include costs related to Civil Service Salaries for federal scientists and engineers.]

- **Recruitment.** Participants must be recruited from among teachers of science, mathematics, and/or technology at the middle- or secondary school level whose background and teaching assignments are matched with the project's research focus. Proposals must detail recruitment, selection, and placement plans, especially as they relate to involvement of women, minorities, the physically disabled and teachers from resource-poor school districts. Lack of financial resources should not prevent participation of any eligible teacher, and proposals must include a plan for providing necessary support (e.g., travel, room, and board) for those with limited resources.

- **Duration.** Projects are expected to last from three-to-five years.

- **Activities.** Participants must engage in meaningful R&D summer activities for a minimum of six weeks that are designed to broaden and deepen scientific and technological knowledge. Activities must clearly relate to well-articulated goals and objectives and include mechanisms for translating research experiences to the classroom. Proposals should clearly describe provisions for meaningful academic-year follow-up and continued dialogue among participants. There also should be a plan to assess the extent to which the research activity changes subsequent practices in the classroom and a mechanism to report the resulting data to NSF.

Research Experiences for Teachers and Students Projects --TE anticipates supporting projects, targeted at the middle and secondary levels (grades 7-12), that demonstrate a range of innovative and cost-effective approaches for engaging teachers and students in meaningful SMT research experiences. Participating teacher/student teams (generally from the same school) are expected to work in small groups with researchers and technologists in settings that range from research laboratories to field sites. Research experiences should lead to in-depth mastery of scientific and mathematical concepts and to the development of measurement and analytic skills. Teacher/student teams, working with researchers during the summer and in subsequent follow-up activities, are expected to translate the research investigations into meaningful classroom experiences. Two types of research participation projects are appropriate for funding consideration:

1) **Research Apprenticeships for Teacher/Student Teams--**Teachers and students participate directly in a research project conducted by scientists, mathematicians, and/or technologists. Apprenticeships would typically involve working at the research site for a period of at least four-to-six weeks during the summer and include follow-up activities during the school year.

2) **Research, Large-scale Data Collection, and Analysis for Teachers and Students--**Certain research projects lend themselves to large-scale data collection and/or implementation of research experiences that can be integrated into school curricula. TE will support projects that forge partnerships between practicing researchers and teacher/student participants through four-to-six week summer (or equivalent, intensive academic year) experiences and follow-up activities, with the expectation that participants transport these research activities back to whole schools or classrooms. School-based activities should include gathering, analyzing, and communicating data derived from natural phenomena, museum collections, or on-line databases. Proposals must identify the focus of study, hypotheses and issues, data collection protocols, and data analysis techniques. Projects should build a research community, bringing together teams of teachers and students to report research findings and/or use electronic communications to continue the dialogue among researcher, teacher, and students in disparate geographic locations.

Projects that involve teachers and students are expected to be three-to-five years in duration. In addition to the criteria described above, proposals should describe: 1) recruitment strategies for selection of student and teacher participants (at a ratio not to exceed 3:1); 2) selection procedures to ensure participation of high-ability and/or high-potential students in summer research activities; 3) relevance of the planned research to school curricula and demonstrated commitments by school administrators to provide resources for implementing related instructional classroom activities; 4) content of scientific ethics and career awareness sessions; 5) an evaluation strategy for demonstrating the value-added to the SMT education of teachers and students and for identifying factors that lead to the project's effectiveness; 6) how data documenting the impact of the research experience on classroom practices will be provided to NSF, 7) how effective models will be institutionalized over time by the submitting organization, and 8) plans for ensuring continuation of the project after NSF support ceases.

Cost-sharing/Co-Funding. Participating organizations are expected to provide substantial cost-sharing. Only items allowable under the applicable cost principles, if charged to the project, can be included as cost-sharing. For example, cost-sharing may take the form of participant stipends; staff release time to work with teachers as mentors during project and follow-up activities; donation of relevant materials, supplies, and equipment for implementing related classroom activities in participants' schools; and room and board for participants. For further information on cost-sharing, see section, *"Preparation and Submission of Full Proposals."*

Evaluation. Proposals should clearly describe formative and summative evaluation plans. Formative evaluation should provide a strategy for strengthening the project through continual feedback from participants, staff, and others. Summative evaluation should include data on the project's success in enhancing participants' disciplinary knowledge, instructional skills, classroom practice, and attitude toward science and technology.

Budget. Proposals may request no more than $400,000 per year. Cost-effectiveness is used as one criteria to evaluate the proposal.

Partners. Federal laboratories or facilities are expected to join NSF as full partners in co-funding the project. Both cost-sharing and co-funding commitments will be considered

in proposal review and will be a condition of any resulting award. The proposal must clearly identify the amount and source of cost-sharing and co-funding to allow NSF to determine its impact on the proposed project.

Institutionalization. NSF seeks to support development of effective models that will be institutionalized by the submitting organization over time. Plans for ensuring continuation of the project after NSF support ceases must be clearly described in the proposal.

4. PROFESSIONAL DEVELOPMENT MATERIALS

Major reform efforts in SMT education have increased the need for professional development materials that enhance teachers' understanding, adoption, and implementation of effective, standards-based instruction that uses state-of-the-art student materials, assessment strategies, and educational technologies. The TE Program therefore supports the development of curricula and training materials for pre-K-12 teachers and instructional leaders of SMT.

Projects may range from the creation of new teacher enhancement materials/curricula to the upgrading of existing ones that respond to innovations in student curricula and instruction; from the development of comprehensive teacher enhancement curricula to a few modules on focused content or instructional topics; from a focus on a single topic to the integration of several disciplines; and from supporting specific comprehensive materials to providing generic teacher enhancement for targeted SMT content and pedagogy.

Project Characteristics. Proposed professional development materials/curricula are expected to be developed by experts in the fields of science, mathematics, and technology education and should exhibit the following design characteristics:

- have the potential to be national in scope and/or significance;
- reflect national standards and state frameworks (where relevant) that guide content, instruction, and assessment;
- be grounded in the most recent advances in research in teaching and learning;
- recognize the importance of motivation and prior knowledge for developing materials that stimulate adult interest and understanding;
- incorporate educational technologies and telecommunications as vehicles for creating new, more effective teaching strategies;
- provide for pilot and field testing of teacher development materials, with personnel and in circumstances representative of the target clientele, as part of on-going project evaluation efforts and the revision process;
- include an evaluation that is based on the knowledge gain of the participants; and
- include plans for the publication and wide distribution of results and products.

5. TECHNOLOGY IN SUPPORT OF PROFESSIONAL DEVELOPMENT

To meet national standards for content, teaching, and assessment in SMT education, teachers must continue to learn throughout their careers not only by participating in formal education, but also by engaging in ongoing interactions with their peers, teacher educators, scientists, mathematicians, engineers, and technologists, the informal science community, and the private sector. Teachers need support in their efforts to build and sustain a community of colleagues with shared interests and require easy access to information resources regardless of their location. The TE Program will support a small number of projects that provide such opportunities through the use of educational technologies.

Educational technologies (e.g., electronic mail, bulletin boards, homepages, electronic conferencing) are becoming commonplace and essential to projects whose effectiveness depends on connecting participants with common interests, resources, or needs. TE seeks to support projects that find innovative ways to utilize educational technologies to provide teachers with the capabilities and support needed to go beyond the typical in-service course. Such projects should: 1) create a culture of learning where teachers can share ideas, draw freely on the expertise of their colleagues, and gain access to current information, thinking, and discussions about teaching practice and content; 2) help teachers individualize instruction through the use of modeling and other pedagogical strategies that are made available through advances in technology; and 3) extend opportunities and resources to isolated schools and teachers through telecommunications.

Of particular interest are projects that significantly reduce cost, yet increase the access to -- and the variety of -- in-service experiences available through the use of electronic networking, distance learning, and two-way video technologies. Such projects should support teachers in their continual learning and involvement in SMT while preparing them to use technology in their own instruction.

TE will support a few projects that: 1) extend electronic networking, information access, and two-way

communications to isolated communities in order to support cooperation, collegiality, and the development of a professional community of SMT educators; 2) develop and implement new technologies that provide in-service and ongoing support for the dissemination and adoption of IMD projects; and, 3) extend the model of in-service training allowing teachers to contribute to their field or adopt roles where they have a lifelong involvement in their discipline.

6. IMPLEMENTATION AND DISSEMINATION PROJECTS

The TE and IMD Programs seek to establish implementation sites that will provide information and technical assistance to decision-makers who are responsible for selecting materials and ensuring their implementation in those districts that have decided to implement NSF-supported exemplary materials. These sites should increase awareness of alternatives; identify strategies for selection of materials that are appropriate for local needs; and provide the technical assistance necessary for broad-scale implementation. Please see page 15, under the Instructional Materials Development Program, for the detailed description.

SPECIAL CONSIDERATIONS FOR THE TE PROGRAM

Budget Items Affecting Participants. The policies outlined below apply to allowable participant expenses within a project. No indirect costs may be applied against these budget categories.

- ***Participant Stipends*--**A direct stipend of up to $60 per day (for participation in formal professional development activities occurring outside of paid school time), prorated for partial days, is encouraged and allowable from NSF funds. The total stipend may exceed these amounts if supplemented from other sources.

- ***Costs for Substitute Teachers*--**The cost of hiring substitute teachers is allowable under the following conditions: 1) it is necessary to the project's administration and 2) it can be certified that the substitute teachers are directly replacing teachers participating in the NSF-funded project for the time they are working on the project. Substitute teachers are to be paid in accordance with established school district policies and in lieu of paying the teachers participating in the project. Records must be maintained by the accounting office on the hiring of substitutes and their relationship to the project.

- ***Other Support Costs*--**Tuition fees may be requested from NSF or from participating teachers only if <u>no</u> NSF funds are used to support project administration, instruction, or indirect costs. Also, if NSF funds are requested for any of the three items listed, tuition waivers may not be counted as institutional cost-sharing for the project. Indirect costs are not allowed on participant support costs.

Equipment Purchase. In general, funds should not be requested to purchase equipment. Organizations conducting instructional activities are expected to provide laboratory, computing, and other equipment for use by staff and participants. The purchase and maintenance of equipment for use by participants and their students in schools are the responsibility of state and local agencies.

Cost-Sharing. TE projects require cost-sharing (see special considerations for Local Systemic Change (LSC) and "Education through Research Experience" projects). Proposed cost-sharing is considered in evaluating proposals and will be a condition of any resulting award. Typical cost-sharing amounts for most TE projects are 20-30 percent of the NSF award amount and more than 50 percent for LSC projects. Proposals must document the total estimated amount of cost-share, including the expected contribution made from various sources.

Annual Reports. Annual reports are required for all multi-year awards. In addition to the requirements for annual reports described in the section, *Announcement and Administration of Awards"* page 49, TE annual reports must include findings from evaluation activities, a summary of the professional development activities, and the impact of the project on classroom instruction. A listing and explanation for any significant changes in the plan for the upcoming year, including any changes in the amount of PI and CoPI time devoted to the project is also required. To ensure uniform reporting, LSC projects will be provided a reporting framework; continuation of funding also depends on submission of relevant evaluation data for the mandatory standardized evaluation. Leadership projects and Teacher/Student Development projects will be expected to participate in a standardized data collection effort that requires submission of data on the program and its participants. In addition, all participants will be expected to complete a background data sheet when entering the program. PI's will receive complete instructions on all of these requirements after an award has been made.

Final Project Reports. Submission of a final report is required of all projects; see later section on *"Announcement and Administration of Awards."* As appropriate, all TE projects require submission of the following:

- a participant list complete with addresses, school affiliations, subject expertise, and levels taught (elementary, middle, high school), if such lists have not been made available to NSF during the project.

- information on summative evaluation efforts, including evaluator reports, as available. LSC projects, as part of the standardized evaluation, must report on professional development activities; teacher involvement; teacher knowledge, attitudes, and beliefs; classroom implementation; project sustainability; and support for reform.

Projects that produce professional development materials for teachers are required to submit two copies of all materials with their final report.

PROPOSAL REQUIREMENTS

Preliminary Proposals. A preliminary proposal is required for submission of a full proposal. Requirements for preliminary proposal submission are included in *"Preparation and Submission of Proposals,"* page 41.

Full Proposals. For further information, see section, "*Preparation and Submission of Proposals," page 43.* Full proposals must strictly adhere to the page limitation and formatting requirements, but appendices may be used to provide information relevant to the project. Appendix material should be referenced clearly in the proposal. Please note that reviewers are not required to read appendices. TE may request set(s) of instructional materials for panel review.

Information about **Planning Grants, Conference Grants,** and **Small Grants for Exploratory Research** can be found in "Special Categories of Full Proposals," page 46.

ADVANCED TECHNOLOGICAL EDUCATION

Target Date for Proposals
Preliminary, --*April 14;* **Full--** *October 14*

Telephone: 703-306-1620/1668

A. Overview

The Advanced Technological Education (ATE) program promotes improvement in the education of science and engineering technicians at the undergraduate and the secondary school levels; it particularly targets two-year colleges. The program is managed jointly by the Division of Undergraduate Education (DUE) and the Division of Elementary, Secondary, and Informal Education (ESIE).

It has become increasingly apparent that the quality of America's high-technology workforce depends on strong and innovative science, technology, engineering, and mathematics education at associate degree granting institutions. For this reason, *ATE focuses on two-year colleges and expects two-year colleges to have a leadership role in all projects.* Effective technological education programs should involve partnerships between two-year colleges, four-year colleges and universities, secondary schools, business, industry, and government, and should respond to industry's need for well-prepared workers having adaptable skills.

Activities in support of advanced technological education may include the adaptation of exemplary educational materials, courses, and curricula in new educational settings; the design and implementation of new materials, courses, laboratories, and curricula; the preparation and professional development of college faculty and secondary school teachers; and internships and field experiences for students, faculty, and teachers. Activities may have either a national or a regional focus, but not a purely local one, and they may aim to affect either specialized technology courses or the core science and mathematics courses that serve as prerequisites for specialized technology courses. Fields supported by ATE include, but are not limited to, agricultural technology, biotechnology, chemical technology, computer and information technology, electronics, environmental technology, geographic information systems, manufacturing and engineering technology, marine technology, multimedia technology, and telecommunications.

All projects supported by ATE must be guided by a coherent vision of technological education—a vision that recognizes the needs of the modern workplace, of students as life-long learners, and for articulation of educational programs at different levels. ATE especially encourages efforts which:

- integrate science, mathematics, and technology;
- develop innovative educational approaches in core science, mathematics, and technology courses at the secondary school and college levels, so that students with diverse needs can acquire strong backgrounds that enable them to successfully complete programs in technological fields;
- implement the national science, mathematics, technology, and industry standards in education;
- recognize current and projected occupational requirements and give prospective technicians insight into real-world work environments;
- serve the needs of not only first-time students but also returning students and workers seeking new career opportunities or new skills;
- link educators and educational programs in two-year colleges, four-year colleges and universities, secondary schools, and industry;
- aim to spur major changes and significant improvements beyond the grantee institution and to produce educational materials that can be used nationally; and
- address one or more themes that DUE or ESIE has targeted for special emphasis—i.e., teacher preparation, professional development for faculty and teachers (including workplace experiences), integration of current and emerging technologies into education, and increasing diversity within the technical workforce.

Projects involving multiple investigators and institutions must have a strong plan for project management, commensurate with the number of participants and the complexity of the project's activities.

B. Eligibility

Eligible Institutions. Proposals are invited from two-year colleges and other associate degree granting institutions, two-year college systems, consortia of two-year colleges, and other consortia (involving, for example, four-year colleges and universities, secondary schools, professional societies, and educational research and development organizations) that include two-year colleges in leadership roles. Proposals from a formal consortium should be submitted by the consortium; proposals from an informal consortium should be submitted by one member of the consortium.

Eligible Costs. ATE will support new design or development costs, as well as costs associated with adapting and implementing already developed educational materials, courses, and curricula. NSF funds may not be used to support expenditures that would normally be made in the absence of an award.

C. Program Design

ATE expects to support proposals in two tracks:

Track 1: Projects

While ATE Centers of Excellence (see Track 2 below) are expected to be comprehensive in scope, ATE Projects may focus more narrowly on one or more of the categories described in subsections a-f below. Multifaceted projects that cut across the categories below are especially encouraged.

a. NEW EMPHASIS: Adaptation and Implementation

Since the first ATE awards were made in 1994, many ATE projects have developed high-quality educational materials, novel degree programs, effective educational practices, and thriving partnerships involving education, industry, and government. These results deserve to be disseminated, adapted, and implemented to meet needs in other institutional settings. In addition, as the ATE program has matured, fruitful discussions and collaboration have taken place among projects with similar foci. The program wishes to foster continued community-building and dialogue among projects, so that effective educational strategies can achieve the broadest possible recognition and impact. Consequently, Track 1 will support proposals for the adaptation and implementation of exemplary educational materials, courses, and curricula that have been developed by other ATE projects, as well as exemplary resources developed in other programs (including those not supported by NSF) that can be adapted to technological education.

Proposals for *Adaptation and Implementation* should involve an innovative use or a significant extension of resources developed in other projects, not merely the duplication of a course, program, or pedagogy in a different location. Good proposals might include, for example:

- the adaptation and testing of exemplary materials with a student audience significantly different from the one where they were developed;
- the adaptation of materials developed for an educational program or course in one technical field to the needs of a program or course in a different technical field;
- the use of different pedagogical approaches or technologies to enhance and extend curricula;
- professional development opportunities for college faculty or secondary school teachers in support of an adapted curriculum;
- a systemic implementation of a developed program that links industries, faculty, and students; or
- a comparative evaluation of the effectiveness of an implemented course or curriculum in the new setting and in the original one.

Resources may be adapted from more than one project. Proposals should describe the materials and practices being adapted, as well as the innovations required to effect the desired improvements.

After carefully researching the existing ATE projects and Centers of Excellence in a particular area of technological education (see section D below), proposers may wish to contact the Principal Investigators of exemplary projects and centers to explore possibilities for adapting materials, establishing a new test site, or collaborating in other ways.

Awards for *Adaptation and Implementation* are normally expected to range from $50,000 to $200,000 per year for one to three years, depending on the complexity of the proposed activities and the number of proposed participants. Institutions are expected to contribute significant cost-sharing in *Adaptation and Implementation* projects, as one demonstration of both the strong institutional commitment required to conduct such projects successfully and the disproportionate return that an institution receives by utilizing resources that have already been developed and tested elsewhere.

b. Curriculum and Educational Materials Development

Supported activities should affect the learning environment, course content, and the experience of instruction. Projects often result in textbooks, laboratory experiments and manuals, software, CD-ROMs, videos, and other courseware. Such products are expected to be widely disseminated through publishers, conferences, workshops, electronic networks, journal articles, and other means. A project's focus may range from the substantial revision of existing materials to the creation of entirely new ones; from a few modules at a single educational level to a comprehensive curriculum for multiple years; and from a single subject to the integration of several disciplines.

Awards for *Curriculum and Educational Materials Development* normally range from $200,000 to $600,000 total for two to three years.

c. Teacher and Faculty Preparation and Enhancement

Secondary school teachers and college faculty play a key role in advanced technological education. It is critical that they have a sound disciplinary background, with knowledge of state-of-the-art developments and techniques in their fields; be intellectually vigorous and excited about their disciplines; employ modern teaching practices (including new instructional technologies); and regard teaching as an important and rewarding activity. They should also have opportunities to synthesize knowledge that cuts across disciplines and to interact with expert educators and practicing scientists, mathematicians, engineers, and technicians. Toward these ends, ATE promotes activities that prepare future teachers and faculty as well as activities that enhance the disciplinary capabilities, teaching skills, currency, and vitality of current teachers and faculty.

ATE seeks projects involving the development of curricula to prepare pre-service teachers and faculty for careers in technological education.

ATE seeks projects providing in-service teachers and faculty with opportunities for continued professional growth. Such projects typically include conferences, workshops, intensive seminars, industrial internships (which also fall under the *Technical Experiences* category below), or a combination of such activities. The activities typically last from a few days to several weeks and are usually conducted in the summer, with follow-up activities during the academic year. To effect long-term change, projects for teacher and faculty enhancement should normally span at least two academic years. Teacher Enhancement (TE) projects should meet the criteria of the TE program. (See pages 17-25 of these guidelines.)

Awards for *Teacher and Faculty Preparation and Enhancement* normally range from $200,000 to $500,000 total for two to three years.

d. Technical Experiences

Well-designed technical experiences in the classroom and in a work or community environment can give students, faculty, and teachers a broad, up-to-date, real-world perspective on technical fields. Such experiences typically allow participants to:

- get hands-on exposure to applications of science, mathematics, engineering, and technology and thereby gain confidence in their abilities in technical areas;
- interact closely with working scientists, engineers, mathematicians, and technicians;
- engage in the actual practice and thought processes of science, engineering, and technology—formulating problems and questions, designing appropriate models, troubleshooting, and using technological tools;
- obtain information about various careers as technicians and become aware of the academic preparation necessary for such careers; and
- become acquainted with the environments of two-year colleges and other academic institutions, businesses and industries, government laboratories, and other research organizations.

Projects providing technical experiences may consist of any combination of activities involving instruction, problem solving, research, product development, and industrial internships. Projects ideally should provide a balance of classroom, laboratory, and field experiences. While some activities may be individualized, project activities should stress group interactions that foster collaborations among peers and provide substantive feedback. Student–faculty teams are particularly encouraged to participate in technical experiences and to translate those experiences into meaningful classroom activities that introduce other students to the role of technicians in the workplace.

Proposals should describe recruitment strategies; criteria for selection of participants; the relevance of the planned experiences to curricula; commitments by schools, colleges, or industries to provide resources for implementing project activities (including follow-up); the content of any components dealing with ethics in the workplace or career awareness; and strategies for evaluating the value of the experiences in the education of students and the professional development of teachers and faculty.

Awards for *Technical Experiences* normally range from $50,000 to $300,000 total for two to three years. It is expected that industrial partners will provide major support for internships and cooperative activities.

e. Laboratory Development

Laboratory or field experiences using suitable modern equipment are crucial elements in advanced technological education, especially at the two-year college level. ATE supports the development of innovative methods for using laboratory and field exercises to improve students' understanding of basic principles and for using modern instrumentation, new technologies, or applications of instruments that extend their instructional capability. ATE also encourages the establishment of equipment-sharing arrangements through consortia or Centers of Excellence.

Equipment-only requests are appropriate, although laboratory development is often coupled with the development of new educational materials, courses, or curricula. Proposals whose primary rationale is financial need or the replacement of equipment at the same level of capability are not appropriate.

Equipment funds must be matched by non-federal dollars equal to or greater than the funds requested from NSF. The maximum allowed request to NSF for equipment for the life of a project is normally $100,000 or 10% of the total NSF funding request, whichever is larger.

f. Special Activities

ATE supports a small number of conferences, workshops, and similar activities that lead to a better understanding of issues in advanced technological education. Typically, these are short-duration events and are national in scope. (Note: Activities for teacher and faculty preparation and enhancement should not be submitted in this category.)

ATE anticipates supporting two or three *Special Activities* per year, with funding normally in the $25,000 to $100,000 range.

At least nine months in advance of the planned activity, prospective proposers should contact an ATE Program Director in DUE at (703) 306-1668 or in ESIE at (703) 306-1620, as appropriate, and discuss the preparation of a three- to five-page preliminary proposal. Following this discussion, proposers should prepare the preliminary proposal—including

a statement of the activity's objective and target audience, an outline of the activity, a description of personnel involved, and an approximate budget—and send two copies to the cognizant Program Director. NSF staff will review the preliminary proposals and selectively encourage formal proposals.

Formal proposals for Special Activities should include (1) a summary of the project's objectives, (2) a statement of the need for the activity, (3) curricula vitae of personnel organizing and leading the activity, (4) a list of prospective participants, (5) information about the probable date(s) and time frame for the project, (6) a budget detailing the requested NSF contribution as well as support available from other sources, (7) a description of products to be disseminated, and (8) a plan for evaluating the activity's impact. (Because proceedings of conferences, workshops, etc., are usually published, requests for funding may also include publication costs.)

Track 2: Centers of Excellence for Advanced Technological Education

Centers of Excellence are comprehensive national or regional resources that provide models and leadership for other projects and act as clearinghouses for educational materials and methods.

Centers may vary in size, disciplinary coverage, and the extent of the region served. They are typically cooperative efforts involving two-year colleges, four-year colleges and universities, secondary schools, industry, business, and government. Centers must clearly articulate a vision of technological education for the future, and they must design a workable plan for achieving their vision both during the period of NSF funding and afterwards. Centers typically engage in the full range of activities associated with the various types of projects described above. In particular, centers are expected to develop high-quality educational materials, course, and curricula and to provide teacher and faculty enhancement in support of these resources. Centers are also expected to disseminate their products through commercial publishers, journals, conferences, workshops, electronic networks, and other means.

Proposals for centers should be based on a three-pronged alliance of support from (1) the NSF, (2) the proposing educational institution or consortium, and (3) local businesses, industries, and government agencies and laboratories.

Proposals for centers should detail how they intend to advance ATE's mission and special emphases. In particular, the proposals should lay out significant plans for:

- curriculum development (including the improvement of core science, mathematics, and engineering courses, as well as specialized courses in various technologies);
- the evaluation of products and student learning;
- the dissemination of educational materials and practices;
- the collaboration of educational institutions with business, industry, and government (especially with regard to identifying needed technical skills, planning curricula, and establishing internships for students and faculty);
- the articulation of courses and programs between secondary schools, two-year colleges, and four-year colleges and universities;
- the preparation and professional development of secondary school teachers and college faculty (especially two-year college faculty); and
- the recruitment, retention, and placement of students, especially those from groups underrepresented in science, mathematics, engineering, and technology.

ATE anticipates making up to two new awards for centers annually, depending on the availability of funds and the quality of proposals received. Awards are made for up to $1 million per year for three to five years.

D. Information About Previous Awards

Abstracts for and other information about previous ATE awards can be found online at:

- the DUE Web site;
- the "Search Awards" feature of NSF's Web site; and
- DUE's Project Information Resource System.

See inside front cover for the URLs. Information about ATE awards is also published annually in *Advanced Technological Education: Awards and Activities* (the most recent edition is NSF 98-110).

E. Preparation and Submission of Preliminary and Full Proposals

Preliminary Proposals. Submitting a preliminary proposal is strongly recommended before submitting a full proposal. For proposals for Special Activities, see the instructions on page 41. For all other preliminary proposals, the closing date is April 14, 2000. Responses to preliminary proposals are returned within ten weeks.

Full Proposals. For full proposals related to a preliminary proposal, please take care to specify on the full proposal the proposal number that was assigned to the preliminary proposal. For further information, see section, "*Preparation and Submission of Proposals,*" page 43.

PRESIDENTIAL AWARDS FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING PROGRAM

Application Deadline
February 14, 2000

Telephone: 703-306-0042

1999 Application Packet

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program was established in 1983 by The White House and is sponsored by the National Science Foundation (NSF). The program identifies outstanding science and mathematics teachers, kindergarten through 12th grade, in each state and the four U.S. jurisdictions. These teachers will serve as models for their colleagues and will be leaders in the improvement of science and mathematics education.

Since 1983, more than 2,000 teachers have been selected to enter the network of Presidential Awardees. They represent a premier group of science and mathematics teachers who bring national and state standards to life in their classrooms. They provide the Nation with an impressive array of expertise to help improve teaching and learning while becoming more deeply involved in activities such as curriculum materials selection, research, and teaching other teachers. While most remain in the classroom, some have become school principals, supervisors, superintendents and college faculty.

Recognition is given to K–12 teachers in four award groups: (l) elementary mathematics, (2) elementary science, (3) secondary mathematics, and (4) secondary science. The secondary groups can include middle, junior, and senior high school teachers. Four Presidential Awards will be given in 1999 in each state and the four U.S. jurisdictions—*up to a total of 216 awardees.*

Applications are encouraged from teachers from all locations (urban, suburban, small town, rural) and all underrepresented minority groups (American Indians, African Americans, Hispanics, Native Alaskans, and Native Pacific Islanders).

Administered by the National Science Foundation for The White House, the PAEMST Program resides in the NSF Directorate for Education and Human Resources, Division of Elementary, Secondary, and Informal Education

Presidential Award Program Information

Eligibility

- Teachers who teach K–12 science and/or mathematics in a public or private school in a state or eligible jurisdiction.

- Teachers who anticipate a classroom teaching assignment for the following year. (Teachers on approved leave qualify if they have fulfilled the requirements in the previous year.)

- Teachers with at least five years K–12 teaching experience in science and/or mathematics prior to application.

- Teachers who are full-time employees of their school districts.

- Elementary teachers who are assigned, at least half-time during the school year, to classroom teaching, and who teach mathematics and/or science in a self-contained classroom setting or as teaching specialists.

- Secondary teachers who are assigned, at least half-time during the school year, to classroom teaching of science or mathematics.

- Past Presidential Awardees are **not** eligible.

Categories

- Science or mathematics high school teachers, grades 9–12, compete in the secondary school program.

- Teachers assigned to middle or junior high school, who teach science or mathematics 50 percent or more of the time, compete in the secondary school Presidential Awards Program in mathematics or science.

- Teachers in self-contained classrooms, K–8, who teach science or mathematics in addition to other subjects, compete in the elementary school program in either the mathematics or the science category.

- Teachers of computer science are eligible if their students receive mathematics or science credit for the classes.

Selection Process

State and jurisdiction selection committees choose three finalists from each of the four award groups for recognition at the state level. Each of the twelve state-level finalists receives the National Science Foundation State Award for Excellence in the Teaching of Mathematics and Science, which includes $750. **To ensure consistency across states, state selection committees will use the rubric in this application to score submissions.**

The eligible jurisdictions include Washington, D.C.; Puerto Rico; Department of Defense Dependent Schools; and U.S. Territories as a group—American Samoa, Guam, the Commonwealth of the Northern Marianas, and the Virgin Islands.

A national selection committee, comprised of prominent scientists, mathematicians, educators and past awardees, reviews the application packets of the state-level finalists and makes recommendations to the National Science Foundation. These recommendations are sent forward to the President.

The Award

The Presidential Award includes

(1) A $7,500 National Science Foundation grant to the award's school, **to be spent under the awardee's direction** over a three-year period, to improve school mathematics and science programs,
(2) Generous gifts to the awardees and their schools from donors, and
(3) Recognition events in Washington, D.C., which will include:

- an awards ceremony and Presidential citation,
- meetings with leaders in government and education,
- workshops to share ideas and teaching experiences, and
- receptions and banquets to honor recipients.

Application Packet Requirements

I. Evidence of Talent in Teaching
(6-page maximum; narrative text, double-spaced; no photographs should be included but reference may be made to photographs included in Section V.)

Purpose: To learn what you, the teacher, consider exemplary teaching and how you go about achieving it.

Your materials in this section should give evidence that your instruction is based on:

- your vision of exemplary science and mathematics teaching and how it conveys sound and significant mathematics and science concepts;
- written materials from a unit, module, or the identification of a theme that exemplifies your vision. State your goals and expectations for the unit, module, or theme. The materials selected should address student inquiry, problem formulation, and problem-solving. These materials may or may not be original to you**. If work is adapted, document the source(s) of the material(s);**
- discuss how you use materials and how your use of the materials reflects the students' understanding, interests, and experiences in mathematics and science.
- identify the way you are able to meet the needs of a diverse student population representing a range of ideas, skills, and experiences; and
- include ways in which your teaching practice demonstrates an innovative or inventive instructional approach.

Please demonstrate throughout this section how your teaching of mathematics or science addresses national and/or state standards.

II. Assessment of Student Learning
(6-page maximum, including student work; narrative text, double-spaced; reference may be made to photographs included in Section V.)

Purpose: To learn what you, the teacher, consider exemplary student assessment and how you go about achieving it.

Your material in the section should relate to the material in Section I and include:

- the purposes of assessment in your classroom;
- a sample of student work that illustrates how your assessment activities assess student skills, procedural knowledge, and factual knowledge as part of doing mathematics or science; and
- a discussion of (1) the relationship of the assessment to your instructional practices and materials, (2) the strengths of your assessment activities, and (3) the instructional decisions you made as a result of the assessment activity.

III. Background and Experience (2-page maximum, single-spaced résumé format)

Purpose: To show that you have a strong commitment to teaching mathematics and/or science content, an educational foundation in the methods of teaching, and experience in the classroom. To demonstrate that you have a sustained commitment to continuing education and professional development.

Please provide the following information:

A. Formal and Continuing Education Include institutions, dates, and degree(s) earned. List additional science/ mathematics course(s) beyond your undergraduate degree.

B. Teaching Experience List school(s), important teaching assignments, dates, and any other information that provides an accurate description of your teaching career.

C. Professional and Community Activities Focus on activities within the past five years such as:

- Professional, school, community and/or youth organizations or activities that illustrate your role as an advocate for education; and
- Leadership roles, publications, research and/or professional development activities you have presented.

IV. Three Letters of Support
(Please see instructions for submission on page 5 of this application.)

Purpose: To demonstrate support for the teacher from a colleague, administrator, parent, and/or student, and to provide an opportunity to highlight the candidate's abilities beyond those revealed in the application materials. **At least one of the letters must be from a current immediate supervisor or district-level administrator.**

See the sample "Instructions for Writers of Letters of Support." Request only three letters of support. Letters of support should come from mentors, colleagues, students, parents of students, supervisors/ administrators, principals, department chairs, and/or others from the educational community who can give specific evidence of your successful classroom practices.

V. Photographs of Learning Activities
(2-page maximum)
At least one page of the photographs should illustrate the unit, module, or theme in Section I and/or Section II. Photographs should **not** be integrated into the text.

All applicants to the PAEMST Program must provide the materials requested in this packet for consideration by the state and national selection committees. These materials are divided into five sections:

I. **Evidence of Talent in Teaching** *(6-page maximum; narrative text, double-spaced; no photographs should be included.)*

II. **Assessment of Student Learning** *(6-page maximum, including student work; narrative text, double-spaced)*

III. **Background and Experience** *(2-page maximum, single-spaced, résumé format)*

IV. **Three Letters of Support**

V. **Photographs of Learning Activities** *(2-pages)*

Text

- All narrative material must be word processed or typewritten. Please adhere strictly to each section's spacing requirements. Where double-spacing is required, **one and a half line spacing will not be accepted.** Application materials should be on 8½ x 11-inch plain paper (one side only, portrait orientation) with at least a half-an-inch margin around the entire sheet of paper.

Instructions for Submission

- Type size, whether word processor or typewriter, should be **12 point and no more than 14 characters per inch of text.** Width between characters should be set at normal (100%).

Photographs

- Photographs can be 8 x 10 inches or smaller, black and white or color prints. Color copies of photographs are acceptable. Photographs should be attached to 8½ x 11-inch sheets of paper (one side only). Please do not submit slides, videotapes, or newspaper clippings. Photograph captions should not exceed 30 words per photo. Please write your name, state and category on the back of each photograph.

Assessment of Student Learning

- Student work samples, whether original or reproduced and including student assessments, must conform to the 8½ x 11-inch format but need not be double-spaced.

- Please do not send models, oversized projects, scrapbooks, tapes, or software.

Letters of Support

- Three letters of support are required; at least one of which must be from a current immediate supervisor or district-level administrator. These letters must be signed and then sealed, with the writer's signature across the sealing flap.

- Please emphasize to the writers that failure to seal and sign the envelope or exceeding the one-page limit will disqualify the letter. Please submit them with your completed application.

Requirements for Application Submission

- To assure that the materials can be easily reproduced, do not place pages in a bound folder or notebook. Unbound folders and clips are fine.

- In addition to your original application, please include **five** photocopies of your complete application for your state-level reviewers.

Please follow all instructions carefully, as deviations will result in disqualification. Please remember that the selection committees read dozens of applications. Small font, narrow margins, extra pages, etc. will result in disqualification.

Anticipated Time-line for PAEMST Program

February	*March/ April*	*May/ June*	*July/ August*	*September October/ November*	*December/January February*	*June*
Applications due to State Coordinators	Applications are reviewed and three State Finalists are selected for each category	State finalists are announced and sent to National Science Foundation	National Selection Committee identifies Presidential Awardees	The National Selection Committee's recommendations are sent to White House for review and clearance	National Awardees are announced	National Awards Ceremony

Letters of Support

The PAEMST Program seeks to identify, recognize, and reward outstanding K–12 teachers of mathematics and/or science. As part of the application process, applicants are required to seek letters of support from a variety of individuals.

As a writer of a letter of support, you are asked to give evidence of the applicant's effectiveness as a classroom teacher in mathematics and science and other professional activities. It should be noted that success with low- or average-ability students is just as significant as with high-ability students.

Instructions for Writing Letters of Support

You may wish to consider the following suggestions.

If you are the current Administrator or a Supervisor:

- How has the teacher supported mathematics and/or science education reform in terms of the curriculum, new instructional strategies, specific materials, and work with other teachers, or school/district/activities?

If you are a Parent or Student:

- What did this teacher do to influence or motivate your child or you and other students?

- Why do you consider this person to be a good teacher? (Cite specific examples.)

If you are a Colleague:

- How has this teacher supported other teachers to improve mathematics or science teaching?

NOTE: For further information about the selection process at the state level for the PAEMST Program, contact your state science or state mathematics State Coordinator. Please visit our website at http://www.ehr.nsf.gov/EHR/ESIE/awards/core.htm to find your PAEMST State Coordinator.

Sample One-Page Format

Your letter is intended for use by selection committees at the state, and possibly national level. You may simply address it "PAEMST Selection Committee."

- The **maximum** length of your letter **is one page** (either single-spaced or double-spaced).

- Place your signed letter in an envelope, **seal the envelope and sign your name across the sealing flap.**

- Please **return** the sealed envelope with your letter by ___/___/___ **to the teacher who requested the letter from you** so that it can be included with the teacher's application materials.

Jefferson School
1234 Main Street
Anywhere, ST 54321

February 1, 1999

Dear PAEMST Selection Committee:

XXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXX

Sincerely,

Chris M. Kelsey
(State relationship to nominee)

Chris M. Kelsey

1999 PAEMST
Application Rubric

The following criteria will be used to evaluate your application. We have outlined the scoring rubrics for each section of the application. (*Note to applicant: This rubric has been included to illustrate how your application will be evaluated. Please do not return this section with your application packet.*)

I. Evidence of Talent in Teaching

To what degree are the following exemplars evident?

A. The teacher has a strong, coherent vision of mathematics or science teaching and presents sound and significant mathematics or science concepts.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

B. The mathematics or science content in the selected unit, module, or theme is accurate and appropriate for the designed purpose. The goals and concepts are clearly stated and developed through student inquiry, problem formulation, and problem-solving.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

C. Content is developmentally appropriate for the students' levels of understanding. Content is selected and adapted within a curriculum design to meet the interests, knowledge, understanding, abilities, and experiences of the students.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

D. There is evidence of respect for the diverse ideas, skills, and experiences of all students. The educational strategies recognize and respond to student diversity and enable all students to participate fully.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

E. There is an element of the instructional approach that is innovative or inventive and may improve teaching practice.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

II. Assessment:

To what degree are the following exemplars evident?

A. The teacher clearly articulates multiple purposes for assessment. These could include, but are not limited to, monitoring student progress, making instructional decisions, evaluating student achievement, and evaluating the mathematics or science program.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

B. The assessment tasks provide students the opportunity to demonstrate their achievement. Skills, procedural knowledge, and factual knowledge are assessed as a part of doing mathematics or science.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

C. The assessment is clearly and appropriately related to the materials and instructional practices used by students to acquire the concept(s) measured.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

III. Background and Experience:

To what degree are the following exemplars evident?

A. The teacher possesses a strong academic background in mathematics or science appropriate to the grade level taught. Participation in workshops, courses, and other educational opportunities specific to mathematics or science has occurred throughout the teacher's career.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

B. The teacher is engaged in planning, developing, and delivering activities at the building, local, or state level which affect the mathematics or science teaching strategies of his/her colleagues.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

C. The teacher is an active participant or leader in professional, school, community, or youth organizations or activities that illustrate their role as an advocate for education.

3 points	fully evident
2 points	partially evident
1 point	minimally evident
0 points	not addressed

IV. Letters of Support:

Three letters addressing the exceptional qualities of the teacher are intended to highlight or support the teacher's abilities. (One letter is required from a current immediate supervisor or district-level administrator.)

3 points	fully supportive
2 points	partially supportive
1 point	minimally supportive
0 points	not supportive

V. Photographs

At least one page of the photographs illustrates important points in the material described in Section I and /or Section II.

3 points	fully supportive
2 points	partially supportive
1 point	minimally supportive
0 points	not supportive

PAEMST Application
Teacher's Information Form

Check One[1]: ____Elementary School Science ____Elementary School Mathematics

____Secondary School Science ____Secondary School Mathematics

Check Grade(s)[2]: ___K, ___1, ___2, ___3, ___4, ___5, ___6, ___7, ___8, ___9, ___10, ___11, ___12

First Name: _____ **Middle Name(s):** _____ **Last Name:** _____

Social Security Number: ____ - ___ - _____ **Date of Birth:** ____/____/____

Home Address: _____

Home City:_____ **State:** _____ **Zip:** _____

Home Telephone: ( )_____

School Name: _____

School Address: _____

School City:_____ **State:** _____ **Zip:** _____

School Telephone: ( )_____

School Fax: ( )_____

E-mail address for Internet *(if available):*_____

Number of Years of Teaching Experience_____ **Number of Years at Current Position**_____

Describe current teaching assignment; include grade level, specialty, and weekly teaching schedule:

_____

_____

_____

[1]Elementary school teachers frequently teach both science and mathematics. However, for this program you must choose between the two subjects. Do not check both categories.

[2]A sixth–eighth grade teacher in a middle school, who teaches science or teaches mathematics 50 percent or more of the time, must enter the secondary school awards program. Teachers in self-contained classrooms, K–8, who teach science and/or mathematics, in addition to other subjects, must enter the elementary school awards program.

NSF Form 1381 (4/98, Revised)

School Data: Total Enrollment_____ Grades_____ Public_____ Private_____

School Location *(circle):* Urban, Suburban, Rural, Other
(If other, describe):_____

Indicate classroom student population percentage:

__American Indian or Alaskan Native __Asian
__Black, not of Hispanic origin __Hispanic
__White, not of Hispanic origin __Pacific Islander

Describe the demographics of your classroom (i.e., special education, gifted, ESL):

_____

Provide the following information about the principal/administrator who will receive the NSF grant that will be spent under your direction:

Name:_____ Title:_____

Institution Name: _____

Address:_____

City: _____ State: _____ Zip: _____

Provide the following information about your local superintendent or head of schools:

Name: _____ Title: _____

School District: _____

Address: _____

City: _____ State: _____ Zip: _____

Completed applications must be **postmarked by February 14, 2000,** and returned to your State Coordinator. For information on how to contact your State Coordinator, please contact your state Department of Education, call the National Science Foundation PAEMST Program at (703) 306-0422, or visit the PAEMST web site at http://www.ehr.nsf.gov/EHR/ESIE/awards/core.htm

Please make sure that your application includes all of the following in accordance with the stated formatting:

- ❑ *Evidence of Talent in Teaching;*
- ❑ *Assessment of Student Learning;*
- ❑ *Background and Experience;*
- ❑ *Three Letters of Support;*
- ❑ *Photographs; and*
- ❑ *Fully Completed Forms.*

Applications that do not meet these requirements are subject to disqualification.

PREPARATION and SUBMISSION of PROPOSALS

GENERAL INFORMATION

This section provides basic information needed to initiate planning for proposal submission. Proposals submitted in response to this program announcement should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide* (GPG), NSF 99-2. The complete text of the GPG (including electronic forms) is available electronically on the NSF Web site at: http://www.nsf.gov/. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov. Proposers are reminded to identify the program announcement number (nsf99-92) in the program announcement/solicitation block on the NSF Form 1207. *"Cover Sheet for Proposal to the National Science Foundation."* Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing. All supplementary guidance of deviations would be identified here.

Additional details are contained in the NSF ***Grant Policy Manual (GPM*) (NSF 95-26)**, available electronically through the ***World Wide Web:*** http://www.nsf.gov**,** or for purchase at $21.00 from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The **GPM** is not ordinarily needed to prepare a proposal. However, if a submitting organization has never received a NSF award, it is recommended that appropriate administrative officials become familiar with the NSF policies and procedures contained in this **GPM** as they apply to most NSF awards. Prior to receipt of an award, such institutions will be required to provide the Division of Grants and Agreements certain organizational, management, and financial information (see Chapter V of the **GPM**).

PRELIMINARY PROPOSALS

To be eligible for submission, a full proposal to any program within ESIE must either be 1) based on a preliminary proposal to that program and subsequent response letter from an NSF Program Officer or 2) a revision of a proposal declined during the current or past fiscal year. Any exception must get written prior approval from the relevant program within ESIE. [Note: Preliminary proposals are not required for conference grants, most planning grants, and Small Grants for Exploratory Research (SGER). Planning Grants to the ISE Program do require submission of a preliminary proposal.]

Preliminary proposals should be submitted as far as possible in advance of the target dates for full proposal submission, but must be postmarked no later than the preliminary proposal submission date designated for each full proposal target date (See pg. 7). Staff reviews will be returned as expeditiously as possible, but no later than one month prior to the date for submission of a full proposal.

All preliminary proposals formatting should follow the requirements specified in the **GPG,** unless otherwise noted as follows.

- **Single-spaced Pages.**
- **Top, bottom, side margins** -- No less than 2.5 cm.
- **Type size** -- Must be clear and legible with no more than 12 characters per 2.5 cm if using *constant spacing*. No more than an average of 15 characters per 2.5 cm if using *proportional spacing.*
- **Pages** - All preliminary proposals (except those to ATE) are limited to **no more than six (6) pages** of narrative, including an abstract, and not more than two (2) additional pages for the biographical sketch and 2 pages for the budget. All proposals must be of standard size, and conform to standard formatting instructions set in **GPG (NSF 99-2). NO APPENDICES** or attachments are allowed.
- **Copies** - Single side of page only. Submit two (2) copies of the proposal to the appropriate program with the exception of the ATE Program, which requires nine (9) copies.

FAILURE TO FOLLOW THE ABOVE REQUIREMENTS MAY RESULT IN THE RETURN OF THE PRELIMINARY PROPOSAL WITHOUT REVIEW AND DELAY SUBMISSION OF A PROPOSAL FOR ONE REVIEW CYCLE.

A Preliminary Proposal should contain the following.

- **A one-page letter of transmittal that is not included in the page limit.** This letter should clearly indicate the program to which the proposal is to be submitted, as well as the name and address of the PI to whom reviews should be sent. As appropriate, indicate type of project [e.g., LSC, TE Capacity Building, IMPL, ISE, ATE (whether Center or Project)], disciplinary focus and grade level(s).

- **Narrative -** The narrative should begin with an abstract no longer than 100 words that describes the content and audience for the project. The narrative should address the following topics: 1) need for the project; 2) the goals or objectives of the project; 3) the essential features of the project design or workplan describing how the project will be accomplished and the goals achieved; 4) evaluation plans (both formative evaluation to inform development of the project and summative to assess the impact of the project on the target audience); and, 5) dissemination plans.

- **Budget -** Preliminary proposals should provide an estimated budget for total cost to be requested from the Foundation with information, as appropriate, on salaries, equipment (where allowable), participant costs, consultant costs, travel, indirect costs, and cost-share from other sources, including any partners and their contribution.

- **Biographical Sketch -** Preliminary proposals should provide a brief narrative description of the expertise relevant to the proposed project of key personnel (e.g., educators, researchers, evaluators) to be involved. Those biographical sketch should be complete enough to show that the necessary expertise is available to conduct the project.

In addition to the above, some programs suggest that the following additional points be addressed in the narrative, by program:

Informal Science Education: 1) identification of the target audience(s), 2) ancillary material to be produced, 3) promotion plans, 4) plans for institutionalization of the project, and 5) linkages with formal education;

Instructional Materials Development: 1) a general description of the materials to be developed, including content and pedagogical characteristics, modules or comprehensive course; and 2) timeline for completion of deliverables;

Implementation and Dissemination: 1) timeline for completion of major deliverables; and 2) project strengths in terms of content, available resources, and partnerships;

Teacher Enhancement and Student Development: 1) the project strengths in terms of content, available resources and partnerships; and 2) the design of the professional development model; and

Advanced Technological Education: 1) aspects considered innovative and most likely to produce change on a national scale, 2) partnerships--the roles of the institutions and their alliances that will participate in the full project; 3) identification of other NSF projects with which you will be interacting and describe the nature of the interaction. 4) specific plans to increase diversity within the workforce and to increase effective dialogue among faculty, teachers, industrial participants, and others.

In addition to the guidelines above, there are some special considerations and/or differences for submitting preliminary proposals for the Advanced Technological Education (ATE) Program: 1) ATE preliminary proposal must use the NSF Cover Page (NSF 1207) signed by the Principal Investigators (no other institutional signatures are required); 2) a project data sheet (NSF 1295, page 60) must be submitted; 3) a one-page estimated yearly budget plus a one-page budget explanation that also shows cost-sharing (Form 1030 need not be used, but the budget should include the major categories from the form); and, 5) the narrative of ATE preliminary proposals are limited to no more than 6 single spaced (or 12 double spaced) pages.

Submission of Preliminary Proposals.

- **Preliminary proposals for *ISE, IMD, TE, Implementation, and Assessment*** should be mailed as early as possible, but must be postmarked no later than the date specified by the program in order to be eligible for the next full proposal submission date. Two copies should be sent directly to:

  "Program" Name--[Acronym, i.e., IMD, ISE, TE, IMPL, ASSESS]
  National Science Foundation--ESIE/EHR
  4201 Wilson Boulevard -- Room 885
  Arlington, VA 22230

- **Preliminary proposals to the ATE Program** (except as identified for workshops and other special projects) should be submitted with ten copies to:

  Allied Technology Group, Inc.
  NSF/DUE Program: ATE
  Announcement No: 99-92
  4200 Forbes Blvd. Suite 106
  Lanham, MD 20706

FULL PROPOSALS

Contents. Full proposals should contain the following information, assembled in the order indicated below. ***(Note: For recycling purposes, no colored paper should be included with the proposal.) For FastLane submissions, each PDF file should be numbered beginning with number one.***

Cover Sheet. The cover sheet (NSF Form 1207, Revised 10/98) must contain all requested information. One copy of the cover sheet must carry the original signature of the Principal Investigator (PI), all co-PIs, and the authorized organizational representative. If project funds are requested from another federal agency or another NSF program, it must be indicated in the upper-right-hand section. If such funds are requested subsequent to proposal submission, a letter should be sent to the relevant program in the ESIE Division, identifying the proposal by its NSF number.

For paper proposals, the top left box must identify the special initiative or program to which the proposal is being submitted (e.g., "LSC" for *Local Systemic Change projects*; "TE" for non-LSC Teacher Enhancement projects; "IMPL" for Implementation projects; "ASSESS" for Assessment projects; "Planning Grant" for planning grants – please include program also. For FastLane proposals, in the program announcement/solicitation field, enter the program announcement number NSF 99-92. For FastLane proposals, begin the title with the abbreviation for the specific initiative.

Project titles help direct proposals to appropriate reviewers and communicate the nature of projects supported with NSF funds to the general public and scientific community. They should include informative key words that indicate, for example, the discipline, grade level (when relevant), target audience, and the nature of the project.

Project Summary. A one-page summary, suitable for publication, should be prepared that presents a self-contained description of the activity that would result if the proposal were funded. It should be written in the third person, in the present tense, and include an indication of the need being addressed, a statement of objectives, methods to be employed, potential contribution to the advancement of knowledge, and a description of the products or outcomes resulting from the project. It should be informative to other persons working in the same or related fields and, as much as possible, understandable to a scientifically or technically literate lay reader.

Project Data. This information is primarily used to communicate potential project impact and general project characteristics, as well as to direct proposals to appropriate reviewers.

Project Narrative (including results from prior NSF support). The narrative presents most of the information that determines whether or not a grant will be awarded. It should be written to respond to criteria that will be used by reviewers in judging the merit of the proposal as described in this document.

If the prospective PI or co-PI(s) received support for related NSF activities within the past five years, a brief description of the project(s) and outcomes must be provided in sufficient detail to enable reviewers to assess the value of results achieved. Past projects should be identified by NSF award number, amount, period of support, title, summary of results, and a list of publications and formal presentations that acknowledge the NSF award (do not submit copies of the latter). Descriptions of results of relevant prior NSF support (see below) should be limited to five (5) pages and must be included as part of the page limitations listed below. PI's must have submitted a final report for any completed NSF-funded project or no new grant may be awarded. Formatting should follow requirements specified in the ***GPG,*** unless otherwise noted in the box that follows.

Also, within the project description include the **Project Data Sheet.** This information is primarily used to communicate potential project impact and general project characteristics, as well as to direct proposals to appropriate reviewers.

NSF will return proposals not conforming to these requirements.

FORMATTING REQUIREMENTS for PROJECT NARRATIVE
(Note: *Proposals not meeting these requirements will not be accepted for review and will be returned.*)

Top, bottom, side margins -- No less than 2.5 cm.
Type size – Must be clear and legible with no more than 12 characters per 2.5 cm, if using *constant spacing*. And no more than an average of 15 characters per 2.5 cm, if using *proportional spacing*.
Pages –All pages must be **single-spaced** and numbered sequentially (preferably at the bottom), be of standard size, and conform to standard formatting instructions set in ***GPG*** **(NSF 99-2).**
Maximum Number of Pages of Proposal Narrative, single side of page only – 15 (Full) 10 (planning & Conference)

***NOTE:** Narrative Page limitations include visual materials (e.g., charts, graphs, maps, photographs, and other pictorial presentations). See the "Appendices" section below, and individual Program sections for any exceptions to this limitation.

In addition to the project narrative, proposals should include the following:

Vitae. Biographical information (no more than two pages) must be provided for each person listed as senior personnel on *NSF Form 1030* (Proposal Budget); include career and academic credentials and a mailing address.

Budget (NSF Form 1030) and Budget Justification. Proposals must contain a budget for each year of requested support and a cumulative budget for full NSF support. Facsimiles of *NSF Form 1030* may be used, but at no time may substitutions or deletions in budget categories be made. The proposal may request funds under any budget category so long as the item is considered necessary to perform the proposed work and is not precluded by program guidelines or applicable cost principles. All budget requests must be documented and justified. Ordinarily, no funds are made available for equipment or facilities. Estimates of calendar months of activity must be reported for categories of key personnel. The proposed level of non-federal cost-sharing must be included on Line M. Additional information on completing the budget can be found in the ***GPG (NSF 99-2)***.

Cost-sharing. The TE and ISE Programs expect significant cost-sharing; such cost-sharing is considered in the review and ultimate award decisions on proposals. Categories acceptable for cost sharing must be eligible for NSF funding and may cover items such as personnel, materials, equipment, supplies, and computer services. Categories that are <u>not</u> acceptable include: tuition remission; general-purpose office equipment; rental of rooms; janitorial costs; and/or other similar charges at an institution receiving indirect costs. Only items allowable under the applicable cost principles, if charged to the project, may be included as the grantee's contribution to cost-sharing.

Funds from non-federal sources may be counted as cost-sharing against only one federal project. Total non-federal cost-sharing should be shown on Line M of NSF Form 1030. The level of cost-sharing that is reported on Line M of the final negotiated budget is auditable and its attainment becomes a precondition for future funding increments. Funds from federal agencies (e.g., Eisenhower Funds of the Education for Economic Security Act) should not be included in Line M of NSF Form 1030, but should be identified separately by source and amount in the budget justification. Verification of actual cost-share, signed by the authorized institutional representative, must be submitted with each annual report and will affect the decision made regarding the next increment. The grantee must maintain records of all project costs that are claimed by the grantee as cost-sharing as well as records of costs to be paid by the government. Such records are subject to audit.

Current and Pending Support (NSF Form 1239). All current and pending externally-funded support (including that from non-NSF sources) to the PI and co-PI's (if any) must be listed on the form. The proposed project and all other projects or activities requiring a portion of the time of the PI or other senior personnel should be included, even if they receive no salary support from the project. The number of person-months per year to be devoted to the projects must be stated, regardless of source of support. Similar information must be provided for all proposals already submitted or submitted concurrently to other possible sponsors, including NSF. This information is needed to ensure that key personnel have time to carry out the project and that there is no duplication of support.

Appendices. Reviewers are often asked to read and assess a substantial number of competing proposals. For this reason, the proposal description alone should provide sufficient information so that a reviewer unfamiliar with the context of the project can make an informed judgment. In some cases, it may be critical to convey more detailed information to demonstrate levels of competence or expertise, to document commitment of personnel or other resources, to demonstrate the quality of instructional materials, or to provide other

relevant information. Such material can be included in appendices that are clearly referenced by the proposal. Presentation of such materials should be thoughtful and concise. Reviewers are not generally required to read appendices. Proposals to all programs but ISE are limited to 20 single-spaced pages of appendices; any exceptions must have prior written approval. (See the ISE section for further information about appendices.)

Proposals for materials for students, teacher professional development, or parents should include examples of proposed materials, and samples of past work, if they exist. Proposals seeking to implement curriculum in *Local Systemic Change* or *Implementation and Dissemination* projects (TE and IMD Programs) must include a complete description of the materials; samples of materials should be sent directly to the program for exhibit to reviewers. Prospective PI's are encouraged to contact NSF Program Officers if they have any questions regarding submission of appendix materials.

ISE proposals that involve exhibit development, film, television, or other media should include diagrams of exhibits, program treatments/scripts, or any other materials that may assist reviewers in understanding the specific plans for the proposed project. Media proposals should also include samples of past work to demonstrate production skills of the proposers. A set of sample materials should be included with **each** copy of the proposal.

Appendices should be clearly labeled, paginated, and identified in the Table of Contents. For FastLane proposals, the appendix should be included at the back of the Project Description PDF file. Though it will be included in the number of pages that shows up on the Table of Contents, it will not count against the page limit for the project description.

Submission of Full Proposals.

Proposals may be submitted either electronically via FastLane (http://www.fastlane.nsf.gov) or by regular mail.

For mailed submissions, required materials must be postmarked no later than the program target date. For all submissions, ESIE programs require one (1) copy be sent directly to the below address so it arrives within five working days. **For FastLane submissions, no other copies should be mailed to NSF.**

Program Name [Proposal Identification, i.e., IMD, ISE, TE, ATE, IMPL, ASSESS]
National Science Foundation
ESIE/EHR
4201 Wilson Boulevard -- Room 885
Arlington, VA 22230

Proposals submitted electronically via the NSF FastLane Project, the signed proposal Cover Sheet (NSF Form 1207) should be forwarded to the following address and received by NSF within five working days of the deadline.

National Science Foundation
DIS-FastLane Cover Sheet
4201 Wilson Blvd
Arlington, VA 22230

A proposal can not be processed until the complete proposal (including signed Cover Sheet) has been received by NSF.

Include a transmittal letter identifying the preliminary proposal or declination number on which the proposal is based, the program to which it is being submitted, the title, as well as grade level and disciplinary focus.

- 14 copies **[IMD, ISE, TE, Implementation, and Assessment],** including the signed original, sent in a single package to:

  NSF Proposal Processing Unit
  ATTN: EHR/ESIE -- [Proposal Identification--see above]
  National Science Foundation
  Room P60
  4201 Wilson Boulevard
  Arlington, VA 22230

- 10 copies **[ATE]** including the signed original, sent in a single package to:

  Allied Technology Group, Inc.
  NSF/DUE/ATE
  Announcement No. 99-92
  4200 Forbes Blvd. Suite 106
  Lanham, MD 20706

The following materials must be included with all proposal submissions:

- One copy of "Supplementary Information on PI's/Project Director" *(NSF Form 1225)*. Do not include a copy of Form 1225 in the body of the proposal, since this would compromise the confidentiality of the information. While providing information requested on *NSF Form 1225* is voluntary, NSF requires submission of this form and its omission will cause delay in processing the proposal. NSF forms can be found in the ***GPG (NSF 99-2)*** and through the World Wide Web at http://www.nsf.gov.

The following requirements also must be met:

- All materials submitted to NSF must be contained in a secured package. NSF cannot be responsible for the processing of proposals damaged in transit.

- Each copy of the proposal should be on standard sized paper of regular weight. It should be stapled in the upper left hand corner **or** bound by means of glue, spirals, wire, clasps, or any other means. All narrative and appendix pages must be numbered. The duplicating process should ensure legibility for at least five years. **Only white paper should be used for ease in recycling.**

- One copy, submitted to the NSF processing unit, must be signed by the PI, all co-PIs, and the administrative official who has been designated as an Authorized Institutional Representative.

Proposals, including any ancillary material, submitted to the ESIE Division are considered the property of the NSF and are not returned.

The NSF FastLane system is available for electronic preparation and submission of a proposal through the Web at the FastLane Web site at http://www.fastlane.nsf.gov. The Sponsored Research Office (SRO or equivalent) must provide a FastLane Personal Identification Number (PIN) to each Principal Investigator (PI) to gain access to the FastLane "Proposal Preparation" application. PIs that have not submitted a proposal to NSF in the past must contact their SRO to be added to the NSF PI database. This should be done as soon as the decision to prepare a proposal is made.

Instructions for preparing and submitting a standard proposal via FastLane are located at
http://www.fastlane.nsf.gov/a1/newstan.htm

In order to use NSF FastLane to prepare and submit a proposal, the following are required:

Browser (must support multiple buttons and file upload)

- Netscape 3.0 or greater
- Microsoft Internet Explorer 4.01 or greater

PDF Reader (needed to view/print forms)
- Adobe Reader 3.0 or greater

PDF Generator (needed to create project description)
- Adobe Acrobat 3.01 or greater
- Aladdin Ghostscript 5.10 or greater

A list of registered institutions and the FastLane registration form are located on the FastLane Web page.

For paper submission of proposals, the delivery address **must clearly identify the NSF announcement or solicitation number** under which the proposal is being submitted.

SPECIAL CATEGORIES OF FULL PROPOSALS

Conferences, Symposia, and Workshops. NSF supports conferences, symposia, and workshops to assemble experts for purposes of discussing recent research or education findings and issues, exposing others to new research and education techniques, and developing action plans. Proposals must describe: 1) the rationale for selecting participants and recruiting strategies; 2) the nature of participant involvement and relevance of the conference to their normal professional activities; and, 3) the "action plan" being developed for participants and its anticipated impact. Since conference proceedings are normally published in professional journals, requests may be made for publication costs. The level of funding generally is determined by the size and nature of the conference. Conference proposals should be made at least nine months in advance of the scheduled date; one-year lead-time is preferable. (For ATE proposals see page 39.)

Proposals should include: 1) a summary (one page or less) indicating the objectives of the project and its potential for changing practice; 2) statement of need and a list of topics; 3) names and qualifications of key personnel organizing the activity; 4) a list of participants; 5) information on the location and probable date(s) of the meeting; 6) the method of announcement or invitation; and, 7) estimated total budget, detailing the requested NSF contribution and support requested or available from other sources. Note that no indirect costs may be applied to participant support costs. For further information, see ***GPG (NSF 99-2)***. These proposals may be submitted at any time and do not require prior submission of a preliminary proposal, though prior discussion with an ESIE Program Officer is encouraged. Proposals should be transmitted to NSF using the guidelines for full proposals described above.

Planning Grants. Planning grants are generally intended for groups that need additional resources to develop critical areas of a project. Such groups may include those who have been underrepresented in science or mathematics education activities (e.g. minorities, women, the physically disabled), new performers, or applicants attempting to coordinate the activities of large and complicated systems and/or develop large-scale leadership activities.

The grant proposal should specify why planning support is needed and must present a clear description of the planning activities, goals, and methods. Where appropriate, organizations should develop a vision of goals of a larger project; form necessary partnerships with stakeholders; and develop strategies for bringing outside resources and expertise into the planning process. Planning grant proposals should describe: (1) names, roles, and relevant expertise of planning team members; (2) results of any self-study or

identification of needs; (3) a list of names and roles of experts that may be used; (4) a list of resources (e.g., other projects, sites, or instructional materials) that the planning team will draw upon. There also should be a discussion of what information or products will result from the planning process and how these results will be used in follow-up activities.

Planning grant proposals may be submitted anytime during the year using the same format as a full proposal, although the project description may be less detailed. **An original, signed proposal with four copies** should be sent directly to the relevant program. Preliminary proposals for planning grants are required for submission to the ISE Program but not for other Programs in ESIE. Planning grants are subject to external review in all programs except TE.

ESIE will support planning grants under the following conditions: 1) they are small-scale or exploratory in nature; 2) the award typically does not exceed $50,000 with a maximum indirect cost rate of 10%; 3) the duration does not exceed two years; and, 4) awards are non-renewable and continued support may be requested only through submission of a full proposal. A final project report is required. Full proposals that result from planning grants require prior submission of a preliminary proposal.

Small Grants for Exploratory Research (SGER). Proposals (one copy only) for small-scale, exploratory, high-risk research in the fields normally supported by NSF in both research and education, may be submitted to appropriate individual programs. Eligible SGER activities include: 1) preliminary work on untested and novel ideas; 2) ventures into emerging research areas; 3) application of new expertise and new approaches to "established" research topics; 4) research having severe urgency with regard to availability of, or access to, data, facilities, or specialized equipment, including quick-response research on natural disasters and similar unanticipated events; or 5) efforts of similar character likely to catalyze rapid and innovative advances. It is highly recommended that a program officer be contacted before submission of a SGER proposal.

Project descriptions for SGER proposals should be two to five pages in length and include clear statements as to why the proposed research should be considered particularly exploratory and high risk, the nature and significance of potential impact on the field, and why a SGER grant is suitable for supporting the work. SGER proposals are not subject to external peer review. The budget request is not to exceed $100,000. Project duration will normally be one year, but no more than two years. Renewed funding may only be requested through submission of a non-SGER proposal, which will be subject to full merit review. Additional information about this activity is included in ***GPG (NSF 99-2)*** or can be obtained from NSF program officers. The box "Small Grant for Exploratory Research" must be checked on the NSF Form 1207.

REVIEW CRITERIA

Grants are awarded on a competitive basis using both panel and ad hoc mail review, as appropriate. Reviewers are selected from among scientists, mathematicians, engineers, technologists; teachers and other educators; and professional and institutional leaders drawn from colleges, universities, schools, research organizations, museums, public service groups, government agencies, industry, professional societies, and media organizations. Special efforts are made to secure reviews from individuals with strong records of achievement in working with special target audiences (e.g., women or minorities) or with specialized expertise (e.g., development of museum exhibits, media production). Award recommendations are made by program staff and reflect reviewer comments, expertise of the program staff, program priorities, and resource availability.

NSF evaluates proposals on the basis of two general criteria that are interpreted in light of the goals and objectives of each program. Proposers should carefully review individual program guidelines for any special review criteria. The two general NSF criteria are as follows:

- **What is the Intellectual Merit of the Proposed Activity?** How important is the proposed activity to advancing knowledge and understanding within its own field and across different fields? How well qualified is the proposer (individual or team) to conduct the project? 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, 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?

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 provde 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 learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

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. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

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Merit Review Process and Associated Customer Service Standard: Most proposals submitted to NSF are reviewed by mail review, panel review, or some combination of mail and panel review. Proposals submitted in response to this announcement will be reviewed primarily by panel review. All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Reviewers will be asked to formulate a recommendation to either support or decline each proposal. A program officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. In most cases, proposers will be contacted by the program officer after his or her recommendation to award or decline funding that has been approved by his or her supervisor, the division director. This informal notification is not a guarantee of an eventual award. NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals in this category. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used

by the program. The interval ends when the division director accepts the program officer's recommendation. In all cases, after final programmatic approval has been obtained, the recommendation then goes 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 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 an 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 Officer does so at its own risk.

In addition to the above considerations, specific criteria used in evaluating ESIE proposals are:

- **Impact.** The potential for the project to make a significant impact in addressing a major national or regional problem. Potential of the project for significantly strengthening the Nation's literacy and education in science and technology. Use of a particularly creative approach that might serve as a model for others. (For ATE projects. Does the project address the current and future needs of industry for technicians? Does the project enhance the current status of technician education?)

- **Plan**. Likelihood that the project will achieve results, is cost-effective, and is appropriate relative to needs and anticipated impact. The soundness of the approach with respect to disciplinary content and/or instructional methods. Alignment or integration of the project with other major efforts to improve the quality of science, mathematics, or technology education. Reasonableness of evaluation plans. Credibility of the plan for project continuation beyond NSF support. Reasonableness of mechanisms put in place that are expected to result in widespread dissemination of instructional materials, models or other project results.

- **Personnel**. The expertise and background of senior personnel that will ensure success of the project. Assurances that those levels of commitment and involvement are commensurate with their anticipated contribution.

- **Products.** Clear description of expected products or outcomes of the project and the likelihood that they will be of high quality. Likelihood that the impact of the project will be broadened through dissemination or replication of products or outcomes in other locations or nationally.

- **Cooperative Relationships.** Reasonableness of working relationships among collaborating parties and clear evidence of the level of collaboration demonstrated in the proposal. Likelihood that the project will facilitate greater interactions among professionals in museums, media, cooperating school systems, universities, and industry. Evidence that long-term relationships are likely to be forged that can supplement and support the quality of science, mathematics, and technology education.

- **Evaluation Plans.** Inclusion of appropriate evaluation plans to assure that: 1) draft material and prototype activities will be tested during the development stages of the project, and 2) assessment will be conducted on the impact of the completed project on participants' knowledge, attitudes, interests, and/or behavior.

- **Contributions.** Evidence that the proposal includes appropriate contributions (intellectual and/or financial) from the host institution, private sector, state or local educational agencies, colleges and universities, professional societies, and other sources.

ANNOUNCEMENT and ADMINISTRATION of AWARDS

ANNOUNCEMENT

Review and processing of proposals requires approximately six months. Decisions are announced individually through written notices to the institution and to the PI. Before notice is sent, NSF staff can give no information concerning the probability that any particular proposal will be supported or declined. Proposers are strongly urged to refrain from making inquiries. Decisions on awards for individual projects are announced as soon as they are made. Thus, some proposers receive a decision earlier than others. The number of awards made depends on the quality of those received and the availability of funds.

ADMINISTRATION OF GRANTS

Grants awarded as a result of this announcement will be administered in accordance with the terms and conditions of NSF GC-1 (10/95) or FDP-III (3/97), ***Grant General Conditions***. Copies of these documents are available at no cost from the NSF Forms and Publications Unit, National Science Foundation, 4201 Arlington Boulevard, Room P15, Arlington, Virginia 22230; by telephone, (703) 306-1130; or via electronic-mail: pubs@nsf.gov. More comprehensive information is contained in the ***GPG (NSF 99-2)***. NSF publications can also be obtained from the ***World Wide Web*** at http://www.nsf.gov

PRIOR APPROVAL REQUIREMENTS

Prior written authorization from NSF is required for the following: 1) transfer of project effort to another institution; 2) changes in objectives or scope; 3) absence or change in PI; 4) a substantial change in PI effort; 5) alterations or rearrangements (construction activities) costing $10,000 or more; 6) establishing relatedness of projects under the direction of collaborating PIs; and, 7) reallocation of funds budgeted for participant or trainee support. Decreases in participant support costs require written approval of the cognizant Program Officer; all other changes listed above require approval of the cognizant Grants Officer. (See ***Grant General Conditions (GC-1)***). For participants in the Federal Demonstration Project, decreases in participant support costs, as well as changes in objectives, scope, or PI require prior written approval from NSF. (See also ***GPM*** Exhibit III-I that highlights grantee notifications to, and requests for, approval from NSF.)

TRANSFER OF PRINCIPAL INVESTIGATOR

If a PI leaves a project before its completion, the grantee institution has the prerogative to nominate a replacement PI or request that the grant be terminated. Replacement PIs are subject to NSF approval by the cognizant program officer named in the grant letter. A written request for the change in PI should include an explanation for the request, the nominee's qualifications, curriculum vitae, and statement of current and pending support, and must be signed both by the nominee and the grantee's Authorized Organizational Representative. Approval is then obtained from the cognizant Grants Officer. The appointment of a new PI is not effective until written approval is received from NSF.

In those cases where a particular PI's participation is integral to a given project and the PI's original and new organizations agree, NSF will arrange a transfer of the grant and assignment of remaining unobligated funds to the PI's new organization (See ***GPM***, Section 312 and ***GPM*** Exhibit III-2 for NSF Form 1263 "*NSF Grant Transfer Request*.")

GRANT REPORTS

Annual Progress Reports. All multi-year grants require submission of an annual technical progress report to the cognizant NSF Program Officer [see Article 15 of NSF *Grant General Conditions* GC-1 (10/98)]. **The report should be submitted at least 90 days before the end of the period currently being funded.** PIs are encouraged to submit reports electronically via the project reporting system in FastLane. It should summarize activity during the previous year, assess progress in meeting milestones set in the proposal or through negotiations, identify significant developments, and describe any problems encountered. Reprints of publications and draft materials, produced as a result of the project, must be provided as soon as they are available. Reports should also include any significant changes planned for the following year. All projects should submit an updated data sheet each year. **Annual reports must certify progress on meeting cost-sharing requirements stipulated in the award and must be submitted using NSF Form 1328 available in the *GPG (NSF 99-2)*.**

Final Report. Within 90 days after grant expiration, the PI must submit a signed Final Project Report , including the Part IV Summary, to the NSF Program Officer, with a copy to the Authorized Organizational Representative. Applicants should review this form prior to proposal submission so that appropriate tracking mechanisms are included in the evaluation plan to ensure that complete information will be available at the conclusion of the project. Failure to provide final technical reports may prevent funding of subsequent proposals and/or will delay NSF review and processing of pending proposals for that PI and any co-PIs.

The final report should contain technical information needed by NSF for program management and informing the public about the results of supported activities. The report requests

information on the gender, race, ethnicity, citizenship, and disability status of individuals supported under the grant. See earlier sections on program descriptions for any special programmatic requirements. The final report should also include certification of cost-sharing as stipulated in the award letter. Projects must transmit final copies of instructional materials developed under grants both to the relevant program (e.g., IMD) and to the Eisenhower National Clearinghouse.

Final expenditure information is supplied by most grantees through the quarterly Federal Cash Transactions Report (SF 272), submitted via FastLane (including a signed certification) by the grantee's financial officer.

ACKNOWLEDGMENT OF NSF SUPPORT AND DISCLAIMER

Appropriate acknowledgment of NSF support should be given to NSF-supported projects. Individual programs will inform grantees of specific requirements for funding credit. The Foundation requires that broadcasts, exhibits, books, instructional and professional development materials and other documents include a clear documentation of the source(s) of support (both NSF and other contributors), as well as the NSF logo prominently displayed.

In addition, a disclaimer must appear in publications of any material, whether copyrighted or patented on, or developed under, NSF-supported projects:

> "This material is based upon work supported by the National Science Foundation under Grant No. (grantee should enter NSF grant number)."
>
> "Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation."

COMMERCIAL PUBLICATION OR DISTRIBUTION of NSF-SUPPORTED MATERIALS

The National Science Foundation encourages the broad dissemination of materials resulting from NSF awards. If an award involves the development of materials or publications which will be disseminated commercially, the grantee is responsible for developing, documenting and implementing a publication or distribution plan which includes, at a minimum, the following elements:

- procedures to be followed for selection of a publisher or distributor so as to ensure reasonable competition or justification for non-competitive selection;
- delineation of the criteria used in the selection of the publisher or distribution; and,
- steps taken to prevent conflicts of interest in the selection of a publisher or distributor.

The grantee shall ensure that the publisher or distributor of any material supported under this NSF award agrees to provide the Government with the right to use the materials for Government purposes as described in *Grant General Conditions GC-1 (10/98)* Article 18. Any materials developed under an award to a Federal Demonstration Project, must ensure that the publisher or distributor of any material supported under the NSF award agrees to provide the Government with a non-exclusive, nontransferable, irrevocable, royalty-free license to exercise or have exercised for or on behalf of the United States throughout the world all the exclusive rights provided by the copyright. Such license does not include the right to sell copies or photo records of the copyrighted works to the public. Any publication or distribution agreement must be consistent with FDP-III, Article 10.

Under normal circumstances, NSF also requires that:

- off-the-air recording rights for supported television programs be offered to educational agencies or institutions for a minimum of three years following the first broadcast

- all television programs have closed captions encoded on the master broadcast tape and be broadcast with the closed captions

Normally, income generated as a result of commercial publication and/or distribution of NSF-supported materials will be subject to guidance provided in Section 750 of the ***GPM*** with the exception that royalty income earned during the life of the project should be used to further project objectives. The grantee is required to retain appropriate financial and other records relating to project income earned during the grant period and for three years beyond the end of the grant period. The grantee's understanding and acceptance of these income procedures should be provided in the proposal.

LEGAL RIGHTS TO INTELLECTUAL PROPERTY

NSF normally allows awardees to retain principal legal rights to intellectual property developed under its awards. This policy provides incentive for development and dissemination of inventions, software, and publications that can enhance their usefulness, accessibility, and upkeep. It does not, however, reduce the responsibility of PIs and their institutions to make results, data, and collections available to educational and other appropriate communities.

APPENDICES

I. Checklist for Proposal Preparation

II. Data Sheet: Informal Science Education Program

III. Data Sheet: Instructional Materials Development Program and Assessment Projects

IV. Data Sheet: Implementation and Dissemination Projects

V. Data Sheet: Teacher Enhancement Projects

VI. NSF Form 1295: Advanced Technological Education Program

VII. NSF Major Systemic Projects

APPENDIX I
Checklist for Proposal Preparation

Complete proposals expedite review and processing. Your proposal should include all materials below in the order listed below. All NSF Forms can be obtained in ***GPG (NSF 99-2)***. Forms marked with an asterisk (*) are included in this Announcement.

[ ] **Transmittal Letter**. Include preliminary proposal or previous declination number. ONE COPY ONLY should be attached to the original signature copy of the proposal.

[ ] **Supplementary Information on Principal Investigators/Project Director** *(NSF Form 1225)*. ONE COPY should ONLY be attached to the original signature copy of the proposal.

[ ] **Cover Sheet** *(NSF Form 1207*, revised 7/95*)*. Enter the applicable program in the box in the upper left corner. For FastLane proposals, in the program announcement/solicitation field, enter the program announcement number NSF 99-92. For FastLane proposals, begin the title with the abbreviation for the specific initiative. Include all required signatures: Principal Investigator/Project Director, Co-Principal Investigator(s)/Co-Project Director(s), and an authorized organizational representative. Page 1-- all copies; page 2--original signature copy only).

[ ] **Project Summary**.

[ ] **Program Data Sheet.***

[ ] **Table of Contents.**

[ ] **Project Description.** Do not exceed page limitations; include results from prior NSF support, if applicable.

[ ] **References Cited**.

[ ] **Biographical Sketches of Key Personnel.** Limit two pages per principal investigator.

[ ] **Budget** *(NSF Form 1030)*. If project is more than one year in duration, provide a cumulative budget for the full term and individual budget forms for each year the project will be in operation.

[ ] **Budget Justification.**

[ ] **Current and Pending Support** *(NSF Form 1239).*

[ ] **Appendices.**

[ ] One copy of the proposal sent directly to the Division; other required copies, including the **original signature** copy of the proposal, sent to NSF Proposal Processing Unit.

APPENDIX II
Informal Science Education
Project Data Sheet
(A completed project data sheet must accompany the proposal)

A. **Project Information:**

Principal Investigator: _____

Project Title: _____

Institution: _____

B. **Funding Information:**

Total NSF/ISE Request $ _____

Total Non-federal Cost-Sharing $ _____

Other Funding from Federal Sources $ _____

Sources of Funding: [Sum = 100% of budget]

NSF	$_____	Corporate:	$_____
Grantee Institution:	$_____	Project Generated:	$_____
Other Foundations:	$_____	Other (explain):	$_____
Other Federal Agencies:	$_____		_____

C. **Science /Mathematics Content:** [Sum = 100]

Astronomy (11)	_____%	General Science (99)	_____%
Biology (61)	_____%	Life Sciences (60)	_____%
Chemistry (12)	_____%	Mathematics (21)	_____%
Computer Science (31)	_____%	Physics (13)	_____%
Earth Science (42)	_____%	Physical Sciences (10)	_____%
Engineering (50)	_____%	Psychology (70)	_____%
Environmental Science (40)	_____%	Social Sciences (80)	_____%
Geography (88)	_____%	Technology (58)	_____%

D. **Number of Participants or Potential Impact on Target Audience:** [Yearly] _____

E. **Level of Participants/Target Audience:** [Check all that apply]

Preschool	_____	Secondary	_____	Family	_____
Elementary	_____	Undergraduate	_____	Adult	_____
Middle School	_____	G raduate	_____	Other (explain)	_____

F. **Special Emphases:** [Check all that apply]

Minorities	_____	Urban	_____
Women	_____	Rural	_____
Persons with Disabilities	_____	Other (explain)	_____

G. **Scope:** [Check all that apply] Local _____ Regional _____ National _____

APPENDIX III
Instructional Materials Development and Assessment Projects
Project Data Sheet
(A completed project data sheet must accompany the proposal))

A. **Project Information:**

Principal Investigator: _____

Project Title: _____

Institution: _____

B. **Funding Information:**

Total NSF Request $ _____

Total Auditable Cost-Sharing $ _____

Total Non-auditable Cost-Sharing $ _____

Sources of Funding: [Sum = 100% of budget]

NSF	$_____	Corporate:	$_____
Grantee Institution:	$_____	Project Generated:	$_____
Other Foundations:	$_____	Other (explain):	$_____
Other Fed. Agencies:	$_____		

C. **Science /Mathematics Content:** [Sum = 100 – Limit to four]

Astronomy (11)	_____ %	Geography (88)	_____%
Biology (61)	_____ %	Mathematics (21)	_____%
Chemistry (12)	_____ %	Physics (13)	_____%
Computer Science (31)	_____ %	Physical Sciences (10)	_____%
Earth Science (42)	_____ %	Psychology (70)	_____%
Engineering (50)	_____ %	Social Sciences (80)	_____%
Environmental Science (40)	_____ %	Technology Ed (58)	_____%
General Science (99)	_____%		

D. **Level of Materials Target:** [Check all that apply]

Preschool	_____	Undergraduate	_____
Elementary	_____	Parents	_____
Middle	_____	Other (explain)	_____
Secondary	_____	_____	

E. **Special Emphases:** [Check all that apply]

Minorities	_____	Urban	_____
Women	_____	Rural	_____
Persons with Disabilities	_____	Other (explain)	_____
		_____	

APPENDIX IV
Implementation and Dissemination Projects
Project Data Sheet
(A completed project data sheet must accompany the proposal.)

A. Project Information

Principal Investigator: _____
Project Title: _____
Institution: _____
Total NSF $_____
Total Auditable Cost-Sharing $_____ (Exclude all Federal funds. Should be the same as line M of budget.)
Total Non-auditable Cost-Sharing $_____

B. Other Funding Sources (Sum = 100% of budget)

NSF	$_____	Publisher	$_____
Grantee Institution	$_____	Other Corporations	$_____
Other Fed. Agencies	$_____	Foundations	$_____
Other: (Explain)	$_____	School Districts	$_____

_____

C. Characteristics (Check all that apply)

Disciplinary Areas: Science _____ Mathematics _____

Grade Level: K _ 1 _ 2 _ 3 _ 4 _ 5 _ 6 _ 7 _ 8 _ 9 _ 10 _ 11 _ 12 _

Focus: National _____ Regional _____ (List states, up to six) _____

Curriculum/instructional materials offered (list all that apply).

_____

_____

D. Products/Activities (Check all that apply)

Assistance to Districts:
- Needs assessment ___
- Curriculum adoption/implementation ___
- Develop resources (demonstration sites, videos, simulations, telecommunications) ___
- Utilization of educational technologies ___
- On-site, follow-up activities with districts ___

Instructional Materials Support:
- Assessing alignment of instructional materials to standards ___
- Alignment of instructional materials across grade levels ___
- Assistance in student assessment strategies ___

District Professional Development Support:
- Planning of professional development activities to support curriculum___
- Identification of professional development tools ___
- Enhancement of staff developers to support curriculum implementation ___

E. Impact

Number of districts to be served directly at site(s) (per year) _____/_____
Number of schools represented (per year) _____/_____
Number of participants to be served directly at site(s) (per year)
- District administrators _____/_____
- District Staff developers _____/_____
- Resource/Lead Teachers _____/_____
- Parent/Community Leaders _____/_____
- Other (Explain): _____/_____ _____

APPENDIX V

Teacher Enhancement Projects

Data Sheet

(A completed project data sheet must accompany the proposal and each year's progress report.)

A. Project Information

Title: _____

Principal Investigator: _____

Institution: _____

Proposed Duration _____

Auditable Cost-Sharing $_____ (Exclude all Federal funds)

B. Other Funding Sources:

NSF Other (e.g. non-TE, USI, SSI): .. $ _____
Institution of Higher Education..... $ _____
Foundations:..... $ _____
Federal ..... $ _____
Eisenhower..... $ _____
Chapter 1..... $ _____
Other Agencies..... $ _____
State/Local (if not grantee)..... $ _____
Industry:..... $ _____
Other (explain):..... $ _____

Area from Guidelines (*Check one*)

Local Systemic Change..... ☐
Materials for Professional Development..... ☐
Teaching Enhancement:
Capacity Building ..... ☐
Mentor Teachers/Teacher Leaders..... ☐
Professional Support for the Teaching Workforce ..... ☐
Teacher/Student Development ..... ☐
Planning Grant ..... ☐
Conference ..... ☐

C. Science /Math Content: [Sum = 100%]

Astronomy (11)..... _____%
Biology (61)..... _____%
Chemistry (12) ..... _____%
Computer Science (31)..... _____%
Earth Science (42)..... _____%
Engineering (50) ..... _____%
Environmental Sci. (49) ..... _____%
General Science (99)..... _____%
Other (explain) ..... _____%

Geography (88)..... _____%
Life Sciences (69) ..... _____%
Mathematics (21) ..... _____%
Physics (13) ..... _____%
Physical Sciences (19) ..... _____%
Psychology (70) ..... _____%
Social Sciences (80)..... _____%
Technology (58)..... _____%

D. Local Systemic Change Projects: Report data for all schools in all districts that participate in the project.

	Number of Schools	Total Number of Teachers	Number of Math Teachers	Number of Science Teachers
Elementary			n/a	n/a
Middle				
High school				
K-12				
Project total				

E. Leadership Projects: Estimate the number of participants directly involved in the staff development/ leadership experiences who receive at least 100 hours a year of professional development (including follow-up).

	Total Number of Teachers	Number of MathTeachers	Number of Science Teachers	Number of Administrators
Elementary				
Middle				
High				
K-12				
Project total				

Indicate the number years you will be providing services: _____

F. Leadership Projects: Estimate the number of teachers who will receive professional development for at least 60 hours from the project's direct participants.

	Number of Teachers	Mathematics Teachers	Science Teachers
Elementary			
Middle			
High			
K-12			
Project total			

G. If the project provides professional development for implementing instructional materials, please list the materials used:_____

_____

_____

H. **Technology Projects Only**: Does the project teach teachers how to use networking or computer technologies for:

☐ professional use (accessing resources, collaborating with colleagues, etc.)
☐ teaching students to use the technology (programming, access libraries, interface instruments, etc.)
☐ Other (*explain*) _____

If the project uses networking for teachers, do they have access to the Internet? In their school? ☐ Yes ☐ No
In their classroom? ☐ Yes ☐ No

Does your project use Distance Learning to deliver instruction to teacher? ☐ Yes ☐ No.
If yes, how is it delivered?
☐ Satellite ☐ Two-way broadcast ☐ Network
☐ Other (*explain*):_____

I. Teacher –Student Research Development Projects Only

	Number of Students	Number of Mathematics Teachers	Number of Science Teachers
Middle			
High			
Project total			

APPENDIX VI
Advanced Technological Education

NSF FORM 1295: PROJECT DATA FORM

The instructions and codes to be used in completing this form are provided in the Appendix.

1. **Program-track** to which the proposal is submitted: _____
2. Name of **Principal Investigator/Project Director** (as shown on the Cover Sheet):
   _____
3. Name of submitting **Institution** (as shown on Cover Sheet):
   _____
4. **Other Institutions** involved in the project's operation:
   _____

ATE and CETP only
Preliminary Proposal Number(s) that led to this proposal: _____

Project Data:

A. Major Discipline Code: __ __
B. Academic Focus Level of Project: __ __
C. Highest Degree Code: __ __
D. Category Code: __ __
E. Business/Industry Participation Code: __ __
F. Audience Code: __ __ __ __
G. Institution Control Code: __ __ __ __
H. Strategic Area Code: __ __ __
I. Project Features: __ __ __ __ __

Estimated number in each of the following categories to be directly affected by the activities of the project during its operation:

J. Undergraduate Students: _____
K. Pre-college Students: _____
L. College Faculty: _____
M. Pre-college Teachers: _____

Project Summary:
On a separate sheet of paper, provide a summary of the proposed work. The **Project Summary** should be a concise description of the project. It is limited to 22 single-spaced lines of standard-sized 12-point font.

NSF Form 1295 (10/98)

Instructions and Codes for Completing Project Data Form (Form 1295)

Item 1 Indicate the **program-track** to which the proposal is being submitted:

CCLI: Course, Curriculum, and Laboratory Improvement

CCLI-EMD	Educational Materials Development
CCLI-A&I	Adaptation and Implementation
CCLI-ND	National Dissemination

CETP: NSF Collaboratives for Excellence in Teacher Preparation

CETP-IF	Collaborative: Institutional Focus
CETP-SF	Collaborative: System-wide Focus

ATE: Advanced Technological Education

ATE-PR	Project
ATE-CE	Center of Excellence

Item 2 Enter the **Name of the Principal Investigator/Project Director**.

Item 3 Enter the **Name of the Submitting Institution**, including the branch or campus.

Item 4 List any **Other Institutions Involved**: directly, through subcontracts, or through shared use of equipment.

Code A Select a two-digit **Discipline Code** that is most descriptive of the general area for your proposal.

11	**ASTRONOMY**		**ENGINEERING**		**SOCIAL, BEHAVIORAL, & ECONOMIC SCIENCES**
		51	Aeronautical Engineering		
61	**BIOLOGICAL SCIENCES**	**53**	Chemical Engineering	**71**	Biological Psychology
		54	Civil Engineering	**72**	Social Psychology
12	**CHEMISTRY**	**55**	Electrical Engineering	**73**	Cognitive Psychology
		56	Mechanical Engineering	**81**	Anthropology
	COMPUTING	**57**	Materials Science & Engineering	**82**	Economics
31	Computer Science	**58**	Engineering Technology	**83**	History
32	Computer Engineering	**59**	Engineering—Other; includes Agricultural; Bioengineering; Industrial & Management; Nuclear; Ocean; Manufacturing; Systems Engineering; and Inter- or Multi-disciplinary projects involving Engineering disciplines only.	**84**	Linguistics
33	Information Science and Systems			**85**	Political Science
34	Software Engineering			**86**	Sociology
35	Computing—Other; includes Computational Science & Systems. Note: Computer applications should be coded under specific disciplines.			**88**	Geography
				89	Social Sciences—Other
				91	Science & Technology Assessments; Effects of Sciences & Technology on Society; Ethical Considerations; Science Policy
		99	**INTERDISCIPLINARY / MULTIDISCIPLINARY**		
	EARTH SCIENCES				
40	Earth Systems Science				
41	Atmospheric Sciences	**21**	**MATHEMATICAL SCIENCES**		
42	Geology				
43	Oceanography	**13**	**PHYSICS**		

Code B Enter the **Academic Focus Level Code** of the project. That is, the project will develop, implement, or disseminate curricular or laboratory material for eventual presentation at what academic level: **LO** = lower division undergraduate courses; **UP** = upper division undergraduate courses; **BO** = both divisions of undergraduate courses; **PC** = pre-college courses (preK-12); **AL** = pre-college and undergraduate courses.

Code C Enter the **Highest Degree Code** to indicate the highest degree offered in science, mathematics, or engineering by any department on the campus submitting this proposal: (**A** = Associate; **B** = Baccalaureate; **M** = Masters; **D** = Doctorate; **N** = Non-academic institution).

Code D Enter the proper **Category Code** depending on the program:

CCLI: Indicate whether the project scope is at the **X** = "proof-of-concept" or single course/lab level; or at the **Y** = full development or comprehensive curriculum level.

CETP: Indicate whether the project focuses on preparing **ET** = elementary school teachers; **MS** = middle school teachers; **SS** = secondary school teachers; or is **CM** = comprehensive.

ATE: Indicate whether the project focuses on **A** = adaptation and implementation, **B** = curriculum and educational materials development, **C** = teacher and faculty preparation and enhancement, **D** = technical experiences, **E** = laboratory improvement, or **F** = special activities

Code E If the project has major participation by the private sector (commercial or industrial organizations), indicate by entering **PS**; otherwise leave blank.

Code F For those proposals where a **significant** component of the project is the education of the following groups, indicate the proper **Audience Code(s)**. ***Each group indicated must be discussed explicitly and substantively in the proposal narrative*.** Codes: **W** = Women; **M** = Minorities; **D** = Persons with Disabilities; **H** = Technicians and Technologists; **T** = Pre-Service Teachers; **I** = In-Service Teachers; **S** = Secondary School Students; **F** = Faculty Professional Development

Code G Enter the **Institution Control Code** to indicate whether the performing institution is:

PUBL = Public; **PRIV** = Private; **CONS** = Consortium; **NACD** = Non-academic.

Code H If applicable, indicate that the project has a **Strategic Area** focus by entering an appropriate code according to the following: **GC** = Global Change; **HPC** = High Performance Computing; **EN** = Environment; **MA** = Manufacturing; **BT** = Biotechnology; **AMP** = Advanced Materials and Processing; **CI** = Civil Infrastructure Systems; **KDI** = Knowledge and Distributed Intelligence.

Code I If applicable, indicate whether the project involves any of the following activities. Include up to **five** of the following **Project Features**:

1 = Research on Teaching and Learning

2 = Integration of Research and Education (e.g., direct undergraduate student research; research processes and/or data integrated into coursework; sharing research results via training courses for faculty, teachers, or industry groups; and encouraging greater balance in faculty teaching and research activities by altering rewards, review policies, and resources)

3 = Educational Uses of Technology (e.g., computers, portable instrumentation, distance learning, e-mail and other electronic communication, etc.)

4 = Field Experiences (i.e., outside the classroom)

5 = Connections with Business and Industry

6 = Science Literacy for Non-SMET Majors

7 = International Activities

Codes J-M

Give your best estimate of the numbers of persons in the indicated categories who will receive immediate benefit from the project (primary effect) and are likely to immediately benefit as a result of another person's participation (secondary effect) during the period the project is in operation (including intermediate periods for seasonal projects).

APPENDIX VII
NSF Major Systemic Projects
(As of October 1998)

Local Systemic Change (LSC) Projects
Teacher Enhancement (TE) Program

School District(s)	State	Principal Investigator	Phone Number
Mathematics, Grades K-8			
Birmingham	AL	Louis Dale	(205) 934-8762
Visalia	CA	David Francis	(209) 730-7555
Santa Ana USD	CA	David Pagni	(714) 773-2671
Oxnard and Ventura	CA	Julian Weissglass	(805) 893-7046
University of IL, Chicago	IL	Kathryn Chval	(312) 996-8708
Baltimore City Schools	MD	Patricia Campbell	(301) 405-3129
Community SD#2, NY	NY	Lucy Mahon	(212) 385-3459
Elizabeth City-Pasquotank	NC	Susan Friel	(919) 962-8805
Austin	TX	A.C. Gonzalez	(512) 414-2482
Mathematics, Grades 7-12			
Chandler, Sunnyside, Nogales, Mingus, Sedona-Oak Creek USD (Phoenix area)	AZ	Linda Jaslow	(602) 731-8054
16 CA School Districts	CA	Judith Mumme	(805) 388-4420
Azusa, Charter Oak, Hacienda-LaPuenta, and Pomona USD	CA	Jack Price	(909) 869-3475
Chicago	IL	Philip Wagreich	(312) 413-3019
Indianapolis	IN	Bill Frascella	(812)-855-5564
Waltham	MA	Tom Foley	(617) 893-8050
20 New England School Districts (16 MA, 3 VT, 1CT)	MA	Carla Oblas	(617) 373-2328
Kalamazoo Area	MI	Laura Van Zoest	(616) 387-4595
19 Iowa School Districts	IA	Harold Schoen	(319) 335-5433
Pittsburgh	PA	Diane Briars	(412) 338-8052
27 schools in Philadelphia, SE Penna and Southern NJ	PA	Joseph Merlino	(215) 951-1203
5 Southwest Virginia School Districts	VA	C.Wayne Patty	(540) 231-2157
St. Paul	MN	Thomas Post	(612) 625-0069
4 Rochester Area Middle Schools	NY	Raffaella Borasi	(716) 244-3207
6 School Districts in Seattle area	WA	Ramesh Gangolli	(206) 543-1807

Science and Mathematics, Grades K-8			
Mesa	AZ	Bob Box	(602) 898-7815
Fresno	CA	Sandra Carsten	(209) 265-2910
Las Vegas	NV	P. Kay Carl	(702) 799-5474
4 NJ School Districts	NJ	Carlo Parravano	(908) 594-7401
Science, Grades K-8			
Decatur, Athens, Fort Payne, Scottsboro, Morgan City Schools	AL	John Wright	(205) 895-6670
Anchorage	AK	Judy Reid	(907) 269-8341
Tucson Unified SD	AZ	Gail Paulin	(520) 617-7052
National City School District	CA	Paul Saltman	(619) 534-3824
Oakland	CA	Jane Bowyer	(510) 430-3169
El Centro	CA	Michael Klentschy	(760) 352-5712
San Francisco	CA	Maria Santos	(415) 759-2767
7 Rural CA School Districts	CA	Patricia Stoddart	(408) 459-3850
Cupertino, Los Altos, Menlo Park, Mountain View, Palo Alto, Redwood, Santa Clara, & Whisman	CA	Jan Hustler	(415) 857-5194
7 School Districts in DE	DE	Rachel Wood	(302) 739-3742
Atlanta	GA	Robert DeHaan	(404) 727-6237
Fort Wayne, IN and 9 Rural School Districts	IN	Susan Johnson	(317) 285-1042
Montgomery County	MD	Gerard Consuegra	(301) 279-3371
Midland	MI	Sarah Lindsey	(517) 839-2427
Minneapolis	MN	Carol Johnson	(612) 627-2010
Bozeman	MT	Myra Miller	(406) 585-1500 x1565
West Windsor/ Plainsboro Rural School District, Ewing and Lawrence Township	NJ	Sondra Markman	(609) 799-0200
East Orange & Jersey City	NJ	Jacqueline Willis	(201) 655-7753
Buffalo	NY	Peter Dow	(716) 896-5200
Community School Districts #3 & #5	NY	Gilbert Turchin	(212) 678-2918
Toledo & Springfield	OH	Charlene Czerniak	(419) 530-2094
16 School Districts in Stark County	OH	Jane Hazen	(330) 492-8136
15 Allegheny County School Districts	PA	Reeny Davidson	(412) 488-1444
7 Rhode Island School Districts	RI	Betty Young	(401) 874-4150
6 Rhode Island School Districts	RI	Greg Kniseley	(401) 456-8559
Nashville	TN	Barbara Nye	(615) 963-7231
Riverview, Skykomish and Snoqualmie	WA	Denis Schatz	(206) 443-2867

Seattle	WA	Sharon Greene	(206) 298-7180
Vancouver	WA	Anne Kennedy	(360) 750-7500
Brooke, Hancock, Marshall, Ohio, Wetzel Counties	WV	Harold Cook	(304) 277-2308
Science, Grades K-12			
Spokane	WA	Robert E. Gibbs	(509) 359-7469
Seattle	WA	Leroy Hood	(206) 221-4692

Division of Educational System Reform
(As of October 1998)

STATEWIDE SYSTEMIC INITIATIVES	**URBAN SYSTEMIC INITIATIVES**	**SYSTEMIC INITIATIVES**
Connecticut Phase II	Baltimore, MD	Alaska
Louisiana Phase II	Chicago, IL	Kentucky
Massachusetts Phase II	Cleveland, OH	*Includes parts of KY, NC, OH, TN, VA, WV*
New Jersey Phase II	Columbus, OH	
Puerto Rico Phase II	Dallas, TX	
South Carolina Phase II	Detroit, MI	Georgia
Texas Phase II	El Paso, TX	*Includes parts of AL, FL, GA*
Vermont Phase II	Fresno, CA	New Mexico
	Jacksonville, FL	*Includes parts of NM, AZ, CO, UT*
	Los Angeles, CA	
	Memphis, TN	North Dakota
	Miami, FL	*Includes parts of ND, MT, NE, SD, WY*
	Milwaukee, WI	
	New Orleans, LA	Mississippi
	New York, NY	*Includes parts of AR, CA, MS*
	Phoenix, AZ	Mississippi
	Philadelphia, PA	The Mississippi Valley area
	San Antonio, TX	Oklahoma
	San Diego, CA	
	Saint Louis, MO	Texas

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research related programs described here. 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 subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

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 projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Catalog of Federal Domestic Assistance Number: 47.076 Education and Human Resources

PRIVACY ACT AND PUBLIC BURDEN

The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate Programs. See Systems of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995). Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

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 or 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, 4201 Wilson Boulevard, Arlington, VA 22230.

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at http://www.nsf.gov/oirm/y2k/start.htm.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD dial (703) 306-0090; for FIRS, 1-800-877-8339.

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 learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

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. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

NATIONAL SCIENCE FOUNDATION

ARLINGTON, VA 22230

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P.T.: 22, 25, 42, 44
K.W.: 0502031; 0502023; 0502020
0502033; 0504000; 0506000

NSF 99-92
(Replaces NSF 98-4)