

ELEMENTARY, SECONDARY, AND INFORMAL EDUCATION

Program Solicitation and Guidelines

Informal Science Education

Preliminary, No Later Than-March 5; Full-May 31

Preliminary, No Later Than-August 2; Full-November 15

Except for the following:

- ASCEND Projects
Preliminary-August 14; Full-November 15

Instructional Materials Development

Preliminary-May 9; Full-August 23

Teacher Enhancement

Applied Research (separate projects)

Preliminary-May 18; Full-September 10



NATIONAL SCIENCE FOUNDATION

**DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
NSF 01-060**



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PREFACE

EDUCATION MISSION OF THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is mandated to promote the progress of science and engineering in the United States. Given the strong relationship between research and education, the Agency's mission explicitly articulates a role for strengthening the quality and effectiveness of the nation's underlying human resource base. NSF's cohesive and comprehensive set of education and human resources activities addresses every level of education, including early career development. Stimulating, quality science, mathematics, engineering, and technology (SMET) education is vitally important to ensuring a diverse, scientific and technical workforce, as well as a citizenry capable of mastering the scientific and technological concepts and skills needed by workplace, social, and home environments that are characterized by increasing technological sophistication.

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES

NSF's Directorate for Education and Human Resources (EHR) programs 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.

Five long-term goals of EHR aim at delivery of quality SMET education to *all* students, especially those from population groups traditionally underrepresented in these disciplines. EHR programs work toward a future where:

- High-quality SMET 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 SMET careers 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;
- Interested non-specialists have opportunities to broaden their scientific and technical knowledge; and
- The public has opportunities to develop a better understanding of scientific and technological developments and processes.

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

Division of Elementary, Secondary, and Informal Education (ESIE).....	703-292-8620
Division of Undergraduate Education (DUE).....	703-292-8670
Division of Graduate Education (DGE).....	703-292-8630
Division of Educational System Reform (ESR).....	703-292-8690
Division of Human Resource Development (HRD).....	703-292-8640
Division of Research, Evaluation, and Communications (REC).....	703-292-8650
Office of Experimental Program To Stimulate Competitive Research (EPSCoR).....	703-292-8683

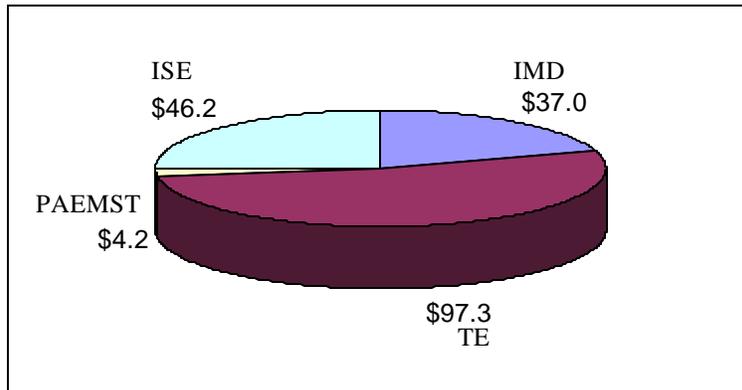
EHR recognizes that by itself it cannot ensure accomplishment of its goals. It promotes partnerships that enable a broader range of resources to be brought to bear in service of these goals.

This *Solicitation* covers all ESIE programs and replaces the previous *Program Announcement and Guidelines* (NSF 00-99). Brief supplements may be issued to announce relevant changes or additions, and special solicitations may be issued for new, developing initiatives.

Proposal Submission and Award Statistics Fiscal Year 2000

PROGRAM	FULL PROPOSALS RECEIVED	NO. OF AWARDS	FUNDING RATE	AWARD RANGE (thousands)	DURATION (years)
Informal Science Education	132	52	.39	\$25-3,000	1-5
Instructional Materials Development	117	33	.28	\$10-2,794	1-4
Teacher Enhancement	199	61	.31	\$19-5,999	1-5

ESIE Program Budget: \$184.7 Million Fiscal Year 2000



- IMD** – Instructional Materials Development
- ISE** – Informal Science Education
- PAEMST** – Presidential Awards for Excellence in Mathematics & Science Teaching
- TE** – Teacher Enhancement

INTRODUCTION TO ESIE

The Division of Elementary, Secondary, and Informal Education (ESIE) programs and funding decisions rely heavily on research that informs the teaching and learning of science, mathematics, and technology (SMT) in both formal and informal education settings. Although the quality and quantity of research findings vary by academic level, disciplinary area, and educational setting, an expanding body of knowledge guides development of new programs and the evolution of existing ones. ESIE is placing greater emphasis on strengthening assessment and applied research in order to lay a stronger research foundation for its programming.

Considerable research, for example, exists concerning the effectiveness of different models of teacher professional development that guides the Teacher Enhancement (TE) program and its portfolio of Local Systemic Change (LSC) projects. Recent studies find that improved teacher content knowledge may change teaching practice (Cohen and Hill, 1997). When teachers cover topics about which they are well prepared, they encourage student questions and discussions, spend less time on unrelated topics, permit discussions to move in new directions based on student interest, and generally present topics in a more coherent way (Leder, 1990).

Other studies also provide evidence that professional development experiences enhancing teachers' subject matter knowledge and expanding their range of teaching practices are likely to improve student achievement (Chaney, 1995; Cohen and Hill, 1997; Monk, 1994). Monk has found that additional coursework taken by teachers in specific areas (e.g., number and kinds of science and mathematics courses) has a positive effect on student learning, while additional coursework by teachers in unrelated subjects has no, or a negative, effect on student learning. Further, Chaney found that better prepared teachers are more likely to include college preparatory subjects such as algebra for students in general mathematics courses. Thus, research suggests that professional development experiences should be solidly based on specific content areas.

Instructional Materials Development (IMD) efforts are informed by the findings of the recent TIMSS assessment. A consortium of U.S. districts, entitled First in the World Consortium (FITWC) involves multiple districts along the North Shore of Lake Michigan. Analyses of the materials and

instruction in 8th grade mathematics across high achieving countries, the U.S., and the FITWC provide insights on effective curricula. Teachers in the FITWC taught fewer topics than their counterparts in other U.S. districts (12 compared to 19). Even this reduced number, however, was significantly more than the six core topics taught in the Czech Republic and the five topics taught in Japan (two high achieving nations). An independent, secondary analysis of TIMSS findings in mathematics (Slowinski, 1999) concludes that the success of students in high-performing TIMSS nations, as well as in the Consortium, strongly indicates that a shift from skill building to mathematical understanding is needed. The focus of teachers in the FITWC schools (and in Japan and the Czech Republic) is on developing the ability to comprehend mathematical concepts rather than on memorization and use of procedural methods. ESIE's instructional materials development projects reflect the importance of developing conceptual understanding. New program directions furthermore reflect research findings that speak to the power of providing professional development that is aligned with curricula in increasing student performance. Increasingly, professional development activities are being integrated with curricula development so that teachers are prepared to fully implement the new materials.

An emerging body of research on NSF-supported instructional materials also indicates that when those materials are fully implemented (consistently taught, using all components), student achievement is enhanced in comparison to when traditional curricula are used (Briars, 2000). Recent analyses of student achievement in classes whose teachers used NSF-supported physics curricula or whose teachers had participated in an NSF-funded professional development activity indicate that students in those classes achieve well above the level of students in comparable classes on the TIMSS assessment of physics (Gregory, 1999).

People of all ages learn science, technology and mathematics from experiences in science museums, from watching films and other media, and from participating in community activities. The impact of informal experiences on science learning has been studied for many years and some studies point to positive outcomes for individual learners (Crane, 1994; Bitgood, et al., 1994; Hein, 1998). The Informal Science Education (ISE) program encourages use of those findings to strengthen

supported projects. In addition, ISE strongly encourages systematic evaluation of its projects, as well as the incorporation of research efforts that can identify the most effective strategies for delivering informal education to various audiences.

ESIE programs are designed to eliminate achievement gaps among identifiable sub-groups of students. Numerous factors, such as teachers' certification, content preparation, effectiveness, and their belief that under-represented and under-served students are capable in science and mathematics, impact students' achievement. ESIE's **Teacher Enhancement** programs target those key areas. The **Instructional Materials Development** program supports the development and implementation of standards-based instructional materials that ameliorate achievement gaps between under-represented students and improve students' knowledge. Other research shows that students' out-of-school experiences in SMET may improve their attitude and achievement in the formal setting. ESIE's **Informal Science Education** program, **After School Centers for Explorations and New Discovery (ASCEND)**, focuses on providing out-of-school experiences for students from under-represented groups in SMET.

In addition, as information technology becomes increasingly embedded in all facets of our lives, ESIE seeks to support the development of those tools, contents, and practices that advance formal and informal SMET education. Information technology will redefine what should be learned, how it is learned, and even the environment in which learning takes place. Digital libraries, computational tools, modeling and visualization, virtual environments, connectivity, and communication are among a growing catalog of capabilities that change what each learner can do. All ESIE-funded projects use information technology in appropriate ways, anticipating a future where these technologies are ubiquitous and all children can be provided the appropriate resources to learn. Beyond that, ESIE will support some projects in ISE, TE, and IMD that push those frontiers into areas of unique opportunity. They include efforts to extend opportunities to all children; to provide additional support to those with additional needs; to build support systems for educators in all environments through communities and access to information; and to rethink the role of dynamic and interactive media in what have traditionally been textbook-based SMET.

Goals. ESIE programs support projects designed to enable **all** students, pre-kindergarten through grade 12 (preK-12), to succeed in their SMT studies and to increase the scientific and technological literacy of students 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, providing effective advocacy for high-quality education in these fields.

Objectives. To provide leadership and 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 that are consistent with the national standards for content, teaching, and assessment that:
 - enhance knowledge, thinking skills, and problem-solving abilities of all students;
 - incorporate recent advances in disciplinary content, research on teaching and learning, and educational technologies; and
 - can be implemented broadly and in diverse settings.
- 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.

- Promote transitions between secondary school and the workplace, as well as transitions within the workplace, through development of exemplary materials, varied instructional environments, and other activities; and facilitate transitions to higher education by providing high quality SMT education for all students.
- 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;
 - to establish linkages with formal education to improve education in all learning environments; and
 - to 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.

To achieve its objectives, ESIE 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**; supports the development of high-quality course and curriculum materials for all students through its **Instructional Materials Development (IMD) program**; and 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**. Two additional programs include the **Centers for Learning and Teaching (CLT) program** and the **Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) program**. The CLT program creates disciplinary centers that address critical issues of the science, mathematics, engineering and technology (SMET) instructional workforce and that conduct research concerning these issues. The PAEMST program recognizes outstanding SMT teachers and creates a national network of teacher leaders.

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EXECUTIVE SUMMARY OF PROGRAM ACTIVITIES

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, zoos, arboreta, community centers, homes) and involve the use of various media (e.g., broadcast, film, interactive technology, print, 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 projects can bridge the informal and formal education communities. Through collaborations, partners combine their resources and expertise to develop effective strategies for reaching target audiences. A special class of projects, NSF After School Centers for Exploration and New Discovery (ASCEND), is part of ISE's community-based program activities.

INSTRUCTION MATERIALS DEVELOPMENT

Instructional Materials Development (IMD) projects create instructional materials and student assessments that change classroom instruction and assessment in grades preK-12, enabling students to acquire a sophisticated understanding of science, mathematics, and technology. The materials incorporate investigative, inquiry-based science, mathematics, and technology (SMT) activities and align with national standards for content, teaching, and assessment. IMD-supported materials promote the success of all students and promote positive student attitudes toward science, mathematics, and technology. Projects range from major revision of existing materials to the creation of 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 may 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.

TEACHER ENHANCEMENT

Teacher Enhancement (TE) projects provide professional development opportunities to broaden and deepen the disciplinary knowledge and pedagogical skills of teachers, thus improving their ability to deliver rich and challenging SMT education to **all** students. Through active involvement of administrators, projects address the need to provide requisite resources to support SMT education reform. 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) improve retention rates of novice teachers during their initial years of teaching; (4) create professional development materials for teachers; and (5) include innovative applications and effective implementation of educational technologies. Emphasis is placed on projects that focus on professional development of teachers as a primary driver for implementing SMT education reform.

CROSS-CUTTING AREAS OF SPECIAL INTEREST

Applied Research. ESIE has a strong commitment to applied research that assesses the effectiveness and impact of its programs in enhancing learning and instruction in science, mathematics, and technology in both formal and informal educational settings. The purpose of this effort is to ensure that all ESIE programs are firmly grounded in a solid research base and that their projects benefit from this knowledge. Applied research provides important feedback for strengthening ESIE's portfolio and for identifying new programmatic directions. ESIE encourages focused applied research efforts will be encouraged that:

- are based on clear theoretical foundations and include a thorough review of relevant research and evaluation literature;
- have clear research questions that address areas of interest fundamental to ESIE's mission and goals;
- employ appropriate methodologies; and

- have a high likelihood of generating data that will contribute to the cycle of design, research, and redesign of ESIE's programs and portfolios.

Questions that might be addressed through applied research include: Is enhanced student learning an outcome of using ESIE-funded instructional materials? In what ways and under what circumstances? Do ESIE-funded instructional materials enhance other desirable student outcomes (e.g., increased enrollments in upper level science and mathematics courses)? How can the degree of implementation of instructional materials in classrooms be assessed? What kind of content and pedagogical experiences improve teachers' abilities to teach in ways that lead to student achievement gains? What are the characteristics of teachers and classroom environments that lead to student achievement gains? How do exhibits, films, and other media most effectively meet the needs of learners?

Applied research proposals must demonstrate familiarity with recent literature, identify the research questions to be addressed, include the relevant qualifications of key personnel, and discuss the potential for contributing to the knowledge base. The cost of the proposed research effort must be clearly delineated. Studies may be of three different types:

- a well-defined component of a proposed IMD, ISE, or TE project;
- a supplement to a current project for which the proposed research addresses questions that have arisen during the course of implementation (in this case, the proposed study must generate important feedback to the on-going project); and
- a separate applied research effort that grows out of completed projects or from questions that arise through analysis of an issue of priority to ESIE.

Principal Investigators interested in supplementing a current project with a related applied research effort should contact their cognizant NSF Program Officer. Individuals seeking support for a separate research project (see bullet 3 above) should contact Janice Earle at 703-292-8620. Approximately \$1.5 million will be available for separate projects in Fiscal Year 2001. Stand-alone proposals will be reviewed in collaboration with the EHR Division of Research, Evaluation and Communication (REC).

ESIE will not accept proposals being considered for funding by REC. Preliminary proposals are required for stand-alone applied research projects and must be submitted by May 18; full proposals are due September 10.

Technology Education. Technology education in grades K-12 has the goal of promoting technological literacy. Its focus is the human built environment with content ranging over practical domains such as construction, transportation, communication, manufacturing, power and energy, and biotechnology. These content domains provide contexts for problem-solving and afford opportunities for understanding SMT concepts. Use of tools and materials processing are essential and distinctive features of technology education.

National standards for technology, *Content for the Study of Technology*, developed by the International Technology Education Association (ITEA) with support from NSF, have been sanctioned by the National Research Council (NRC) and by the National Aeronautics and Space Administration (NASA) [See URL: <http://www.itea.org>]. Release of national standards brings new opportunities for the creation of K-12 instructional materials; innovative approaches to professional development of technology teachers; explorations of technological careers; development of instruments for measuring learning and technological literacy; informal learning opportunities for youth and adults that promote technological literacy; and research that focuses on effective strategies for teaching and learning technology. ESIE invites proposals related to technology education in the general areas of Informal Science Education (ISE), Instructional Materials Development (IMD), and Teacher Enhancement (TE). Priority will be placed on proposals that address the following issues:

- development, pilot- and field-testing of exemplary instructional materials for grades K-5 and 9-12 that effectively integrate SMT disciplines;
- development of innovative professional development programs that target elementary teachers and focus on teaching and learning technology in the early grades;
- development and validation of grade-specific instruments that are aligned with standards for assessing student learning or technological literacy;

- partnerships that focus on technology through informal education or through extra-curricula activities; and
- development of exemplary materials that foster connections between technology education and scientific and technological careers.

RELATED ESIE PROGRAM EFFORTS

The Centers for Learning and Teaching (CLT) program. CLT is a comprehensive, research-based effort that addresses critical issues and national needs of the science, mathematics, engineering and technology (SMET) instructional workforce. Centers provide a rich environment that melds research, teacher professional development, and education practice. The CLT effort builds upon previous activities in the preparation and professional development of teachers and provides opportunities for graduate students and post-doctorates in the disciplines and in SMET education to acquire the knowledge and skills to educate the next generation of K-12 teachers. For additional information, refer to the CLT Program Announcement:

<http://www.nsf.gov/cgi-bin/getpub?nsf00148>

Advanced Technological Education (ATE) program. ATE promotes improvement in the education of science and engineering technicians at the secondary school and the undergraduate levels. The program is managed jointly by the Division of Undergraduate Education (DUE) and ESIE. The Program supports curriculum development, preparation and professional development of secondary school teachers and college faculty, internships and field experiences for faculty, teachers, and students, and other activities. With an emphasis on two-year colleges, ATE focuses on the education of technicians for the high-technology fields that drive the national economy. For additional information please refer to the ATE Program Announcement: <http://www.nsf.gov/cgi-bin/getpub?nsf0152>

Presidential Awards for Excellence in Mathematics and Science Teaching. 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. Over the years, Awardees have come to constitute a national network of outstanding leaders in science and mathematics education that are a rich resource for the improvement of science and mathematics education throughout the nation. See details that follow.

Presidential Awards for Excellence in Mathematics and Science Teaching



The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) program was established in 1983 to recognize teachers who incorporate innovation and creativity into their classroom teaching, make significant contributions to curriculum development, and demonstrate leadership within the education community. Administered for the White House by the National Science Foundation (NSF), the Presidential Awards are the nation's highest honor for mathematics and science teachers of grades K-12.

There are four award categories—elementary science, elementary mathematics, secondary science, and secondary mathematics. Teachers working in public and private schools in all 50 states, the District of Columbia, Puerto Rico, U.S. territories, and schools of the Department of Defense Educational Activity are eligible for the Presidential Awards. Each year up to 216 outstanding teachers—one in each award category from every state and eligible jurisdiction—are selected as Presidential Awardees.

Applications are reviewed first at the state/jurisdiction level and then by a distinguished committee of prominent scientists, mathematicians, educators, administrators, and past awardees, who pass on their recommendations to the White House. Each Presidential Awardee receives a \$7,500 grant, a special citation from the President of the United States, and a paid trip for the Awardee and one guest to Washington, D.C., to attend the awards ceremony and other special events.

In the individual states and territories, the PAEMST program is aided by a corps of state coordinators who manage the application and preliminary screening process. In addition, program sponsors—public, private, and nonprofit companies and organizations—provide significant support to the PAEMST program in a variety of ways; e.g., underwriting events during the week in Washington, lending promotional support throughout the year, and providing gifts and educational opportunities for Awardees.

Anyone—principals, teachers, students, and members of the general public—may nominate a teacher for the Presidential Awards program. Applications can be downloaded from the NSF Web site—www.nsf.gov/PA—or obtained from any state coordinator, whose contact address is listed on the Web site. Applicants must submit a packet of material specified on the application to the state/jurisdiction coordinator. All applications should be in English and postmarked no later than February 11, 2002.

For further information, visit the PAEMST Web site—www.nsf.gov/PA—or write or call:

NSF/PAEMST, Room 885
4201 Wilson Boulevard
Arlington, VA 22230
703-292-5096

GUIDELINES FOR PROPOSAL DEVELOPMENT

PRELIMINARY PROPOSAL REQUIREMENT

A preliminary proposal provides NSF staff with opportunities to comment on its responsiveness to program goals and priorities and on its potential to compete successfully with other proposals in the merit review process. See *Preliminary Proposal* section under *General Submission Requirements*. Preliminary proposals must be submitted via FastLane on or before the listed target dates. **A PI should submit a preliminary proposal as early as possible prior to the target date in order to ensure adequate time to obtain staff reviews that provide input for developing the final proposal.**

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 01-2)**. Single copies of the **GPG** are available at no cost from the Forms and Publications Unit, via electronic mail at pubs@nsf.gov, or download a copy from the World Wide Web at <http://www.nsf.gov/cgi-bin/getpub?nsf002>.

PROPOSAL SUBMISSION DATES

Program	Preliminary Proposal no later than	Full Proposal
Informal Science Education	March 5, 5:00 PM local time August 2, 5:00 PM local time	May 31, 5:00 PM local time November 15, 5:00 PM local time
<i>ASCEND Projects</i>	August 14, 5:00 PM local time	November 15, 5:00 PM local time
Instructional Materials Development , including Assessment Materials	May 9, 5:00 PM local time	August 23, 5:00 PM local time
Teacher Enhancement Applied Research	May 18, 5:00 PM local time	September 10, 5:00 PM local time

GENERAL ELIGIBILITY REQUIREMENTS

A PI may submit only one full proposal to each program for each closing date. Requests for exceptions must be directed to the program. PIs 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 that is 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, or physical education, nor ones that primarily address social work, home economics, business, the arts, or the humanities. Innovative projects that link scientific and technical study with the humanities are permissible. For further information, please consult the *GPG* (NSF 01-2).

Eligible Institutions and Departments. Organizations with a scientific or educational mission are eligible to submit proposals. These organizations 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 diverse sectors. See program descriptions for specific requirements.

COORDINATION WITH NSF SYSTEMIC INITIATIVES

To the extent possible, EHR 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 Initiatives (USI), Urban Systemic Program (USP), and Rural Systemic Initiatives (RSI) [Division of Educational System Reform (ESR)]. Prior to proposal submission, prospective PIs must consult with PIs of relevant systemic projects if they intend to operate in the same geographical area. Proposals should 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. Current listings of major systemic projects within ESIE and ESR can be found on the following web sites: <http://lsc-net.terc.edu/> (for Local Systemic Change projects), <http://www.ehr.nsf.gov/ehr/esr/usp.asp> (for Urban Systemic Initiative/Program projects), <http://www.ehr.nsf.gov/ehr/esr/ssi.asp> (for Statewide Systemic Initiatives projects), and <http://www.ehr.nsf.gov/ehr/esr/rsi.asp> (for Rural Systemic Initiatives projects).

SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Name: INFORMAL SCIENCE EDUCATION (ISE)

Short Description/Synopsis of Program: 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.

Cognizant Program Officer(s): Barry Van Deman, Room 885, Division of Elementary, Secondary and Informal Education, telephone 703- 292-8620, e-mail: bvandema@nsf.gov.

Applicable Catalog of Federal Domestic Assistance (CFDA) No.: 47.076 — Education and Human Resources

ELIGIBILITY INFORMATION

- ◆ **PI eligibility limitations:** An individual may serve as the Principal Investigator (PI) on no more than one proposal per round of competition.
- ◆ **Disciplinary Limitations:** Proposals may be submitted for projects in any field of science, mathematics, engineering and technology typically supported by NSF.
- ◆ **Limitation on the number of proposals that may be submitted by an organization:** None
- ◆ **Cost-sharing/matching requirements:** For all ISE projects, except ASCEND, required cost-sharing is 10% of the requested total amount of NSF funds; for ASCEND projects 30% cost-sharing is required.

AWARD INFORMATION

- ◆ **Type of award anticipated:** Standard Grant or Continuing Grant
- ◆ **Number of awards anticipated in FY 2002:** 55-75
- ◆ **Amount of funds available:** Approximately \$31 million, pending availability of funds
- ◆ **Anticipated date of award:** January and May

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

- ◆ **Proposal Preparation Instructions**
 - **Letter of Intent requirements:** None
 - **Preproposal requirements:** Preliminary Proposal Required
 - **Proposal preparation instructions:** Standard NSF *Grant Proposal Guide (GPG)* instructions

- **Supplemental proposal preparation instructions:** None
- **Deviations from standard (GPG) proposal preparation instructions:** Appendices can be submitted without prior Program Officer approval.

◆ **Budgetary Information**

- **Cost-sharing/matching requirements:** For all ISE projects, except ASCEND, required cost-sharing is 10% of the requested total amount of NSF funds; for ASCEND projects 30% cost-sharing is required. Proposed cost-sharing must be shown on line M on the proposal budget form (NSF 1030) and explained in the budget narrative. Please note: ISE typically contributes up to one-third of total production cost and one-half of outreach and evaluation costs for most media projects. For museum and community/youth-based projects, ISE generally supports up to two-thirds of total project costs.
- **Indirect cost (F&A) limitations:** None

◆ **FASTLANE REQUIREMENTS**

- **FastLane proposal preparation requirements:** Use of FastLane is required for preliminary and full proposals. Twelve copies of all supplemental materials (e.g., videos, exhibit plans, sample interactive materials) should be mailed to the ISE program.
- **FastLane point of contact:** Jeff Harris, Division of Elementary, Secondary and Informal Education, Suite 885, telephone 703-292-8620, e-mail jsharris@nsf.gov; or FastLane Help Desk, telephone 1-800-673-6188, e-mail fastlane@nsf.gov.

◆ **DEADLINE/TARGET DATES**

- **Preliminary Proposal Deadline:** Regular ISE--5:00 PM local time, March 5 (FastLane)
Regular ISE--5:00 PM local time, August 2 (FastLane)
ASCEND—5:00 PM local time, August 14 (FastLane)
- **Full Proposal Deadline:** Regular ISE--5:00 PM, local time May 31 (FastLane)
Regular ISE--5:00 PM, local time November 15 (FastLane)

PROPOSAL REVIEW INFORMATION

- ◆ **Merit Review Criteria:** Standard National Science Board approved criteria; as well as special criteria listed under the *Review Criteria* section at the back of these Guidelines.

AWARD ADMINISTRATION INFORMATION

- ◆ **Grant Award Conditions:** GC-1 or FDP III
- ◆ **Special grant conditions anticipated:** Other conditions may apply as required (e.g., commercial dissemination, income, world-wide web requirements).
- ◆ **Special reporting requirements anticipated:** Additional reporting requirements may be included as required.

INFORMAL SCIENCE EDUCATION PROGRAM

Target Dates for Proposals

Preliminary, No Later than--March 5; Full—May 31
Preliminary, No Later Than--August 2; Full--November 15

ASCEND Projects

Preliminary, No Later Than--August 14; Full--November 15

Telephone: 703-292-8620

GOALS AND OBJECTIVES

Informal Science Education (ISE) supports projects designed to increase public understanding of science, mathematics, and technology. All ISE projects have as their primary audience the informal learner. Informal learning is the lifelong process in which every person acquires knowledge, skills, attitudes, and values from daily experiences and resources in his or her environment.

Informal learning, in contrast with formal learning, occurs outside formal classroom settings and is not part of a school program, activity, or assignment. Informal learning is voluntary, self-directed, lifelong, and motivated mainly by intrinsic interests, curiosity, exploration, 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 those fields. While ISE projects are aimed primarily at the informal learner, the ISE program encourages linkages to formal education.

The goals of the ISE program are to produce significant positive changes that:

- increase the number of youth, particularly from underrepresented groups (e.g., minorities, women and girls, persons with disabilities) who are excited about SMT and who pursue SMT activities both in-and out-of-school;

- promote linkages between informal and formal education, creating a synergy that strengthens SMT education in many learning environments;
- stimulate parents and other adults to become effective proponents for higher quality and universally available SMT education in both informal and formal settings;
- encourage parents and other primary caregivers to support their children's SMT endeavors in the home and elsewhere;
- bring informal science education programs and activities to areas that are currently without, or minimally reached by, SMT opportunities (e.g., rural and inner city environments);
- improve the scientific and technological literacy of children and adults so that 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 SMT policies that have societal implications; and
- strengthen SMT education, as well as the ISE program and its supported activities, through applied research about informal learning.

The ISE program especially encourages projects that provide creative and innovative informal learning activities that reflect and apply recent research in SMT education. Projects should contribute to strengthening the infrastructure of informal science education through activities such as electronic networking, technical assistance, and professional development of informal science educators. Projects should conduct research on the informal education process to determine the

effectiveness of innovative techniques for motivating interest in, and informing the public about, SMT topics.

PROJECT CHARACTERISTICS

ISE projects provide rich and stimulating opportunities that primarily are not part of formal school programs, activities, or assignments. Through such opportunities individuals of all ages, interests, and backgrounds may increase their appreciation, understanding and use of science, mathematics, and technology. When appropriate, projects are expected to align with national science, mathematics, and technology standards to guide project content and to promote linkages with formal education. 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 through community/youth-based programs.

Most ISE projects are designed to reach large audiences and to have a significant regional or national impact. ISE does not support local projects that reach relatively few people, nor does it support general operating expenses or capital development costs for informal science institutions. The Program does, however, encourage development of projects that address critical needs for informal science education in less populated regions of the country. All projects are expected to disseminate effective designs or materials in order to maximize their impact. All ISE projects should include plans for rigorous evaluation, based on comprehensive quantitative and qualitative information, in order to document project impact and demonstrate potential for dissemination and replication.

AREAS OF SPECIAL EMPHASIS

ISE encourages the field to strengthen its many current positive approaches to informal education for the American public. The field is challenged also to expand the scope of informal science education activities in order to have greater impact in areas of particular need. Specifically, ISE expects informal science education institutions to become significant players in the total science and mathematics education of our nation's youth. To

accomplish this, they must establish new relationships with major scientific research efforts that enable them to inform the public of the latest scientific advances; explore new ways to engage the public in SMT activities; and inform the public about the need for high-quality, standards-based SMT education. ISE will place special emphasis in the following areas:

Collaborations That Link Informal and Formal Education Communities. Through effective combination of diverse resources and expertise, collaborations can promote creativity and significantly broaden project impact. ISE encourages development of collaborative projects that bring together individuals and organizations from the formal and informal education communities. Where informal science education institutions establish, or have in place long-term, formal agreements with schools in their service area, ISE will support the informal education aspects of those endeavors. For instance, ISE will support development and piloting of materials and educational programs that are complementary to ones in formal education and that are aligned with the curricula and teacher professional development needs of schools. Such materials and programs also must be designed and used to inform the general public, parents, and other caregivers about science, mathematics, and technology, as well as about curricula and educational reform in the schools. Funds for the on-going implementation, operation, and delivery of such services to schools must be provided by the school, the informal education institution, or other sources.

Increasing Opportunities for Under-represented 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 agencies (e.g., community-based organizations, museums, media) for development and implementation of new and innovative strategies that demonstrate promise of increasing participation of minorities, girls and women, persons with disabilities, and youth and adults from economically disadvantaged areas (e.g., inner cities, rural communities) in SMT disciplines.

Increasing Involvement of Parents in SMT. Parents and other primary caregivers may be effective proponents for science and mathematics education reform. Further, they may play a critical

role in promoting success through encouragement and involvement in their children's SMT activities at home, in school, and in informal education settings. ISE encourages development of projects that improve parent understanding of, and attitudes toward, science, mathematics, and technology, as well as ones that increase awareness of new approaches in teaching and assessment. Materials for parents/caregivers should provide effective ways to support children's work in science and mathematics and actively involve them as partners in inquiry-based, experiential activities.

Informing the Public about Research. ISE supports projects that link with major national and international science research efforts in order to inform the public about the purposes, progress, findings, and implications of cutting edge research. Proposed projects should be designed to reach significant segments of the American public. Because of the on-going nature of research, projects should be designed to be updated periodically in order to incorporate new findings or to report progress in the research endeavor.

Increasing Public Understanding of Mathematics. ISE is interested in coordinated, wide-reaching informal education efforts that promote key elements of the national standards in mathematics. For instance, a relatively small public exhibit might explain one or more important areas and engage the public in mathematical activities. If the exhibit were easily replicated, it could be implemented simultaneously at sites across the nation and be promoted by a coordinated national and local campaign as a cost-effective means of informing parents and the public about mathematics education reform.

Innovative High Risk Projects. Innovative and creative informal education projects that develop innovative approaches to delivering informal SMT education and/or delve into emerging SMT content areas have the potential to open new opportunities in the informal science education field. Such projects should test their approaches and document their effectiveness toward reaching SMT learning goals. These projects must incorporate applied research studies and strong evaluation plans. There also should be specific dissemination activities to inform the informal science education field about findings.

NSF AFTER SCHOOL CENTERS FOR EXPLORATION AND NEW DISCOVERY (ASCEND)

As part of its community-based programming effort, ISE will accept proposals for innovative projects for engaging youth in substantive out-of-school activities in specific areas of science, mathematics, and engineering. This effort is established by NSF in accordance with the American Competitiveness and Workforce Improvement Act of 1998 (P.L. 105-277). The Act reflects the national need to provide "opportunities for enrollment in year-round academic enrichment," particularly in support of developing a technologically literate U.S. workforce. ESIE is interested in projects that would provide unique opportunities for middle and high school students to explore science, mathematics, and engineering in creative after-school and/or weekend programs. Such projects should not be extensions of the formal programs offered during the regular school day but rather should explore new content and strategies to interest youth in on-going discovery as well as careers in science, mathematics, engineering, and technology fields.

Proposals should follow the general criteria of the ISE program regarding such areas as staffing, advisors, evaluation, and ancillary materials. The following additional parameters and criteria are specific to ASCEND activities.

- **Project goals.** Project goals should be stated in terms of intended student outcomes.
- **Level and depth of instruction.** Content and instruction should reflect relevant national standards for science, mathematics, and/or technology appropriate to the age level(s) of targeted participants.
- **Minimum/maximum length of instruction/student involvement.** Participants must become engaged in meaningful long-term experiences; investigations must lead to knowledge and understanding of complex scientific and technological concepts and processes; and activities must relate to the development of workplace skills.
- **Recruitment.** Proposals must include a plan to identify potential participants and to encourage their participation. Mechanisms to facilitate access by students from underserved populations (e.g., girls, underrepresented minorities, persons with

disabilities) should be incorporated into the project.

- **Type of institution eligible.** All institutions with an education mission are eligible. Such institutions include, but are not limited to, two- and four-year colleges and universities, businesses, informal science education institutions, professional societies, middle and secondary schools, and community agencies.
- **Length of Project.** Projects are expected to be of two to three year duration.
- **Use of technology and scientific instrumentation.** Applicants are urged to consider use of technology and scientific instrumentation as integral parts of learning experiences, wherever appropriate.
- **Partnerships.** Partnerships with industry, the local community, the scientific and/or business community, and others that might enhance the scope of the project and/or the ability of the project to serve participants effectively are strongly encouraged. Partners may bring additional resources to a project. In many cases, they also may provide opportunities to link the learning experience with real science, mathematics, and engineering endeavors in the local community, in industry, and in the research laboratory. If appropriate, projects may connect with, and build upon, existing informal education projects that engage students in real-world science and technology experiences.
- **Parental Involvement.** Whenever possible, parents or primary caregivers should be included as partners in order to provide at-home continuity and support for students' learning experiences.
- **Scope.** Projects are expected to be either local or regional in scope.
- **Link to NSF systemic reform efforts.** In those areas with systemic reform projects, **ASCEND** projects should be linked with existing systemic reform projects.
- **Research and Evaluation.** Projects should include a plan to track participation and assess effectiveness in order to determine strengths and weaknesses and to make interim adjustments. A plan for summative evaluation should be developed for assessing

the impact on the youth that participate in the project across such dimensions as enhanced performance and interest in formal SMET study, decisions to pursue SMET careers, increased opportunities for summer job opportunities related to SMET careers, etc. The final report should include documentation suitable for others to use as guidance for project replication.

- **Student charges and/or support.** Activities may be free to students or projects may charge reasonable fees for participation. For fee-based programs, scholarship arrangements for participants from low-income families must be built into the project. Support for scholarships from local partners is encouraged. Cooperative work/internship opportunities with local organizations such as industries, research laboratories, and government agencies have the potential to provide participants with science, mathematics, and engineering experiences as well as with financial support.

Preliminary proposals are required. ASCEND proposals should be clearly identified and succinctly address all of the key project components so that reviewers understand the overall plan for the proposed project. Preliminary proposal project descriptions are limited to six pages and should be submitted by August 14th. The deadline for full proposals is November 15th. Questions should be addressed to: Julia Clark, Program Officer, at 703-292-8620.

OTHER CONSIDERATIONS

Cost-sharing. All proposals to ISE must include 10% cost-sharing, with the exception of NSF ASCEND projects that require 30%. The listed cost-share becomes a condition of award and must be shown on line M on the proposal budget. The nature (e.g., in-kind, financial) and intended use of cost-shared resources must be discussed in the budget narrative in enough detail to allow NSF to determine its impact on the proposed project. Documentation of availability of cost-sharing funds must be included in the proposal. See section on *Proposal Preparation and Submission Instructions* found at the back of these *Guidelines* for further information.

Please note: ISE typically contributes up to one third of the total production cost and one half of outreach and evaluation costs for most media

projects. For museum and community/youth-based projects, ISE generally supports up to two-thirds of total project costs. Additional resources can be obtained from sources not allowable as cost-share such as other Federal agencies. These resources can be identified as leveraging, but not listed as cost share.

Evaluation. Competitive proposals must have a well-developed, comprehensive evaluation plan. When appropriate, ISE projects should include three stages of evaluation at a level commensurate with the nature and scope of the proposed project: baseline, formative, and summative evaluations. Applicants must provide adequate time at the end of a project to conduct a summative evaluation. The evaluation plan should clearly detail evaluation goals, design, and methodologies, as well as indicate individual(s) responsible for conducting the evaluation and their expertise. The budget should clearly reflect both internal and external evaluation costs. A letter of commitment from external evaluators should include a summary of the planned work. It should be clear what each external evaluator is responsible for and to whom s/he reports.

PROPOSAL REQUIREMENTS

Preliminary Proposals. A preliminary proposal is required for submission of a full proposal. Preliminary proposal submission requirements are included under the section, *Preparation and Submission of Proposals*, found at the back of these *Guidelines*.

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 section, *Preparation and Submission of Proposals*, at the back of these *Guidelines*. For ISE, the narrative should include results from any prior NSF support, a project overview, goals and objectives, general project description, qualifications of key personnel who will be conducting the project, anticipated results, and evaluation and dissemination plans. Substantive information essential to understanding the details of complex projects should be placed in appendices with

explicit references in the narrative. For example, for a television series, the narrative would outline the scope of the series, briefly describe the programs (outlines, treatments, or scripts would be 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).

Proposers are required to prepare and submit proposals through the FastLane system. Detailed instructions for registration, proposal preparation, and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>.

Applicants who encounter problems with FastLane should contact Jeff Harris, Science Education and Technology Analyst, ESIE, at 703-292-8620 or via e-mail at jsharris@nsf.gov. The signed copy of the proposal Cover Sheet (NSF Form 1207) must be postmarked (or contain a legible proof of mailing date assigned by the carrier) within five business days following proposal submission in accordance with the FastLane proposal preparation and submission instructions referenced below. Ancillary materials that cannot be submitted electronically must be mailed directly to the ISE program. Twelve copies of any ancillary materials such as videocassettes or exhibit layouts are required. Although NSF does not require reviewers to read appendices, ISE reviewers are asked to read any materials explicitly referenced in the proposal narrative.

RELATED OPPORTUNITIES

ISE Supplements for Public Understanding of Research. ISE will fund as many as 30 supplements (up to \$50,000 each) to research grants supported by NSF. Supplements are intended to inform the general public about the content, process, and relevance of state-of-the-art research. Interested PIs with active research grants should contact their Program Officers in the appropriate directorates for information about special requirements and procedures for submitting requests for supplements.

SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Name: INSTRUCTIONAL MATERIALS DEVELOPMENT (IMD)

Short Description/Synopsis of Program: IMD projects create comprehensive curricula and supplemental instructional materials, as well as student assessments that enhance classroom instruction preK-12. These materials reflect national standards for science, mathematics, and technology education; enhance the ability of all students to gain a fundamental understanding of science, mathematics, and technology; and lead to increased interest, further study, and potential career preparation in these fields.

Cognizant Program Officer(s): Dr. John Bradley, Room 885, Division of Elementary, Secondary and Informal Education, telephone 703-292-8620, e-mail: jbradley@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) No.: 47.076 — Education and Human Resources

ELIGIBILITY INFORMATION

- ◆ **PI eligibility limitations:** An individual may serve as the Principal Investigator (PI) for no more than one proposal per round of competition.
- ◆ **Eligible fields:** Proposals may be submitted for projects in any field of science, mathematics, engineering, or technology, typically supported by NSF.
- ◆ **Limitation on the number of proposals that may be submitted by an organization:** None
- ◆ **Cost-sharing/matching requirements:** Cost-sharing of 5% of the requested total amount of NSF funds is required for new materials; 20% of the requested total amount of NSF funds is required for revision of published materials.

AWARD INFORMATION

- ◆ **Type of award anticipated:** Standard Grant and Continuing Grant
- ◆ **Number of awards anticipated in FY 2002:** 25-35
- ◆ **Amount of funds available:** Approximately \$15 million, pending availability of funds
- ◆ **Anticipated date of award:** February

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

- ◆ **Proposal Preparation Instructions**
 - **Letter of Intent requirements:** None
 - **Preproposal requirements:** Preliminary proposal is required.
 - **Proposal preparation instructions:** Standard NSF Grant Proposal Guide (*GPG*) instructions. Project description for comprehensive, multi-year curricula may be 20 pages in length.
 - **Supplemental proposal preparation instructions:** None
 - **Deviations from standard (*GPG*) proposal preparation instructions:** Appendices may be submitted and must be referenced in the narrative.

◆ **Budgetary Information**

- **Cost-sharing/matching requirements:** Cost-sharing of 5% of the requested total amount of NSF funds is required for new materials; 20% of the requested total amount of NSF funds is required for revision of published materials. Proposed cost-sharing must be shown on line M of the proposal budget (NSF Form 1030) and explained in the budget narrative.
- **Indirect cost (F&A) limitations:** None
- **Other Budget Limitations:** See Section on “Proposal Requirements” for additional information.

◆ **FASTLANE REQUIREMENTS**

- **FastLane proposal preparation requirements:** Use of FastLane is required for preliminary and full proposals.
- **FastLane point of contact:** Sarita Rich, Division of Elementary, Secondary and Informal Education, Suite 885, telephone 703-292-8620, e-mail srich@nsf.gov; or FastLane Help Desk, telephone 1-800-673-6188, e-mail fastlane@nsf.gov.

◆ **DEADLINE/TARGET DATES**

- **Preliminary Proposal Deadline:** 5:00 PM local time, May 9 (FastLane)
- **Full Proposal Deadline:** 5:00 PM, local time August 23 (FastLane)

PROPOSAL REVIEW INFORMATION

- ◆ **Merit Review Criteria:** Standard National Science Board approved as well as special criteria listed under the *Review Criteria* section at the back of these Guidelines.

AWARD ADMINISTRATION INFORMATION

- ◆ **Grant Award Conditions:** GC-1 or FDP III
- ◆ **Special grant conditions anticipated:** Additional award conditions may be made addressing the pilot-testing and evaluation of materials on preK-12 students and, as applicable, the distribution or commercial publication of materials developed, a license for government use, and program income.
- ◆ **Special reporting requirements anticipated:** Additional reporting requirements may apply.

INSTRUCTIONAL MATERIALS DEVELOPMENT PROGRAM

Target Dates for Proposals

Preliminary, No Later Than--May 9; Full--August 23

Telephone: 703-292-8620

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, pre-Kindergarten through grade 12 (preK-12). Projects range from the substantial revision of effective materials to the creation of new ones; from development of a single module for one grade level to 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 accompanying materials for teachers, administrators, parents and other caregivers in order to promote the adoption and enhance the effectiveness of the implementation of student instructional materials in classrooms. Development of materials designed solely for the professional development of practicing teachers is supported by the Teacher Enhancement (TE) program, see the section, *Professional Development Materials*, in the TE section of these *Guidelines*.

IMD supports projects that are national in scope and significance. These projects should have the potential to enhance student learning and make a significant and noticeable impact on the national market for instructional materials. IMD also supports innovative, high-risk projects that develop and test prototypes of instructional materials and learning technologies. Proposals for such high-risk projects must demonstrate promise for advancing the state-of-the-art development of curriculum and assessment materials and for testing the limits of instructional and assessment materials to promote student understanding of SMT concepts and processes.

The goal of the IMD program as a whole is the development of high-quality instructional and assessment materials to enhance SMT content knowledge, as well as the thinking skills and problem solving abilities of *all* students, regardless of background, ability, or future education plans. The materials should promote positive student attitudes toward SMT and positive perceptions of themselves as learners. The materials also should encourage a broad cross section of students to pursue SMT education through the use of real-world contexts and/or providing an understanding of the role of SMT in the workplace. Achievement of these goals often requires improvement of teachers' content knowledge and pedagogical strategies. IMD projects, therefore, often need to provide support to teachers to help them extend their content knowledge and pedagogical skills.

PROJECT CHARACTERISTICS

Proposed instructional materials must exhibit a coherent content framework that is aligned with national standards; fosters inquiry, including critical thinking, problem solving, decision making, and communication at increasing levels of complexity; and focuses on appropriate and important topics at each grade level. Projects should be grounded in the recent research in teaching and learning (e.g., Bransford, Brown, & Cocking, 1999) and further an understanding of the connections between science, mathematics, and technology. Projects should be planned and implemented by teams consisting of appropriate combinations of practicing scientists, mathematicians, and engineers, SMT educators, classroom teachers, assessment experts, and instructional technology experts.

Incorporation of instructional technologies should be considered, especially when those technologies are used to provide learning experiences that

enhance student understanding. Strategies for ensuring equity and accessibility in materials use and in student learning should be part of the development and implementation process. In addition, when appropriate, IMD projects should include products designed to help parents understand the materials. It is important that projects include strategies and tools to assess the impact of the instructional materials on student learning. Project evaluation should document changes in student learning; improvements in the SMT performance and participation of female and underrepresented minority students; and modifications in instructional approaches associated with the use of the new instructional materials. These data should be presented in ways that help teachers, administrators and parents make informed decisions about curriculum adoptions.

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 the section, *Preparation and Submission of Proposals*, located toward the back of these *Guidelines*.

Full Proposals. For information on requirements for proposal submission, see section, *Preparation and Submission of Proposals*.

Duration. Project duration is expected to be from two to five years with an award amount not to exceed \$1.5 million in any individual year of the project. The maximum total request of any project may not exceed \$6 million.

Typical Funding Levels. The level of funding for IMD grants depends upon the scope of the project. Amounts range from \$200,000 to \$300,000 for the development of one or two modules to several million dollars for projects seeking to develop comprehensive materials that span several years.

Budget. The majority of IMD project costs support personnel time and personnel-related costs; modest requests to support acquisition of materials, supplies, equipment, and computing services are allowable. Grantees are expected to have the computing facilities, most of the equipment, and the physical environment to achieve project goals. IMD will not fund the purchase of classroom equipment necessary to

pilot, field-test, or implement instructional materials.

Cost-sharing. Cost-sharing of 20% of the requested total amount of NSF funds is required for revision of published materials; cost-sharing of 5% of the total amount of NSF funds is required for all other proposals. Proposed cost-sharing must be shown on line M on the proposal budget (NSF Form 1030). For information on requirements for proposal submission, see section, *Preparation and Submission of Proposals*.

Special Projects. Information about conference grants, Small Grants for Exploratory Research (SGER), and planning grants can be found in the section, *Special Categories of Full Proposals*, located toward the back of these *Guidelines*. An IMD Program Officer should be contacted before any such submission.

PROPOSAL PROJECT DESCRIPTION

The project description should present the following information.

- **Goals and objectives.** Provide a description of project goals and objectives.
- **Anticipated products.** Describe the materials to be produced (e.g., workbooks, textbooks, software, videos, CD-ROMs, scholarly publications, monographs).
- **Need/content area.** Provide evidence that the proposed materials meet the needs of students and teachers throughout the nation better than existing materials. The proposal should reference relevant literature to indicate 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 recommended (see: <http://enc.org/partners/fed/mfinder/nsf.htm>).
- **Development process.** Explain how the materials will be created, reviewed, pilot-tested, field-tested, evaluated, and published. In virtually all cases, projects should (1) identify the desired learning outcomes for students, (2) create methods for determining whether students have attained those outcomes, and (3) design

instructional materials and approaches that enable students to successfully demonstrate attainment of those outcomes. Draft materials must be pilot-tested with master teachers, and field-tests must include a broad range of teachers serving students from diverse backgrounds. It is expected that results of these trials will be used to inform revisions of the materials and that both the results and the revisions will be submitted to NSF.

The proposal should contain a detailed plan of work, including a complete timeline. If the materials are modular or supplemental in nature, they must have a clear and limited content focus; utilize appropriate scientific, computational, and educational technologies; and demonstrate connections to comprehensive curricula. If the materials span one or more years of instruction, there must be an external review to ensure accuracy of the content, appropriateness of the pedagogy, and suitability of the contexts, language, etc. for the intended audience. External reviewers must be selected in consultation with the cognizant Program Officer at NSF.

- **Content and pedagogical strategies.** Describe how the materials' content and pedagogical strategies are aligned with national standards; how the materials will prepare and motivate students to continue to study SMT at higher grade levels; and how the materials will account for potential differences in students' prior knowledge. Resources (e.g., computer expertise) that will be needed at the school level for implementation of the materials also must be specified. The proposal should provide a detailed description of specific learning activities to be developed, including experiments, student projects, assessments, etc. Reviewers often find prototypes of materials to be useful in the review process; they may be included in appendices.
- **Assessment.** Describe tools and strategies for student assessment that will be included with the instructional materials. It is critical that student assessments be clearly aligned with the desired student learning outcomes and be informed by the national standards in mathematics, science, and/or technology. Assessments should address both formative and summative aspects of

learning. That is, assessments should include not only strategies for teachers to use during instruction to determine what students are learning, but also tools (e.g., tests, performance tasks) for teachers to use at the end of a substantive "unit" of instruction to determine the depth of student learning. Development and validation of assessment tools should occur in both the pilot-and field-testing components of the project. To the extent possible, there should be a variety of assessment strategies that are responsive to the different ways that students communicate understanding of content.

- **Professional Development.** Describe the products to be developed that will support teachers and administrators to accurately and effectively implement the materials. This component should include teaching guides (e.g., print, CD-ROM, web-based) to accompany the student materials, but may also include other products. If the materials span one or more years of instruction, there must be separate professional development materials to help teachers learn more about the content and pedagogy of the materials. There should be plans for sustaining the use of the professional development materials after the end of the project and for informing teacher educators about the new materials in order to incorporate them into preservice teacher education programs. The creation of the professional development materials must meet the guidelines for Teacher Enhancement (TE) program's *Professional Development Materials*, see relevant sections of these *Guidelines*.
- **Parents, caregivers, and other community members.** Describe ways to communicate to the community how the materials are designed to enhance learning of significant subject matter content and to increase student interest in science, mathematics, and technology. Attention should be given to communicating how the materials may differ from those with which community members may be familiar. Further, parent/community materials should assist parents and caregivers in helping their children in SMT education.
- **Evaluation.** Describe the evaluation plan, including key questions to be answered, methodologies, instruments, data collection,

and analysis frameworks. At least two kinds of evaluation are needed: first, and most important, is evaluation of the success of the materials in improving student content knowledge and conceptual understanding. The instruments for this part of the evaluation might be the same as those used to assess student learning within the materials themselves. Second, is an evaluation of the process of developing the materials; that is, whether the materials were produced in an effective and cost-efficient manner. For both types of evaluation, both internal and external evaluation plans may be needed. The internal evaluation might be conducted by project staff and would be designed to affect continuing materials development. External evaluation would be designed to ensure the field that the project's work is of high quality. The external evaluation should be reported in ways that can be easily accessed and understood by potential users. The proposal should provide evidence of the qualifications of the internal and external evaluators.

- **Dissemination and Implementation.** Explain how information about the materials will be shared with professionals in SMT education communities both during and after the project. Instructional materials typically will be published and distributed commercially, although in a few instances, "free" distribution (e.g., through a refereed and highly visible web site) might be an appropriate outlet. Proposals should provide a timeline for securing a publisher (or identifying another distribution outlet). This step typically should occur within the first two years of the project. Distribution outlets must be firmly established (e.g., through a contract with a publisher or distributor) by the end of the third year of the project. Dissemination plans that project potential sales income during the duration of the grant should specify how that income will be used to support the implementation, revision or continued development of materials.
- **Personnel.** Describe the expertise and experience of the key personnel. It is expected that the development team will include, as appropriate, scientists, mathematicians, and engineers; science and mathematics educators; classroom teachers; assessment and evaluation experts;

technology experts; and instructional and educational technologists. The proposal should include a detailed description of the role and commitment level of each of the key personnel.

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

REPORTING

Annual reports. Yearly reports are required for all materials development projects. Each report should highlight major accomplishments, document alignment with the proposed time line, and describe the status of the development of the materials. Samples of completed materials, or drafts of materials, should be included.

Final reports/materials submission. Two complete sets of materials must be submitted to IMD at the time of the submission of the final report. If materials are not in the final, published form when the final report is submitted, two published copies must be submitted to IMD as soon as they become available; one published copy must be submitted to the Eisenhower National Clearinghouse (ENC). At any time, IMD staff may request interim drafts of materials for review. Refer to the section, *Announcement and Administration of Awards*, toward the back of these *Guidelines* for further details.

ASSESSMENT PROJECTS

Goals and Objectives. Accurate assessment of student learning is critical for determining the effects of education reforms. New assessment tools must be developed that are tied to national standards, as well as to specific reform goals. Similarly, schools and districts may need support for new types of assessment; for documenting the quality of new instructional materials; for assessing teacher knowledge and practice; and for assessing learning in informal settings. Assessment projects should provide accurate data that expand understanding of how to enhance student learning and how to improve instructional practice.

IMD encourages development and implementation of new directions in the assessment of student and teacher learning in both formal and informal settings. Assessment projects should be collaborations between those with appropriate content expertise and those with expertise in assessment development and psychometrics. Assessment projects should be regional or national in scope and should address one or more of the following areas:

- **Development.** Comprehensive tests are needed that are consistent with national standards, cost effective, and easy to administer, score, and interpret. Areas of critical assessment should be addressed, e.g., assessment instruments that focus on NSF-funded materials; for example, a test that focuses on key concepts or strands in middle school mathematics or one that develops various tools to assess and guide student learning. Comprehensive science assessments are particularly needed and encouraged.
- **Technical Assistance.** New approaches are needed to provide technical assistance to schools and districts in adapting and implementing available assessment items, tasks, or tests.
- **Communication.** Materials and strategies may be developed to help schools and districts communicate effectively with teachers, administrators, school board members, parents, and the general community about the role of assessment and how to be critical consumers of the assessment results.
- **Measuring Teacher Knowledge and Performance.** Information about effective ways to measure teachers' knowledge and performance is needed, as well as instruments to collect that information.
- **Informal Education.** Assessment instruments that build on the current knowledge-base and examine children's learning in informal settings, such as museum exhibits, television, films are needed. Projects should consider any connections (in terms of both content and psychometric approaches) with classroom assessment efforts.

- **New Technologies.** Examination of effective applications of technologies for assessment is needed; studies examining unique contributions of various technologies to assessment are encouraged.

References

Bransford, J. D., Brown, A. L., & Cocking, R. R. (1999). How people learn: Brain, mind, experience, and school. Washington, DC: National Academy Press.

SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Name: TEACHER ENHANCEMENT (TE)

Short Description/Synopsis of Program: TE supports professional development projects to broaden and deepen the content knowledge and pedagogical skills of teachers of science, mathematics, and technology (SMT). Projects typically also involve administrators and others who play significant roles in promoting learning environments and cultures that enable teachers to engage all students in rich and challenging learning activities.

TE encourages the following major categories of proposals: (1) Local Systemic Change projects, both comprehensive and pilot efforts; (2) Teacher Retention and Renewal; (3) Mathematics and Science Courses for Improving Teacher Qualifications; (4) Professional Development Materials; and (5) Professional Development with Emerging Technologies. 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 professional development to be aligned with the curriculum and instructional materials used in participating schools and that the instructional materials implemented are of high quality and aligned with national standards. **TE does not support the development of curriculum or instructional materials for students.**

Cognizant Program Officer(s): Dr. Wayne Sukow, Room 885, Division of Elementary, Secondary and Informal Education, telephone 703-292-8620, e-mail: wsukow@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) No.: 47.076—Education and Human Resources

ELIGIBILITY INFORMATION

- ◆ **Limitation on the categories of organizations that are eligible to submit proposals:** Local Systemic Change projects require establishment of partnerships among school districts or coalitions of school districts and at least one organization with a scientific or educational mission. 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. NSF-supported SSI, USI, USP, and RSI projects are ineligible to apply for LSC Pilot projects.
- ◆ **PI eligibility limitations:** An individual may serve as the Principal Investigator (PI) on no more than one proposal per round of competition.
- ◆ Proposals may be submitted for projects in any field of science, mathematics, engineering, and/or technology, typically supported by NSF.
- ◆ **Limitation on the number of proposals that may be submitted by an organization:** None
- ◆ **Cost-sharing/matching requirements:** For Professional Development Materials, cost-sharing of 10% of the total amount of NSF funds is required; for TE projects, cost-sharing of 20% is required.

AWARD INFORMATION

- ◆ **Type of award anticipated:** Standard Grant or Continuing Grant

- ◆ **Number of awards anticipated in FY 2002:** 55-70
- ◆ **Amount of funds available:** Approximately \$35 million, pending availability of funds.
- ◆ **Anticipated date of award:** March.

PROPOSAL PREPARATION & SUBMISSION INSTRUCTIONS

◆ Proposal Preparation Instructions

- **Preproposal requirements:** Preliminary proposal is required.
- **Proposal preparation instructions:** Standard NSF *Grant Proposal Guide* (GPG) instructions.
- **Appendices:** Appendices are limited to 20 pages, in addition to letters of support. Appendices must be referenced in the proposal narrative.
- **Deviations from standard (GPG) proposal preparation instructions:** None

◆ Budgetary Information

- **Cost-sharing/matching requirements:** For Professional Development Materials, cost-sharing of 10% of the total amount of NSF funds is required; for TE projects, cost-sharing of 20% is required. Proposed cost-sharing must be shown on line M on the proposal budget (NSF Form 1030) and explained in the budget narrative.
- **Indirect cost (F&A) limitations:** None
- **Other budgetary limitations:** Award amounts up to \$1.5 million per year with no more than \$6 million over the duration of the project. Also, see “Budget Requirements” Sections.

◆ FASTLANE REQUIREMENTS

- **FastLane proposal preparation requirements:** Use of FastLane is required for preliminary and full proposal.
- **FastLane point of contact:** Sarita Rich, Division of Elementary, Secondary and Informal Education, Suite 885, telephone 703-292-8620, e-mail srich@nsf.gov or FastLane Help Desk, telephone 1-800-673-6188, e-mail fastlane@nsf.gov.

◆ DEADLINE/TARGET DATES

- **Preliminary Proposal Deadline:** 5:00 PM local time, May 18 (FastLane)
- **Full Proposal Deadline:** 5:00 PM, local time September 10 (FastLane)

PROPOSAL REVIEW INFORMATION

- ◆ **Merit Review Criteria:** Standard National Science Board approved criteria, plus additional criteria detailed in the TE section of these *Guidelines* for LSC projects; see special criteria listed under the *Review Criteria* section at the back of these *Guidelines* for other TE components.

AWARD ADMINISTRATION INFORMATION

- ◆ **Grant Award Conditions:** GC-1 or FDP III
- ◆ **Special reporting requirements anticipated:** Local Systemic Change projects require participation in a standardized core evaluation.

TEACHER ENHANCEMENT PROGRAM

Target Date for Proposals

Preliminary, No Later Than—May 18; Full—September 10

Telephone: 703-292-8620

GOALS AND OBJECTIVES

The Teacher Enhancement (TE) program has as its broad mission improvement of science, mathematics and technology (SMT) teaching and learning at pre K-12 grade levels. The specific goals of the program are:

- to strengthen the teacher workforce by
 - expanding and deepening understanding of content, pedagogy, curriculum, and assessment;
 - increasing understanding of appropriate and effective applications of educational technologies; and
 - heightening awareness of and deepening the understanding of the diverse experiences, strengths, and needs of students.
- to develop a cadre of teachers, administrators, teacher educators, and professional development providers who have an understanding of national SMT standards and who can lead reform in SMT education effectively;
- to develop school, home, and community cultures supportive of teacher professional development and of the reform in SMT education with attention placed on helping teachers develop the strategies and backgrounds needed to communicate effectively with parents and community members;
- to develop and strengthen the system components necessary to support implementation of standards-based SMT curricula;
- to support the use of technology in the teaching of SMT at the preK-12 level and in

the professional development of teachers; and

- to encourage research and evaluation that will contribute to the design of future programs.

In order to accomplish its goals, TE encourages projects within the following categories: (1) Local Systemic Change--comprehensive and pilot projects, (2) Teacher Retention and Renewal, (3) Mathematics and Science Courses for Improving Teacher Qualifications, (4) Professional Development Materials, and (5) Professional Development with Emerging Technologies.

Proposals are encouraged that target areas of greatest need, including geographical areas with high percentages of underrepresented and underserved populations, as well as urban, rural, and resource-poor school districts. All professional development activities must be research-based and aligned with standards-based curricula, instructional materials, and assessments.

1. LOCAL SYSTEMIC CHANGE

Local Systemic Change (LSC) initiatives support school districts and their partners in reforming science and/or mathematics education in grades K-12. Such projects are expected to make significant progress in implementing national standards for content, teaching, assessment, programs, and systems. Two types of LSC initiatives will be supported: Comprehensive (full-scale projects) and Pilot efforts. LSC projects should be coordinated with existing NSF systemic projects, as appropriate. Current listings of major systemic projects within ESIE and the Division of Educational System Reform (ESR) can be found on the following web sites:

- <http://lsc-net.terc.edu/> (for Local Systemic Change projects),

- <http://www.ehr.nsf.gov/ehr/esr/usp.asp> (for Urban Systemic Initiatives/Program projects),
- <http://www.ehr.nsf.gov/ehr/esr/ssi.asp> (for Statewide Systemic Initiatives projects), and
- <http://www.ehr.nsf.gov/ehr/esr/rsi.asp> (for Rural Systemic Initiatives projects).

Comprehensive Local Systemic Change Projects

Comprehensive LSC projects represent a shift in focus from the professional development of individual teachers to professional development of **all** teachers responsible for teaching science and/or mathematics within an entire school organization. Projects should establish professional communities that empower teachers to change practice and to reflect on their own teaching and learning, and they should result in increased learning by students. In LSC projects, teachers learn and adopt new beliefs, skills, and behaviors within a supportive school district culture. As a systemic approach to implementing national standards, each LSC project needs to consider the quality and amount of support provided to administrators, teachers, school board members, parents, and community members in order to successfully carry out the changes proposed.

Project Characteristics

- **Eligibility.** School districts or coalitions of school districts in partnership with at least one institution of higher education are eligible for a Comprehensive LSC project.¹ Other partners may include two- and four-year colleges and universities, state and local education agencies, professional societies, research laboratories, informal science education centers, private foundations, and other public and private organizations whether for-profit or not-for-profit.

¹ A site with an NSF Urban Systemic or Rural Systemic 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 reform strategy; the proposal must be strongly endorsed by the PI of the systemic initiative. NSF-supported SSI, USI, USP, RSI, and LSC projects are not eligible to submit planning grants nor pilot projects.

- **Focus.** Although projects must clearly be placed in the context of a comprehensive reform for grades K-12, they may address one or more components of the educational system. For example, Comprehensive LSC projects for grades K-8 could target all K-8 teachers of science and/or mathematics; all teachers of grades K-5; all middle school mathematics and/or science teachers; all science and/or mathematics teachers in a particular set of schools within a large system. Similarly, 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 6-12, all science teachers, grades 9-12) in a particular set of schools within a large system.
- **Coverage.** LSC projects must include at least 100 teachers of science, mathematics and/or technology as participants. To be considered a participant, a teacher must participate in no fewer than 130 contact hours of professional development. If science and mathematics are both a focus of a K-6 project, then teachers must participate in no fewer than a total of 160 contact hours across both areas. The involvement and commitment of district administrators, school board members, and parents are essential to ensure long-term, institutionalized support for standards-based SMT education. Thus, projects should work with those groups to develop the goals of the LSC project and to ensure long-term, sustainable reform.
- **Duration.** Comprehensive LSC projects are expected to be of three to five years duration.
- **Outreach.** During the later years of the LSC, one or more of the PIs may help another K-12 district(s) develop a plan for systemically implementing reform. An LSC project is encouraged to invite teachers and administrators from a neighboring district(s) to participate. Those teachers and administrators may be from one or several schools interested in learning about standards-based reform of SMT education.
- **Funding Levels.** Maximum level of funding allowable for a Comprehensive LSC is determined by multiplying the total number of participating teachers reached over the course of the project by \$4,500. A further restriction is that Comprehensive LSC projects may request no more than \$1.5 million in any

individual year of the project and no more than \$6 million over the duration of the project. Not all teachers may need the same type of professional development, nor will all professional development require the same amount of NSF support. The allowable cost-per-teacher may, therefore, be an **average** across those participants who engage in at least 130 contact hours of professional development within the duration of the grant. For example, a project may invest heavily in the development of mentor or lead teachers, or it may focus its resources on strengthening the content background of under-prepared teachers.

- **Budget Requirements.** NSF funds are intended to support teacher enhancement activities, not costs of providing classroom instructional materials. Proposals must indicate the amount and source of funding for the purchase of 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 will help sustain professional development opportunities for teachers, equipment purchase will be considered within the allowable funding level.
- **Cost-sharing.** 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 01-2)). However, purchase of classroom materials, equipment, and supplies, which may not be supported by NSF funds, are allowed as cost-sharing. Although 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 with other federal funds. Use of these funds should be described in the budget explanation and be separate from cost-sharing information. Documentation of actual cost-share, signed by the authorized institutional representative, must be submitted with each annual report.

Evaluation. All Comprehensive LSC projects must include a project-specific evaluation component for examining the effects of the professional development and the implementation of instructional materials on student achievement.

Projects are encouraged to add other components to their evaluation plans. While a project may choose a lead evaluator with credentials and experience primarily in program evaluation, it is important that the lead evaluator also have appropriate expertise in science/mathematics and in K-12 education. The project's lead evaluator must be competent to conduct some of the required NSF *Core Evaluation* (see below), and it may be desirable to have one or two additional individuals with expertise in science and/or mathematics education to conduct classroom observations.

Comprehensive LSC projects must participate in a standardized *Core Evaluation*. This set of instruments and procedures allows NSF to monitor individual projects, aggregate data and information across projects, and produce cross-project analyses for reporting on the quality and impact of the LSC program as a whole. The *Core Evaluation* ensures program accountability and provides assessment of the progress upon which continued funding depends. **No continuing grant increments will be made for LSC projects unless the PI remains current with requirements of the *Core Evaluation*.** The current evaluation design requires approximately 50 days of staff time annually and includes a number of project-level evaluation activities that provide information for formative and summative evaluation. These activities include project team interviews, professional development and classroom observations, and principal and teacher interviews and questionnaires. Specific information on the *Core Evaluation* requirements can be found at <http://www.horizon-research.com/LSC/info>.

Special Proposal Review Criteria. The reform strategy employed in LSC projects must be aligned with nationally recognized content, teaching, and assessment standards for science, mathematics, and technology education. Projects must address alignment of district policies with the national standards. Except in very unusual circumstances, districts will not be eligible for two LSC awards. If districts submit proposals to extend efforts to different SMT disciplines and/or grade levels, proposals must show that the new project (1) builds on the infrastructure created by the earlier award; (2) has modified project activities based on lessons learned; and (3) is more cost effective than the prior effort. Proposals are reviewed using the National Science Board review criteria (see section, *Review Criteria*, in these *Guidelines*), as well as with 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 research-based professional development strategy. The vision should include goals and objectives for student and teacher learning that are consistent with the national standards for curriculum, instruction, assessment, programs, and systems. The project must encourage changes in the education system that are essential to support improved SMT education (e.g., district-wide assessment systems; procurement, distribution, replenishment of materials; equity issues in access and retention). Comprehensive LSC projects should address science and/or mathematics comprehensively by articulating a coherent vision for K-12 SMT education.
- **Needs Assessment.** The proposed project must be based on an accurate assessment of the district(s) strengths and weaknesses. This assessment should identify teacher needs based on the current status of instruction and the chosen curriculum; administrative understanding of, and support for, reform-based science or mathematics education; parent and community support for reform in science or mathematics education; staff, materials, and community resources available to support the reform effort; related activities (both NSF and others) impacting the district(s); and state and local policies directly influencing content, instruction, and assessment.
- **Instructional Materials Implementation.** Participating school districts must delineate the curriculum framework for their LSC project. Selected student instructional materials must be aligned with science and mathematics education standards and must demonstrate effectiveness based on extensive field-testing. The proposal must identify the instructional materials to be implemented or submit a list of instructional materials to be considered for adoption, accompanied by criteria for selection. The materials selection process must be completed during the first year of the grant. If it is likely that members of the review panels will not be familiar with the identified instructional materials, representative samples should accompany the proposal.

The professional development strategies, program support, and resource levels described and committed to in the proposal must be sufficient to implement the selected instructional materials throughout the project's schools.

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

Cooperative Relationships. The project should forge partnerships among higher education, business and industry, informal science education centers, 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, Urban, or Rural Systemic awards, regional curricula implementation and dissemination centers, regional labs, and new NSF Centers for Learning and Teaching (CLT). Lists of active systemic projects within ESIE and ESR may be found on the following web sites:

- <http://lsc-net.terc.edu/> (for Local Systemic Change projects),
- <http://www.ehr.nsf.gov/ehr/esr/usp.asp> (for Urban Systemic Initiatives/Program projects),
- <http://www.ehr.nsf.gov/ehr/esr/ssi.asp> (for Statewide Systemic Initiatives projects), and
- <http://www.ehr.nsf.gov/ehr/esr/rsi.asp> (for Rural Systemic Initiatives projects).

A listing of curricula implementation and dissemination centers can be found in Appendix B

of these *Guidelines*. NOTE: Prototype CLTs will be awarded in September 2000.

Pilot Local Systemic Change Projects

Pilot LSC projects provide opportunities for districts to explore directions for enhancing their K-12 mathematics and/or science programs. A successful pilot project will create opportunities to try out exemplary instructional materials and effective instructional strategies, as well as to build a cadre of leaders who can support their peers. In particular, such projects should create platforms for:

- teachers to explore exemplary instructional materials and identify the content knowledge and pedagogical skills needed to support implementation;
- teachers and administrators to gain significant experience in classroom use of materials and to acquire the leadership skills needed to serve as models and coaches for their peers beyond the life of the pilot project; and
- districts to put together appropriate parent and community collaborations to support reform efforts and to develop rigorous applied research plans for future large-scale implementation efforts.

A Pilot LSC project is intended to build a foundation for systemic reform that may lead to a Comprehensive LSC project. Thus, projects are expected to exhibit strategies consonant with the nature of the LSC philosophy. In particular, Pilot projects are expected to include substantial professional development for participating teachers built around exemplary instructional materials for the discipline and grade levels targeted. Professional development activities should focus on enhancing teachers' content knowledge in mathematics and/or science, as well as support their pedagogical skills and strategies. Administrators are expected to take part in professional development designed to acquaint them with the curriculum and instructional strategies utilized by Pilot LSC teachers.

The proposal must identify targeted grade levels and the instructional materials to be piloted. TE particularly encourages Pilot LSC projects that focus on secondary science. The proposal should articulate a rationale for the choice of materials to be piloted and grade levels to be targeted within the

context of the district's existing K-12 mathematics and science curriculum and learning goals. Projects are encouraged to develop connections with the NSF-funded Curricula Implementation and Dissemination Projects (see *Appendix B*) for expertise and guidance in these efforts. Teacher enhancement activities should include development of leadership skills needed to coach and engage their peers in the implementation of chosen instructional materials. Proposals also are expected to articulate a strategy for working with parents and the public to increase understanding of the curricular and instructional changes being considered in the district's K-12 mathematics and/or science program(s). In addition, models that address issues of scale are encouraged.

Eligibility. A school district, coalition of districts, or coalition of schools must form a partnership with a college or university. Partnerships may also include informal science education institutions, regional or state agencies, curriculum developers and publishers, and the business community. Funded LSC projects are ineligible for pilot projects.

Duration. A Pilot LSC project is expected to be of two to three years duration; subsequent application for a Comprehensive LSC project is seen as a likely outcome.

Coverage. Pilot projects must include a minimum of 15 teachers, each receiving at least 200 hours of teacher professional development over the life of the project.

Funding Levels. Funding will be dependent upon the number of teachers involved, but the total request from NSF may not exceed \$200,000. Funds may be used to purchase instructional materials for use in pilot classrooms, as well as for district/building administrators and project participants to travel regionally to established LSC project sites and NSF-supported Curricula Implementation and Dissemination projects.

2. TEACHER RETENTION AND/OR RENEWAL

The growing number of teachers leaving the profession before retirement is a significant cause of teacher turnover and subsequent teacher vacancies. Compounding this situation is the fact that top undergraduates (as measured by their scores on college entrance tests) who become

teachers are more likely than their peers to leave within three to five years. In addition, analysis of data from the five-year *Baccalaureate and Beyond* study indicates that teachers who have not participated in induction or mentoring programs during their first few years of teaching, are twice as likely as those who have participated to leave after their first three years of teaching. The shortage of SMT teachers is more severe than it is in other areas, making SMT teacher retention a national priority. Teacher Retention and Renewal projects focus on efforts to retain effective teachers in the SMT workforce and to increase the probability that novice teachers will choose to continue in the profession beyond the first few years of service.

Creating and maintaining a well-informed cadre of science and mathematics teachers requires that school districts have access to personnel who can support SMT teachers. *Teacher Retention and/or Renewal* projects will provide opportunities for districts to (1) develop master SMT teachers who can act as change agents responsible for implementing standards-based SMT programs and/or (2) support novice teachers through mentor programs. Proposals may address either or both of these categories.

Projects should afford participants opportunities to learn advanced science and/or mathematics content, standards-based instructional strategies, and leadership and adult educational skills. In addition, projects should include opportunities to examine and use quality instructional materials and educational technologies, as well as focus on the processes of educational change. The professional development provided should model standards-based approaches to teaching and assessment. Projects also might provide participants with opportunities to take part in disciplinary research experiences or to expand their understanding of the workplace. To adequately prepare such teachers, there is particular interest in supporting projects housed at institutions of higher education that offer opportunities for graduate degree programs and internships.

It is anticipated that mentor teachers will have responsibilities for guiding and supporting novice SMT teachers during their induction period. The participants in the projects will be highly successful, experienced SMT teachers who will receive professional development in content, pedagogy, and mentoring to prepare them to assist new teachers in the implementation of standards-based curricula and teaching. Participants should both learn and practice the skills necessary to

ensure that SMT teachers become effective professionals whose students are successful in learning science and mathematics.

The support requested from NSF should be commensurate with the anticipated involvement of teachers and the commitment of a school district or community to participate in subsequent activities. Each participant's school or district must provide sufficient time, support, and resources to enable the participant to apply the knowledge and leadership skills gained from the project to support reform of SMT education. Typical *Teacher Retention and/or Renewal* projects will include the equivalent of six weeks of study/participation, plus follow-up activities that include adequate time for reflection and guided practice. Typically a project's duration will be 3 to 5 years and will cost up to 2 million dollars.

3. MATHEMATICS AND SCIENCE COURSES FOR IMPROVING TEACHER QUALIFICATIONS

Research shows that students achieve at higher levels and are less likely to drop out of school when taught by teachers with strong disciplinary backgrounds and with teaching certification in the appropriate discipline. There is growing evidence of a SMT teacher shortage that has resulted in a large number of teachers teaching classes outside of their field of specialization. NSF is, therefore, interested in funding the creation of pilot courses for teachers who are currently: (1) SMT teachers teaching courses out of their field of certification (e.g. biology certified teachers teaching physics); (2) teachers with inadequate backgrounds in SMT (e.g., middle school teachers with elementary certification); and (3) SMT teachers who wish to move to another grade level (e.g., middle school SMT teachers who are preparing to teach high school).

Courses should include relevant content and pedagogy, be based on national standards, relate the content and pedagogy to student learning, and use teaching strategies effective with adult learners. The courses should be based on current research on teaching and learning and should include instruments to assess participant learning and provide evidence of the effectiveness of courses. Institutions may develop alternative approaches for delivering science and mathematics content, as long as the approach leads to the teaching certification appropriate for the position.

Proposals should be based on a needs assessment of the identified geographic area and include recruitment strategies and incentives for potential participants, a plan for meeting the state certification requirements, a mechanism for providing on-site support to newly certified teachers, a plan for the institutionalization of the courses, a plan for course dissemination to other institutions of higher education, and a comprehensive evaluation plan.

Projects may request funding for up to three years at a maximum amount of \$400,000 per year, dependent upon the number of courses to be developed. During the period of course development and field testing, NSF funds may be used to deliver courses to teachers. After the period of development and revision, colleges and universities, states, districts, or teachers will be expected to cover any tuition/fee costs. It is expected that there will be extensive collaboration among education departments, relevant disciplinary departments, and school districts.

Eligibility. Colleges and universities that grant graduate credit are eligible to apply.

4. PROFESSIONAL DEVELOPMENT MATERIALS

Major reform efforts in SMT education have increased the need for professional development materials that can be used to enhance teachers' understanding, adoption, and implementation of standards-based teaching practices and use of state-of-the-art instructional materials, assessment strategies, and educational technologies. The TE program, therefore, supports the development of such materials for K-12 SMT teachers and instructional leaders.

Projects should address critical content and/or pedagogical issues in SMT education. For example, materials might focus on critical concepts in a discipline (e.g., force and motion), cross-discipline concerns (e.g., biocomplexity for secondary school), pedagogical strategies (e.g., using technology in elementary school mathematics), or critical issues (e.g., equity in SMT classes, reducing SMT teacher attrition). Materials also might focus on content for a particular grade band (e.g., primary grade mathematics, middle school science).

Materials may be organized as courses, workshops, and/or self-study units, and they may be produced

in print/text, video, and/or virtual formats. Materials may be created "from scratch" or they may be revisions of existing materials that respond to innovations in student curricula and/or instruction. Materials may support specific comprehensive student materials or provide teacher enhancement for targeted SMT content and/or pedagogy. In all cases, however, the materials should engage teachers in significantly extending their knowledge of content and pedagogy.

Project Characteristics. Proposed professional development materials/curricula are expected to be developed by experts in SMT education and should exhibit the following design characteristics.

- **Goals and Objectives.** The learning goals of the materials should be clearly defined and aligned with appropriate national standards not only for content, instructional strategies, and assessment, but also for professional development. Because of the alignment with national standards, the materials should be national in scope so teachers in many different educational environments may benefit from them.
- **Development Process.** The materials should be developed with input from experts in the academic disciplines, in pedagogy, and in adult learning. Likewise, teachers similar to those who will ultimately be the audience for the materials should be included in development and field-testing. The materials must specify learning goals and include final assessments to determine the extent to which the goals are achieved. The materials should be grounded in recent advances in research on teaching and learning and reflect the importance of teachers' motivation and prior knowledge as ways to stimulate adult interest and understanding. Materials should incorporate information technologies as appropriate both to support the learning of content by teachers and students and to serve as vehicles to deliver professional development to teachers.
- **Evaluation.** The materials should be subjected to careful evaluation at every stage and have a timeline generous enough to allow feedback to inform multiple revisions of materials. A variety of techniques should be employed for obtaining feedback on the quality of the materials (e.g., focus groups, small-scale trials, large-scale field-tests). The evaluation must document knowledge

acquisition of teachers who receive professional development with the materials. Other components of the evaluation plan may assess changes in classroom practice, changes in student learning, changes in learning environments, etc. In addition, the project itself should have an external evaluation to determine if the proposed materials have been produced in an effective and cost-efficient way.

- **Dissemination.** A clear plan should be presented for the long-term dissemination of materials. This plan must include a strategy for publication and wide distribution of the materials; it also should include mechanisms for educating professional development providers on the effective use of materials. Dissemination might include commitments from publishers to support use of materials and/or cooperation with professional organizations to develop mechanisms to use the materials in professional development programs. These techniques should be piloted during the life of the project, and plans for successful dissemination after NSF support terminates should be described. The dissemination plan should address ways of informing SMT teacher education faculty about the materials for possible use in preservice SMT teacher education programs.

5. PROFESSIONAL DEVELOPMENT WITH EMERGING TECHNOLOGIES

NSF seeks to support a small number of high-risk projects that develop and test new paradigms for education. Proposals to this area are expected to push the educational envelope and anticipate changes in formal education brought about by changes in access and the capabilities of technology. They may relate to preparing teachers, supporting teaching activities, or enhancing other professional activities.

Emerging technology projects may be one or any combination of the following three types.

- Implementation of new technologies that provide professional development experiences and on-going support for the dissemination and adoption of innovative instructional materials. Eligible projects might deliver in-service courses and support teachers in isolated communities. They

should be cost effective, sustain change, and extend teacher enhancement opportunities.

- Use of innovative technologies to support new or changing areas of content or technologies that are used in the community and/or in the workplace. Proposals could address new areas of content (e.g., biotechnology, computational science); approaches to learning (e.g., data acquisition and analysis, computer modeling); or methodologies for learning (e.g., using data base resources, supporting student on-line collaboration). Projects should respond to specific curricular needs, demonstrate potential for broad impact, and be connected to existing classroom instructional materials.
- Development of technology tools or utilities for improving teaching. Projects should support the delivery of instruction by offering teachers additional capabilities (instructional tools), access to resources (mentors, databases, peers), or collaboration tools which allow interactions with the broad education community (e.g., teachers, teacher educators, scientists, mathematicians, engineers, technologists, the informal science community, and the private sector).

Proposals must carefully delineate the aspects of the project that make it original. Proposals must define expected outcomes in comparison with traditional approaches, cite relevant and related research, describe the techniques of evaluation, and formulate strategies for national impact. Evaluation will be a major component of these projects.

SPECIAL CONSIDERATIONS FOR THE TE PROGRAM

Budget Items Affecting Participants. The policies outlined below apply to allowable participant expenses within a project. Indirect costs cannot be applied against these budget categories.

- **Participant Stipends.** A direct stipend of up to \$75 per day, prorated for partial days, (for participation in formal professional development activities occurring outside of paid school time) is allowable from NSF funds. The total stipend may exceed that amount 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 substitute teachers are directly replacing teachers participating in the NSF-funded project during their time 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.** Funds for tuition and/or fees may be requested from NSF or from participating teachers only if NSF funds are not used to support project administration, instruction, or indirect costs. If NSF funds are requested for any of the three above items, tuition and/or fee waivers may not count as institutional cost-sharing. 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. Cost-sharing of 20% of the requested total amount of NSF funds is required for most categories of TE projects; 10% is required for *Professional Development Materials Projects*. Cost-sharing information should be detailed in the budget. Cost-sharing per year should be shown on NSF Budget Form 1030, Line M.

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*, 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/or Co-PI time devoted to the project, are required. To ensure uniform reporting, LSC projects will be provided a reporting framework. Continuation of LSC funding depends upon submission of relevant evaluation data for the mandatory standardized *Core Evaluation*. *Teacher Retention and Renewal*, *Mathematics and Science Courses for Improving Teacher Qualifications*, and *Professional Development and Emerging Technologies* projects will be expected to participate in a standardized data collection effort that requires submission of program and participant data. In addition, all participants will be expected to complete a background data sheet when entering the program. PIs will receive complete instructions on all requirements after an award has been made. Additional reporting requirements can be found in the section, *Award Administration Information*.

Final Project Reports. Submission of a final report is required of all projects; see *Award Administration Information* for additional information. As appropriate, all TE projects--other than LSC projects--require submission of the following:

- participant list complete with addresses, school affiliations, subject expertise, and levels taught (i.e., elementary, middle, high school), if such lists have not been made available to NSF during the project; and
- information on summative evaluation efforts, including evaluator reports, as available.

LSC projects, as part of NSF's *Core Evaluation*, must report on professional development activities; teacher involvement; teacher knowledge, attitudes, and beliefs; classroom implementation; project sustainability; student achievement and support for reform. Projects that produce professional development materials for teachers must submit two copies of all materials with their final report. In addition, published copies must be forwarded when available and one published copy must be submitted to the Eisenhower National Clearinghouse (ENC).

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

PROPOSAL PREPARATION INSTRUCTIONS

Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide (GPG)*, NSF 01-2. 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 paperpubs@nsf.gov.

Proposers are required to prepare and submit all proposals for this program solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at <http://www.fastlane.nsf.gov/a1/newstan.htm>.

All ancillary materials that cannot be submitted electronically must be mailed directly to the appropriate program: IMD, TE, ISE, ASCEND, National Science Foundation, 4201 Wilson Blvd. Room 885, Arlington, VA 22230. Twelve copies of any ancillary materials are required. Proposals, including any ancillary material, submitted to the ESIE Division are considered the property of the NSF and are not returned.

Proposers are reminded to identify the program solicitation number (NSF 01-60) in the program announcement block on the FastLane cover sheet form. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

PRELIMINARY PROPOSALS

All programs listed in this solicitation require submission of preliminary proposals. In order to be eligible for submission in the ISE, IMD, and TE programs, a full proposal must either be (1) based on a preliminary proposal and subsequent response letter from an NSF Program Officer or (2) a revision of a proposal declined during the year or past fiscal year. Any exception must get written prior approval from the relevant program. [Note for ALL programs: 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 must be submitted via FastLane. Preliminary proposals must be submitted via FastLane no later than 5:00 PM local time on specified target dates. 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.

Submission of preliminary proposals via FastLane require completion of the following FastLane forms:

- **Cover Sheet.** Be sure to check the preliminary proposal box.
- **Project Summary.** The summary should be no longer than 100 words and describe the content and audience for the project.
- **Project Description.** The section is limited to six pages (or equivalent). The project narrative should address the following topics: (1) relevant research; (2) need for the project; (3) goals or objectives of the project; (4) essential features of project design and a workplan that describes how the project will be accomplished and the goals achieved; (5) evaluation plans (both formative to inform project development and summative to assess the impact of the project on the target audience); and (6) dissemination plans. Page formats should be single-spaced, with a clear and legible type size of 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*.
- **Budgets.** Preliminary proposals should provide an estimated budget for total cost being requested from NSF with information on salaries, equipment (where allowable), participant costs, consultant costs, travel, indirect costs, and cost-share from other sources, including any partners and their contribution. The budget should be entered as the Year 1 budget in FastLane; FastLane automatically creates the cumulative budget.
- **Biographical Sketches.** Preliminary proposals should provide a brief narrative

description of the expertise relevant to the proposed project of key personnel (e.g., educators, researchers, and evaluators) to be involved. Biographical sketches should be complete enough to show that the expertise necessary to conduct the project is available.

In addition to the above, some programs suggest that the following additional points be addressed in the six-page project description, by program:

- **Informal Science Education.** (1) identification of target audience(s), (2) ancillary material to be produced, (3) promotion plans, (4) plans for institutionalization of the project, (5) linkages with formal education, and (6) a list of advisors, their qualifications related to the project, and their contributions to the project;
- **Instructional Materials Development.** (1) a general description of the materials to be developed, including content and pedagogical characteristics, and (2) timeline for completion of deliverables; and
- **Teacher Enhancement.** (1) project strengths in terms of content, available resources and partnerships and (2) design of the professional development model.

FULL PROPOSALS

Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide (GPG)* [NSF 01-2]. The complete text of the *GPG* (including electronic forms) is available electronically on the NSF website 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.

Full proposal submitters should complete the following FastLane forms:

- **Cover Sheet.** The cover sheet must contain all requested information. One copy of the cover sheet must be submitted by mail directly to the appropriate program (i.e., ISE, IMD, TE, ASCEND) and must carry the original signature of the Principal Investigator (PI), all co-PIs, and the authorized organizational representative. The signed copy of the cover sheet must be postmarked (or contain a legible proof of

mailing date assigned by the carrier) within five business days following proposal submission in accordance with the FastLane proposal preparation and submission instructions. If project funds are requested from another federal agency or another NSF program, it must be indicated on the cover sheet. If such funds are requested subsequent to proposal submission, a letter should be sent to the relevant program in ESIE, identifying the proposal by its NSF number. In the program announcement/solicitation field, enter the program solicitation number NSF 01-60.

- **Project Summary.** A one-page (250 word) 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 Description (including results from prior NSF support and data sheet).** The description 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. In addition, it should communicate potential project impact and general project characteristics. The information provided should help to direct proposals to appropriate reviewers.

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 pages and must be included as part of the page limitations listed below. PIs 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. **Note that the Project Description file must be converted to PDF format before uploading to FastLane.**

The maximum number of pages allowable for the *Project Description* is 15 pages with the following exceptions: planning and conference grant proposals should be no longer than 10 pages in length, including visual materials (e.g., charts, graphs, maps, photographs, and other pictorial presentations) and comprehensive, multi-year curricula materials should be no longer than 20 pages in length. 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*. All pages must be single-spaced. See the section, *Supplementary Documents*, below and individual program sections for any exceptions to this limitation.

Proposals for development of student, as well as teacher professional development materials, should include examples of proposed materials and samples of past work, if they exist. Proposals seeking to implement curriculum in *Local Systemic Change* must include a complete description of the materials; samples of materials should be sent directly to the program for exhibit to reviewers. Prospective PIs 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. Twelve copies of any ancillary

materials, such as videocassettes or exhibit layouts, are required.

- **Supplementary Documents.** Reviewers are often asked to read and assess a substantial number of competing proposals. For this reason, the project 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 in the proposal. Appendices should be uploaded into Supplementary Documents. FastLane provides the option to convert files to PDF format. Presentation of such materials should be thoughtful and concise. Reviewers are not required to read appendices. Proposals to the TE program are limited to 20 single-spaced pages of appendices in addition to letters of support; any exceptions must have prior written approval. (See the ISE section for further information about appendices.)

Notes on program data sheets. A completed project data sheet must accompany the proposal. Data sheets may be downloaded from the ESIE website at: <http://www.ehr.nsf.gov/ehr/esie/datasheet.doc>. Data sheets should be included in the supplementary document section of FastLane.

- **Biographical Sketches.** Biographical information (no more than two pages) must be provided for each person listed as senior personnel on the budget form; include career and academic credentials and a mailing address. See specific program description for other requirements.
- **Budgets.** Proposals must contain a budget for each year of requested support. 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 in the Budget

Justification section. Ordinarily, no funds are made available for equipment or facilities or for continued operational expenses. Estimates of calendar months of activity must be reported for categories of key personnel. Additional information on completing the budget can be found in the *GPG (NSF 01-2)*.

Cost-Sharing--All ESIE programs require cost-sharing. The nature (e.g., in-kind, financial) and use of cost-shared resources must be discussed in the budget justification in enough detail to allow NSF to determine its impact on the proposed project.

Documentation of availability of cost-sharing must be included in the Budget Justification section. Only items that 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. Funds from non-federal sources may be counted as cost-sharing against only one federal project.

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.

Total non-federal cost-sharing should be shown in section M of the budget form and explained in the Budget Justification. The level of cost-sharing that is reported in section 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 section M 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.** All current and pending externally-funded support (including that from non-NSF sources) to the PI and co-PIs 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 no salary support is received from the project. The number of person-months per year to be devoted to the project 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.
- **Letters of Support.** Letters of support for proposed projects, if applicable, must be collected by the PI and mailed directly to the appropriate program Science Education Analyst (IMD, TE, or ISE) Elementary, Secondary, and Informal Education Division, National Science Foundation, 4201 Wilson Blvd., Room 885, Arlington, VA 22230.

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, introducing others to new research and education techniques, and developing action plans. Proposals must describe: (1) the rationale for selecting participants and recruitment 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. Because conference proceedings are usually 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 in advance is preferable.

Proposals should include: (1), a summary (one page or less) indicating the objectives of the project and its potential for changing practice (Project Summary); (2) a statement of need and a list of topics (Project Description); (3) names and qualifications of key personnel organizing the activity (Biographical Sketches); (4) a list of participants; (5) information on the location and probable date(s) of the meeting (Project Description); (6) the method of announcement or invitation (Project Description); and, (7) estimated total budget, detailing the requested NSF contribution and support requested or available from other sources (Budget Justification). Note that no indirect costs may be applied to participant support costs. For further information, see *GPG (NSF 01-2)*. 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, persons with disabilities), new performers, or applicants attempting to coordinate the activities of large and complicated systems and/or develop large-scale leadership activities.

The 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, including a list of names and roles of experts who may be involved (Biographical Sketches); and (2) results of any self-study or identification of needs; and a list of resources (e.g., other projects, sites, or instructional materials) that the planning team will draw upon (Project Description). 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. Proposals should be submitted via the FastLane system. Preliminary proposals for planning grants are required for submission to the ISE program, but not for other programs in ESIE.

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 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; 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 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 01-2)* or can be obtained from NSF Program Officers. The box, *Small Grant for Exploratory Research*, must be checked on the cover sheet form.

PROPOSAL REVIEW INFORMATION

NSF PROPOSAL REVIEW PROCESS

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

Proposals will be reviewed against the following general merit review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those criteria that are relevant to the proposal and for which s/he is qualified to make judgments.

What is the intellectual merit of the proposed activity?

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

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance

the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

PIs should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give these factors careful consideration in making funding decisions.

Integration of Research and Education

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

Integrating Diversity into NSF Programs, Projects, and Activities

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

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

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

- **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.
- **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.

REVIEW PROTOCOL AND ASSOCIATED CUSTOMER SERVICE STANDARD

All proposals are carefully reviewed by at least three persons outside NSF who are experts in the particular field represented by the proposal.

Reviewers are asked to formulate a recommendation to either support or decline each proposal. A Program Officer assigned to manage the proposal's review considers the advice of reviewers and formulates a recommendation. 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. 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 programmatic approval has been obtained, proposals recommended for funding are forwarded to the Division of Grants and Agreements (DGA) 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 a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants Officer does so at their own risk.

AWARD ADMINISTRATION INFORMATION

NOTIFICATION OF THE AWARD

Notification of the award is made *to the submitting organization* by a Grants Officer in the Division of Grants and Agreements (DGA). Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Division administering the program. Verbatim copies of reviews, not including the identity of reviewers, will be provided to the Principal Investigator.

GRANT AWARD CONDITIONS

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approval or disapproval of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable grant conditions, such as Grant General Conditions (NSF GC-1) or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions ¹ and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The GPM may be ordered through the GPO Web site at: <http://www.gpo.gov>. The GPO telephone number for subscription information is 202-512-1800.

REPORTING REQUIREMENTS

¹ These documents can be accessed electronically on NSF's Web site at: <http://www.nsf.gov/>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301-947-2722 or by e-mail from pubs@nsf.gov.

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

Within 90 days after expiration of a grant, the PI is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic Project Reporting System, available through FastLane. This system permits electronic submission and updating of project reports, including information on: project participants (individual and organizational); activities and findings; publications; and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. The Project Reporting System can be found at http://www.fastlane.nsf.gov/cgi-bin/NSF_PrjRpt.

OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter. Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the *GPG*. Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF Bulletin, available monthly (except July and August), and in individual program announcements. The Bulletin is available electronically via the NSF Web Site at <http://www.nsf.gov>. The direct URL for recent issues of the Bulletin is <http://www.nsf.gov/od/lpa/news/publicat/bulletin/bulletin.htm>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

APPENDIX A Combined Project Data Sheet

Division of Elementary, Secondary, and Informal Education

A completed project data sheet must accompany the proposal. All proposals to ESIE should include Section I. In addition, all proposals should include one of the following sections: II (ISE) or III (IMD) or IV (TE) depending on the section of the Guidelines to which the proposal responds. (If convenient, unneeded sections may be deleted from this form before submission.) This data sheet may be downloaded at: <http://www.ehr.nsf.gov/ehr/esie/datasheet.doc>.

Section I

A. Project Information

Principal Investigator: _____
 Project Title: _____
 Institution: _____

B. Sources of Funding [Sum = Total budget in dollars]

Total NSF Request	\$ _____	Other (non-NSF) Federal	\$ _____
Industrial Funds	\$ _____	Grantee Institution (s)	\$ _____
State Funds	\$ _____	International Funds	\$ _____
Local Government	\$ _____	Other Funds	\$ _____

C. Science/Mathematics Content [Sum = 100%]

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

D. Scope [Check one]

National [check] ___ Local [# of Districts] ___ States [# of States, List below.] _____

E. Special Emphases [Check all that apply]

Minorities ___ Urban Environment ___ Women/Girls ___
 Rural Environment ___ Persons with Disabilities ___
 Other (explain) _____

Section II. [Informal Science Education projects only.]

F. Type of Project [Check one]

Museum ___ Media ___ Youth/Community-based ___ ASCEND ___
 Research ___ Prof. Develop. ___

G. Type of Participant/Target Audience [List # of participants in each category.]

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

Section III [Instructional Materials Development projects only.]

H. Level of Materials Target [Check all that apply]

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

Section IV [Teacher Enhancement projects only.]

I. **Type of Project** [Check One]

LSC, Comprehensive ____ LSC, Pilot ____ Teacher Retention & Renewal ____
 Professional Development Materials ____ Professional Development w/ Technology Support ____

J. **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				
Middle				
High School				
Project Total				

K. **Teacher Retention & Renewal Projects:** Estimate the number of participants directly involved in staff development experiences who receive at least 130 hours a year of professional development (including follow-up).

	Total Number of Teachers	Number of Math Teachers	Number of Science Teachers	Number of Administrators
Elementary				
Middle				
High School				
Project Total				

Indicate the number years you will be providing services: _____

L. **Teacher Retention & Renewal Projects:** Estimate the number of teachers who will receive professional development and/or mentoring for at least 60 hours from the project's direct participants.

	Total Number of Teachers	Number of Math Teachers	Number of Science Teachers	Number of Administrators
Elementary				
Middle				
High School				
Project Total				

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

Appendix B

Curricula Dissemination and Implementation Projects

Mathematics Implementation Centers

K-12 Mathematics Curriculum Center, EDC, Contact Information: 1-800-332-2429
<http://www.edc.org/mcc>

Elementary Grades Implementation Center, COMAP, Contact Information: 781-862-7878, ext. 44
<http://www.arccenter.comap.com>

Show-Me Center (Middle Grades), University of Missouri, Contact Information: 573-884-2029
<http://showmecenter.missouri.edu>

COMPASS (Secondary), Ithaca College, Contact Information: 1-800-688-1829
<http://www.ithaca.edu/compass>

Science Implementation Centers

Leadership and Assistance for Science Education Reform (LASER), K-8, Smithsonian Institution, Sally Shuler, sgshuler@nas.edu

IMPACT: A K-12 Regional Curriculum Implementation Effort, Northeastern University, Marilyn Decker, mdecker@lynx.neu.edu, Peg Bondorew, mbondore@lynx.neu.edu

EDC K-12 Science Curriculum Dissemination Center, Education Development Center, Judith Sandler, jsandler@edc.org

Biological Science Curriculum Study, Secondary Science Center, Rodger Bybee, rbybee@bscs.org

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement or contact the program coordinator at (703) 292-8620.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at (703) 292-5090 or through FIRS on 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 – 17th Street, N.W. Room 10235, Washington, D.C. 20503.