

Discovery Research K-12 (DR-K12)

Program Solicitation NSF 06-593



National Science Foundation

Directorate for Education & Human Resources
Division of Elementary Secondary & Informal Education

Letter of Intent Due Date(s) (required):

November 01, 2006

Exploratory Projects only, in all categories

Preliminary Proposal Due Date(s) (required):

November 15, 2006

Full Scale Projects only, in all categories

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

December 01, 2006

Conferences related to Components A, B, and C

March 09, 2007

Component A: Applied Research (Exploratory and Full-Scale)

March 20, 2007

Component B: Development of Resources and Tools (Exploratory and Full-Scale)

March 28, 2007

Component C: Capacity Building (Exploratory and Full-Scale)

May 08, 2007

Conferences related to Components A, B, and C

In furtherance of the President's Management Agenda, in Fiscal Year 2006, NSF has identified programs that will offer proposers the option to utilize Grants.gov to prepare and submit proposals, or will require that proposers utilize Grants.gov to prepare and submit proposals. Grants.gov provides a single Government-wide portal for finding and applying for Federal grants online.

In response to this program solicitation, proposers may opt to submit proposals via Grants.gov or via the NSF FastLane system. In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

The following items are major revisions and updates of the previous version of these program solicitations:

The Discovery Research K-12 (DR K-12) solicitation represents a consolidation and re-alignment of the Teacher Professional Continuum (TPC), Instructional Materials Development (IMD) and Centers for Learning and Teaching (CLT) programs that were administered in the Division of Elementary, Secondary, and Informal Education.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Discovery Research K-12 (DR-K12)

Synopsis of Program:

Discovery Research K-12 funds research, development, and evaluation activities through knowledge generation and application to improve K-12 learning and teaching. The program addresses this mission by funding activities in three major areas:

- *Applied Research* that supports three categories of projects: Evaluative Studies of NSF-Funded Resources and Tools, Studies of Student Learning Progressions, and Studies of Teachers and Teaching.
- *Development of Resources and Tools* that supports two categories of projects: Assessment of Students' and Teachers' Learning and Instruction of K-12 Students and Teachers.
- *Capacity Building* that supports two categories of projects: STEM Systems Research and STEM Education Research Scholars.

In addition to these three areas, conferences related to the mission of the program are also supported.

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

- 47.076 --- Education and Human Resources

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 48 with approximately 12 Conference, 21 Exploratory, and 15 Full-Scale projects to be funded

Anticipated Funding Amount: \$42,000,000 in FY2007, pending availability of funds

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Proposals may be submitted by institutions and organizations including universities, two- and four-year colleges, state and local education agencies, school districts, professional societies, research laboratories, informal science education centers, private foundations, or other public and private organizations whether for-profit or not-for-profit.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
 - Full Proposals submitted via FastLane: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Letter of Intent Due Date(s) (required):**

November 01, 2006

Exploratory Projects only, in all categories

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

November 15, 2006

Full Scale Projects only, in all categories

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

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Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria apply.

Award Administration Information

Award Conditions: Standard NSF award conditions apply

Reporting Requirements: Standard NSF reporting requirements apply

TABLE OF CONTENTS

Summary of Program Requirements

- I. [Introduction](#)
- II. [Program Description](#)
- III. [Award Information](#)
- IV. [Eligibility Information](#)
- V. [Proposal Preparation and Submission Instructions](#)
 - A. [Proposal Preparation Instructions](#)
 - B. [Budgetary Information](#)
 - C. [Due Dates](#)
 - D. [FastLane/Grants.gov Requirements](#)
- VI. [NSF Proposal Processing and Review Procedures](#)
 - A. [NSF Merit Review Criteria](#)
 - B. [Review and Selection Process](#)
- VII. [Award Administration Information](#)
 - A. [Notification of the Award](#)
 - B. [Award Conditions](#)

I. INTRODUCTION

The DR-K12 program merges three EHR formal K-12 education programs--Teacher Professional Continuum (TPC), Instructional Materials Development (IMD), and Centers for Learning and Teaching (CLT). This merger of the three programs increases flexibility and agility, focuses the resources needed to address acknowledged Grand Challenges in K-12 STEM education, and encourages innovative thinking from the field while continuing to build on the solid foundations of the portfolio. Work related to the Grand Challenges also supports the goals of the *American Competitiveness Initiative* (OSTP, 2006). DR-K12 forges strong connections between curriculum, assessment and professional development and encourages the research, development, and evaluation activities through which new knowledge is generated and applied. DR-K12 lies between the high-risk research generated by the Research and Evaluation on Education in Science and Engineering (REESE) program and the large-scale implementation of tested innovations generally supported by states and school districts.

DR-K12 brings together STEM education faculty, mathematicians and scientists, cognitive scientists, teachers and administrators, and STEM education graduate students to conduct the research, develop resources and tools and build the nation's capacity to develop and test innovative solutions to improve K-12 teaching and learning.

The following Grand Challenges build on strengths and partnerships unique to NSF and the communities it serves.

Grand Challenge 1: K-12 Mathematics and Science Assessments. NSF has funded work on assessment of student learning in science and mathematics since the early 1990's. However, with the implementation of *No Child Left Behind*, getting assessment "right" is more important than ever. With the growing knowledge of how people learn (Bransford, Brown, and Cocking, 1999), it is critical to develop assessments that help teachers diagnose students' comprehension more precisely and accurately and to link good formative assessments to high stakes state tests.

Grand Challenge 2: Elementary Grades Science. It is generally agreed that significantly less is known about early science learning than about early reading and mathematics learning. Science is often not consistently part of the elementary school curriculum, despite the importance of early development of important concepts and skills. There have been significant recent advances in understanding children's cognitive development and further research in this area will add significantly to our nation's ability to provide elementary programs that promote conceptual understanding, motivate interest, and reduce achievement gaps for those with different backgrounds.

Grand Challenge 3: Cutting-Edge STEM Content in K-12 Classrooms. This challenge capitalizes on the richness of the discoveries by the nation's scientists, engineers, and mathematicians as a means of deepening the understanding of basic science, engineering, and mathematics. An extension of the Challenge is to infuse methodologies enabled by Cyberinfrastructure (CI) into K-12 education. This permits new and powerful ways of working with large data sets, modeling processes, and sharing resources. Proposals should be developed by collaborative partnerships that involve scientists, mathematicians, engineers, learning scientists, and educators. Collaborations with established centers in science, engineering, and STEM education are strongly encouraged.

Within the three grand challenges, NSF continues to put a high priority in broadening participation in STEM disciplines. The achievement gap between students that have been underrepresented in STEM fields remains an issue to be addressed.

The need to find appropriate methods, based upon research, to increase participation of underrepresented groups in STEM learning and careers and to understand what contributes to their success is of high priority.

To address these challenges, the DR-K12 program consists of three components: *Applied Research; Development of Resources and Tools; Capacity Building*. Component A, *Applied Research*, will support three categories of projects: Evaluative Studies of NSF-Funded Resources and Tools, Studies of Student Learning Progressions, and Studies of Teachers and Teaching. Component B, *Development of Resources and Tools*, will support two categories of projects: Assessment of Students' and Teachers' Learning and Instruction of K-12 Students and Teachers. Component C, *Capacity Building*, will support two categories of projects: STEM Systems Research and STEM Education Research Scholars. While each of these categories focuses on a particular set of issues in research and development, funded projects might address issues related to more than one category.

II. PROGRAM DESCRIPTION

A. Applied Research

1. *Evaluative Studies of NSF Funded Resources and Tools*

The *Applied Research* Component supports research and development designed to significantly improve STEM education at the K-12 levels. It is important for NSF and for the potential users of the products developed with NSF support to know the extent to which these products improve STEM education and to understand the conditions under which these improvements are possible. While the projects funded by DR-K12 and its predecessor programs have evaluation components that provide information on effectiveness and impact, those evaluations are necessarily done as part of the research/development grant. And while these evaluations are useful, they are short-term in nature, are done by or under the auspices of the grantee, and are generally focused mostly on formative issues. Potential users, as well as NSF, are interested in how these products work in the longer term and outside of the materials development process. Therefore, DR-K12 solicits proposals to conduct evaluative studies of tools and resources developed with support from any of NSF's programs.

Evaluative studies are intended to investigate the effectiveness and impact of efforts to enhance teachers' and students' STEM learning. These studies support a "culture of evidence" that builds a knowledge base about important findings and issues in the development of tools and resources. Knowledge generated by these studies informs program development, project performance, and the field. The insights of teachers, as well as building and/or district-level administrators should provide guidance to researchers in framing their hypotheses, in choosing their tools and methods, and in testing their theories against the realities of the classroom. Evaluative studies include original research on the effectiveness of tools and resources as well as analysis of defined bodies of such research.

The evaluation of proposals for funding will consider both the research methodology and the contributions of the proposed research to schools, to the development of tools and/or resources, and to understanding critical issues in the field. Priority in *Applied Research* will be given to proposals that address issues pertinent to one of the Grand Challenges.

This category accepts proposals for Exploratory Studies, Full Scale Projects, and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

2. *Studies of Student Learning Progressions*

The concept of "Learning Progressions" in the current STEM education literature has a strong foundation in the learning sciences and previous STEM education research. Smith and colleagues have defined them as; "...descriptions of successively more sophisticated ways of reasoning within a content domain based on research syntheses and conceptual analyses..." (p. 3; Smith, Wiser, Anderson, and Krajcik, in press).

In this solicitation, proposals to conduct research and development of learning progressions are open to any major conceptual idea or process that is found in research-based theoretical frameworks or in the various national standards for the STEM areas (AAAS, 1993; NRC, 1996; ITEA, 2000; NCTM, 2000; AAAS, 2001). Given the emphasis of the current year solicitation on elementary grades, proposals are limited to the study of learning progressions across the lower and intermediate elementary grades (K-2, 3-5) or the transition between intermediate elementary (3-5) and middle grades (6-8). For example, the question of how students' understandings change in regard to the nature of ecosystems from upper elementary to middle grades could be the focus of a proposal. Proposals do not necessarily have to cover all of the grades within both grade bands but grades from two bands must be studied. It is expected in future years, the grades 6-12 will be the focus thus allowing study of the transition from middle to secondary grades.

Successful proposals are expected to provide a conceptual framework for the learning progression, instructional materials for classroom testing, descriptions of a professional development model, pilot

assessments, and classroom based studies. Products resulting from funded projects must include the following:

- Document(s) that outline the theoretical basis for the proposed process/content strands and explain how the learning progressions, instructional materials modules for students, assessments, professional development models, and professional development materials are consistent with relevant theories of learning and appropriate for the selected grade bands. Research should be cited to establish the importance of the selected learning progressions for addressing critical concepts in STEM education at the selected grade bands of instruction (K-2, 3-5, 6-8).
- Instructional materials modules that can support four-to-nine weeks of instruction that spans two grade bands and that provide structured experiences for students that test the efficacy of this approach. In addition to materials, evidence must be provided that the experiences proposed are reasonable for classrooms and can be implemented within the context of specific STEM content. The materials developed under this initiative are intended to be exemplars of new frameworks and should be robust enough to be used by others or become part of published curricula.
- Descriptions of professional development models that provide for the preparation of pre-service and in-service science teachers to work effectively with designated learning progressions that result in effective classroom instruction (Borko, 2004; Loucks-Horsley et al., 2003; Shulman, 2000; Wilson et al., 2001). These models must address professional development needs for pre-service, novice and experienced teachers in the content and process knowledge needed for instruction, as well as pedagogical strategies that support working with the instructional modules for students and the underlying STEM conceptual learning progressions.
- Instruments appropriate for assessing the approaches and materials developed. These instruments may be original and/or be based on currently available items/instruments (with appropriate permission from the authors). The assessments must be formative, based on a model of learning, and help teachers improve learning (See Pellegrino, Chudowky, and Glaser, 2001; Black, Harrison, Lee, Marshall, and Wiliam, 2002).
- Implementation studies that provide results of the pilot study with students in classrooms that test key conjectures establishing the theoretical ideas. It is expected that the research will be based on interventions by team members in active classrooms using the materials developed. While pilot testing may be limited to a few classrooms for a relatively short period of time (weeks instead of semesters), the activities conducted in the classroom need to be well documented and include studies of the implementation with observations, audio and videotapes, student artifacts, results of pilot instruments and/or other mechanisms.

In keeping with the Grand Challenges of this solicitation, priority will be given to projects that address learning progressions for Elementary Science and/or Cutting-Edge STEM Content in K-12 Classrooms.

This category accepts proposals for Full Scale Projects and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

3. *Studies of Teachers and Teaching*

DR-K12 supports research on K-12 STEM teaching and teacher learning at all stages within the professional continuum. The program encourages research on critical issues and needs regarding the recruitment, preparation, support, induction, and retention of K-12 STEM teachers. Innovative research questions that are centered in, and informed by, practice are encouraged.

Proposals that focus on research that will help identify and validate characteristics of highly qualified teachers, develop tasks that allow these characteristics to be expressed and evaluated, and identify vehicles for displaying these features are especially encouraged. Likewise, proposals that focus on what content and pedagogical skills teachers should have to help all students achieve at higher standards are encouraged.

Recent research indicates that the sociocultural context of learning is an important factor in schooling (Barba, 1998; Gay, 2000; Lee, Deaktor, Hart, Cuevas, & Enders, 2005). This includes the culture of the school, classroom, as well as the culture that the child brings to the classroom from home. The interrelationship between culture and learning is frequently overlooked in the classroom (Gay, 2000; Lee et al., 2005). Teachers should have opportunities to develop a sensitivity to the fact that not all children have been socialized to learn in the same way. However, consideration of the

cultural context of learning also requires that teachers avoid stereotypical assumptions about children and their learning styles. Racial/ethnic and linguistic minority students have shown significant achievement gains in science when their cultural and linguistic experiences are utilized as learning resources. DR-K12 will consider research proposals that investigate teachers' implementation of culturally relevant strategies to improve students' STEM achievement. These proposals should communicate knowledge of the influence of school cultural context on teachers' instruction as well as a thorough knowledge of the literature on culture, diversity, equity, and STEM teaching and learning.

The translation and implementation of research findings for practice is also of paramount interest to NSF. All projects are expected to inform STEM education audiences, including K-12 practitioners, of research methods and findings through publication in peer-reviewed journals, presentations at scholarly conferences and practitioner meetings, submissions to digital libraries with appropriate links to websites, and networking with other STEM educators.

Priority will be given to proposals that focus on elementary grades teachers and teachers in environments where cutting edge STEM content is being implemented in their classrooms.

This category accepts proposals for Exploratory Studies, Full Scale Projects, and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

B. Development of Resources and Tools

1. Assessment of Students' and Teachers' Learning

Credible assessment of student and teacher learning is critical for determining the effects of education reforms, providing feedback on the instructional materials development process, and understanding the effects and impact of new instructional materials on student and teacher learning and achievement. New assessment tools must align with appropriate standards, measure specific desirable outcomes of reform, and differentiate the quality of curricula, materials, and instruction. Similarly, schools and districts need support for new types of assessment to document the quality of new instructional materials, to evaluate their effective use, and to assess teacher professional development needs in content knowledge and practice. DR-K12 encourages the development and implementation of new directions in assessing student and teacher learning. Assessments may range from those embedded in instructional materials to the creation of items for general use by districts and states.

Assessment projects: (1) should be based on current research and include a model of cognition and learning as the cornerstone of the assessment design process (Pellegrino, Chudowsky, & Glaser, 2001); (2) provide reliable and valid information that leads to a better understanding of how student learning can be enhanced and how instructional practice can be improved; and (3) are developed in collaborative teams with appropriate expertise in the content area, in cognition and learning theory, in assessment development and psychometrics, and instructional practice at appropriate grade levels.

Assessment projects must address one or more of the following areas:

Student Learning: Assessment focuses on measuring student learning and achievement. Assessment development that focuses both on classroom learning and large-scale tests is needed. These tests must be consistent with standards developed by national professional organizations. Critical areas of need among others include: (a) assessment instruments that focus on key concepts or strands in elementary grades science; (b) projects that develop various tools to assess and guide classroom learning and instruction (e.g., embedded assessments); (c) assessment in technology education and concept acquisition through project-based learning; (d) new types or forms of assessments that provide formative evaluation data to teachers and students about their understanding; and (e) projects that study if "high-stakes" tests, such as those required by a state, correlate with other measures of student learning such as clinical interviews of a subset of the tested students.

Teacher Learning: Multiple organizations require assessment of STEM teachers at various times in their professional career. Most common is the need for pre-service teachers to take assessments

that attempt to measure knowledge of particular STEM content and pedagogical knowledge in regard to teaching STEM content. Support for the development of such large-scale measures is beyond the scope of this solicitation but the rigorous study of existing assessment systems is appropriate. In addition, the development and study of new measures that might provide alternatives to some of these larger measures is also encouraged. A third area of projects is the development and study of measures that would provide formative evaluation information to teachers when they are in their pre-service period as well as when they are in classrooms as teachers.

This category accepts proposals for Exploratory Studies, Full Scale Projects, and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

2. *Instruction of K-12 Students and Teachers*

The DR-K12 program continues support of the development and validation of innovative resources and tools for use with students in K-12 STEM classrooms. Proposed materials must have a coherent content framework that is aligned with research-based theoretical frameworks or the standards from professional organizations (e.g., AAAS, 1993; NRC, 1996; ITEA, 2000; NCTM, 2000, AAAS, 2001). They should foster inquiry, including critical thinking, problem solving, decision-making, design, and communication at increasing levels of complexity. These materials should build on recent research on teaching and learning in general (e.g., Bransford, Brown, & Cocking, 1999; Donovan & Bransford, 2005; Wiggins & McTighe, 2005) as well as on available research on learning the specific content topics addressed in the materials.

The significant investment in the development of innovative, standards-based instructional materials for students requires significant investment in fostering teacher knowledge and professional development. Therefore, the DR-K12 program also supports the dissemination of these knowledge and instructional skills to teachers and teacher educators through the development of resources and tools for use with K-12 teachers. These professional resources should provide evidence of their potential contributions to preparing, supporting, enhancing, and sustaining K-12 STEM teachers, leaders, teacher educators, and administrators. They need to be grounded in research on teaching and learning, address a recognized national need, and advance the knowledge base on STEM teaching, STEM teacher education, and/or the STEM teaching profession.

Successful proposals in this category combine a strong research and STEM content background with a proactive view of STEM teaching and learning. They have a coherent content framework and build on recent research on teaching and learning in the disciplines. It is expected that, when relevant, proposals incorporate appropriate technologies, such as digital libraries, computational tools, and virtual environments, to mention just a few, anticipating a future in which these technologies are used widely to enhance education. Proposals should also consider universal design for learning (UDL) criteria (www.cast.org) in their project planning. Proposals for resources and tools for use with teachers should also review existing materials related to the professional development of STEM teachers by consulting appropriate sources, such as the Teacher Education Materials (TE-MAT) database (<http://www.te-mat.org>) and the National Science Digital Library (NSDL) (<http://www.nsdli.org>).

DR-K12 invites proposals that develop the fundamental understandings and tools necessary to leverage the growing national Cyberinfrastructure (CI) for K-12 education. The potential of CI to provide ubiquitous access to data, resources, tools, and methods that extend the capabilities of both teachers and students to both practice and learn STEM could facilitate profound changes in both formal and informal education. Proposals that explore these possibilities or build educational examples or models based on solid foundations are welcomed.

Supported full scale projects must be national in scope and significance. They need to explain how materials will be pilot-tested, revised, field-tested, and evaluated by independent experts. Projects should show their potential to enhance student or teacher learning and to make a significant and noticeable impact on the national market for instructional materials.

Resources and tools for use with K-12 students can consist of replacement units for specific school contents, virtual tools to increase students' engagement with STEM inquiry, revisions of currently available curricula, and materials that foster participation of underrepresented groups in STEM activities by implementing research-based strategies to diminish achievement gaps between student populations. Priority will be given to proposals that are focused on elementary grades

science, and the integration of cutting-edge STEM content in K-12 classrooms.

Resources and tools for use with K-12 teachers may include, but are not limited to, professional development materials focused on STEM content and pedagogy; tools for enhancing the work with teachers; teacher education curricula and information resources; development of measures related to STEM teachers and teaching.

This category accepts proposals for Exploratory Studies, Full Scale Projects, and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

C. Capacity Building

1. *STEM Systems Research*

Research and development efforts produce new knowledge in the form of research findings, models, resources and tools that can have a substantial impact on the national education enterprise. However, there is no assurance that even the most promising innovations will be incorporated into educational practice since many districts and schools often do not have the capacity to effect even well founded changes. Substantial changes could require rethinking how educational systems are organized to support instruction, how they relate to other stakeholders in the community, and how they adapt to shifting societal demands and national priorities.

DR-K12 encourages proposals for the creation and study of models for the development of the human and materials resources needed to implement the innovations. Such models should take into account the processes by which innovations are implemented and scaled. The DR-K12 program also encourages proposals for projects that develop and study models for building the capacity for schools to adopt and use state-of-the art resources and ideas. An integral part of the study of these models are issues related to the conditions that support the adoption and use of state-of-the-art ideas and how these can be brought to scale. This is a research-based systems approach to building models that explain innovation and can include the classroom, supervisory, professional groups, and state or district administrative levels, but the direct link to classroom instruction must be explicit and verifiable.

This category accepts proposals for Exploratory Studies, Full Scale Projects, and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

2. *STEM Education Research Scholars*

Expansion of the national capacity for doctoral STEM education is critical to ensuring that the Grand Challenges of STEM education are met. DR-K12 seeks to support doctoral students pursuing important work in STEM educational research through grants to individual institutions or to collaborations functioning as one program. From five to seven awards will be made to support student cohorts of no more than five students per grant. Collaborations between STEM education faculty and STEM departments are strongly encouraged.

Funds are intended to support projects that increase the capacity of the field to address important issues in STEM education. STEM Education Research Scholars cohorts will work together on a well-defined and significant research agenda. The pattern of recruiting groups of students who work on a common research agenda is not the way STEM education programs are traditionally organized, but does reflect the practice of many STEM disciplinary departments where clusters of faculty perform research on closely related problems. By supporting clusters of doctoral students working on aspects of a common research agenda, the STEM Education Research Scholars program will provide a more focused doctoral experience and foster the development of research collaborations that can contribute to the doctoral graduates' research program into their early career.

Institutions responding to the *STEM Education Research Scholars* component should propose a research theme important to the future of K-12 STEM education and show how the dissertations and other research work of the proposed doctoral students as well as the faculty interests and research will combine to make an important contribution to the field. Priority will be given to

research that addresses one or more of the Grand Challenges described in this solicitation. The capacity of the institution to support this work, to sponsor coherent research involving multiple students, and to contribute to knowledge accumulation are critical parts of any submission. Both the importance of the research proposed and the experiences planned for the doctoral students will be weighed in funding decisions. Projects should include plans for recruitment of a diverse group of doctoral students, including members of groups traditionally underrepresented in STEM and STEM education.

Projects may request up to \$300,000 (including indirect costs) for the five year period of the project to support a coherent set of education and training activities for the doctoral students. Such activities might include mentoring by senior STEM education faculty, collaborative mini-research projects, special topic seminars, or other training in preparation for academic careers. Proposals should describe the proposed activities, plan for delivery, and how participation will enhance the leadership skills of students and facilitate their entry into STEM education careers. Innovative partnerships, including collaborations with faculty and graduate students in STEM departments, are encouraged.

Proposals in this section should base their budgets on a cost of up to \$40,500 per year per student for a maximum of five years. No individual university or collaboration may request support for more than five (5) students total. Out of the \$40,500, a stipend equal to \$30,000 for a 12-month graduate research assistantship appoint should be provided. The remaining \$10,500 may be used to cover the tuition of the student, health care costs, and normal fees. The \$40,500 per student per year should be budgeted as "Participant Support Costs" and cannot be counted towards the calculation of indirect costs for the overall proposal budget.

This category accepts proposals for Full Scale Projects and Conferences. For information on the development of a proposal and levels of support, please refer to the Award Information (Section III.) and the Proposal Preparation and Submission Instructions (Section V.) parts of this solicitation.

References

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III. AWARD INFORMATION

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

The listing below summarizes the maximum funding level and length of projects for Exploratory Studies and Full Scale Projects. The amount of the request should be commensurate with the scope and complexity of the proposed effort. Projects at the maximum funding level for Full Scale Studies must be full length and national in scale. The number shown for Conferences is considered the typical amount. Funding levels above this amount will be considered in unusual circumstances.

Exploratory Studies should address research questions that can be studied within a limited time and on a modest budget. These projects might (1) examine novel research protocols; (2) develop, adapt, and test research instruments that may ultimately be broadly applicable in research and evaluation; (3) synthesize and disseminate existing research; or (4) conduct secondary data analyses or qualitative studies to research the effectiveness of recognized best practices. Collaborations between K-12 practitioners and researchers are encouraged, as is research that is closely aligned with practice. Full Scale Projects are expected to be larger in scale, longer in duration and address issues of national concern. Conferences are intended to assemble experts to introduce, discuss, and/or synthesize research related to aspects of STEM education or to review and develop action plans for future research, resource development, or evaluation projects in each of the funding categories.

Type Category	Conferences		Exploratory Study		Full Scale	
	Max. Funding	Max. Length	Max. Funding	Max. Length	Max. Funding	Max. Length
A. Applied Research						
Evaluative Studies	\$100,000	24 months	\$300,000	36 months	\$3,000,000	60 months

Learning Progressions	\$100,000	24 months	Not Applicable		\$3,000,000	48 months
Teachers & Teaching	\$100,000	24 months	\$300,000	36 months	\$1,500,000	60 months
B. Resources and Tools for use with K-12 Students and Teachers						
Assessment	\$100,000	24 months	\$300,000	36 months	\$1,500,000	60 months
Instruction	\$100,000	24 months	\$300,000	36 months	\$3,000,000	60 months
C. Capacity Building						
Systems Research	\$100,000	24 months	\$300,000	36 months	\$1,500,000	60 months
Research Scholars	\$100,000	24 months	Not Applicable		\$1,312,500	60 months

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Proposals may be submitted by institutions and organizations including universities, two- and four-year colleges, state and local education agencies, school districts, professional societies, research laboratories, informal science education centers, private foundations, or other public and private organizations whether for-profit or not-for-profit.

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent(required):

Letters of Intent must be submitted via the NSF FastLane system, using the Letter of Intent module in FastLane, even if full proposals will be submitted via Grants.gov.

Required for Exploratory Projects only in all categories.

Letter of Intent Management Conditions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- SPO Submission is Not Required when submitting Letters of Intent
- Submission of multiple Letters of Intent are Not allowed

Preliminary Proposals(required): Preliminary Proposals must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

Required for Full Scale Projects only, in all categories.

Full Scale Projects falling within components A, B or C require a preliminary proposal as a prerequisite for the full proposal submission. Preliminary proposals must be submitted via FastLane no later than 5:00 p.m., local time, on the specified deadline. Preliminary proposals are not required for *Conference* proposals.

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

Cover Sheet. Complete this form with the appropriate information and make sure to check the preliminary proposal box.

Project Summary. Describe the following elements: (1) the project category and sub-category, (2) the Intellectual Merit of the proposed work and (3) the project's Broader Impacts. The latter two are fully described in Section VI of this solicitation and in the Grant Proposal Guide. As indicated in the Grant Proposal Guide, the project summary may not be more than one page in length and "should not be an abstract of the proposal but rather a self-contained description of the activity that would result if the proposal were funded. The summary should be written in the third person and include a statement of objectives and methods to be employed."

Project Description. Describe the following project elements: (1) goals, (2) rationale, (3) anticipated products, (4) work plan, (5) evaluation plan, (6) dissemination plan and (7) personnel. Preliminary proposals are limited to six pages with 2.5-cm margins on all sides. The project description should be single-spaced and use a legible, 12-point font.

Budgets. Provide an estimated budget for the total amount of money requested from NSF, with information on salaries and other expenses, including but not limited to, equipment (where allowable), participants, consultants, travel, subawards, and indirect costs. Include a budget narrative that describes and justifies each of the expenses. Preliminary proposals require cumulative budgets only. Given FastLane's present constraints, the only option available is to enter the project's cumulative budget as the Year 1 budget. FastLane automatically creates the cumulative budget, which, in the case of preliminary proposals, is identical to the Year 1 budget. Enter a one-page budget-explanation narrative in the Budget Justification section.

Biographical Sketches. Provide a brief narrative describing the key personnel expertise, relevant to the proposed work. Biographical sketches should be sufficiently detailed to show that the necessary expertise is available to conduct the project.

Supplementary Documents. Appendices and letters of support are NOT permitted for preliminary proposals.

Review of Preliminary Proposals

Carefully selected reviewers from the field and members of the NSF staff will review preliminary proposals. Ultimate submission of a formal proposal is either encouraged or discouraged based on the reviewers' perceptions of the likelihood that a proposal, as written, will be successful in the formal merit-review process. This recommendation is strictly an advisory opinion; formal proposals may be submitted regardless of the recommendation. Written reviews are intended to provide constructive feedback and suggestions that will help strengthen the final proposal. Reviews are returned as expeditiously as possible, but no later than one month prior to the full-proposal submission date.

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (<http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

The following information deviates from the Grant Proposal Guide and the NSF Grants.gov Application Guide:

Project Summary. Each proposal must have a Project Summary that includes (1) the project category and sub-category, (2) the Intellectual Merit of the proposed work and (3) the project's Broader Impacts. The latter two are fully described in Section VI of this solicitation and in the Grant Proposal Guide. The project summary may not be more than one page in length and "should not be an abstract of the proposal but rather a self-contained description of the activity that would result if the proposal were funded. The summary should be written in the third person and include a statement of objectives and methods to be employed."

Project Description. Limited to 15 pages with 2.5-cm margins on all sides, the project description narrative should be single-spaced and use a legible, 12-point font.

Competitive proposals for the DR-K12 solicitation for all funding categories must address all of the following required elements in the Project Description of the full proposal:

1. Goals (what the project wants to accomplish)
2. Rationale (why this is important)
3. Anticipated products (what will result of this effort)
4. Work plan (how the work will be conducted)
5. Evaluation (how one knows the goals were achieved)
6. Dissemination (how others will learn of this effort)
7. Personnel (who will work on this)
8. Results from prior NSF support (other related work done by the personnel)

Proposals in each category may address these elements in different ways.

Goals

All proposals must describe the major goals for the project. If appropriate, a project should indicate how it addresses one or more of the three Grand Challenges.

Applied Research and *System Research* projects must also include their research questions.

Resources and Tools for Instruction of K-12 Students and Teachers projects must state what students or teachers would know or be able to do as a result of using the materials.

Rationale

All projects need to provide evidence that they are based on clear theoretical foundations and include a clear conceptual framework as well as a thorough overview of relevant research and literature to indicate knowledge of disciplinary, pedagogical, and methodological issues. The proposal *must* describe how the research and/or development endeavor builds on, and relates to, previous and on-going efforts in the field.

Research Scholar Programs should also include a discussion of current issues in doctoral training in STEM education and explain how the proposed project will address these issues and/or contribute to improved effectiveness of STEM education graduate programs.

Anticipated Products

All projects need to describe the materials to be produced. These products will vary by project category. For example:

- *Applied Research* or *Systems Research* products can be theoretical frameworks, scholarly publications, or monographs;
- *Resources and Tools* products can be print, software, videos, CD-ROMs, or scholarly publications;
- *Research Scholars Program* products are students prepared to conduct certain types of research or carry out certain type of activities in STEM education.

Work Plan

Applied Research and System Research projects must clearly explain the research design and the methodology to be applied. Explain, in line with the conceptual framework, how the research design is likely to provide answers to the research questions. Issues related to internal validity (drawing correct conclusions about the effects of treatment) and external validity (the possibility of generalizing the research findings) of the data generated must be addressed. An explanation of how data will be collected and analyzed and the appropriateness of the methods used must be included.

Resources and Tools projects must explain how the materials/assessments will be created (or revised), reviewed, pilot-tested, field-tested, evaluated, and published. Draft materials/assessments must be pilot-tested and field-tests must inform the evaluation of the effectiveness of materials/assessments across a range of diverse student/teacher backgrounds. It is expected that results of these trials will be used to inform revisions of the materials/assessments, and that both the results of the trials and the revisions will be submitted to NSF.

Research Scholars Programs must describe the education and training activities that students will undertake during their doctoral study. These should include but are not limited to STEM graduate coursework and appropriate graduate work in education, psychology, cognitive/learning sciences, research design, and statistics. Discuss plans for activities that will enhance the professional and personal skills of the doctoral students and describe strategies for developing a community of scholars. Describe the opportunities for students to be part of instructional teams for STEM and or STEM education undergraduate and/or graduate students, and opportunities for students to be involved in research projects at the pre-dissertation stage. Also describe plans for recruitment, mentoring, and retention of a diverse group of U.S. graduate students who are highly qualified to conduct the program of research. Discuss the pathways through which new students will enter the program and the duration and level of their support with DRK-12 funds. Describe specific strategies for identifying and attracting members of underrepresented groups.

Evaluation

All projects must have an evaluation plan, including performance indicators and other specific measures that will be used by the project team to assess the project's progress and success in meeting its goals and objectives. Although each project should propose its own measures, NSF plans to conduct a program-wide evaluation of the quality and effectiveness of programs using common measures across projects.

Exploratory Projects, given their limited scope and resources, are not required to have external evaluation plans as outlined below for Full Scale Projects. However, they must have an external advisory/review panel that provides the project advice on the design, procedures and progress of the project.

The evaluation plan should address but not be limited to the following methodological considerations:

- Poses significant questions that can be addressed empirically and that are central to the project's goals and

objectives as well as contributing to understanding that meets current and expected educational demands of the nation on world-class criteria.

- Reflects clearly how current literature and the context of the project informs the evaluation methodology and goals.
- Plans for evaluation and/or research methods appropriate to the questions posed and to possibly emergent questions that arise during the course of the project with a credible rationale for selection of methods.
- Provides clear and logical arguments and evidence for conclusions drawn and addresses plausible rival interpretations of findings.
- Makes use of existing data where possible and takes into account ways of reducing the burden on people and institutions in data gathering.
- Contributes to understanding of what factors contribute to the project's success in meeting its goals and objectives and understanding of the effects of the evaluation itself.

Resources and Tools projects also have to propose an evaluation that covers all critical components of the project, including formative assessment of the development process (which may be conducted by an internal evaluator) and summative evaluation (which must be conducted by an external evaluator) that speaks to factors affecting implementation as well as data and analysis from pilot- and field-test results. The proposal must clearly describe qualifications of the evaluators. In addition, all materials must undergo independent review by qualified experts to ensure accuracy of the content, appropriateness of the pedagogy, and suitability of the contexts, language, etc., for the intended audience.

Research Scholars Programs evaluation must also include the number of students recruited by ethnicity, gender, and disability, annual surveys/interviews of students in the program, and the success rate of the students in completing their doctoral study.

Dissemination

All projects must explain how their results will be communicated to professionals and practitioners in STEM education communities both during and after the project.

Resources and Tools proposals should explain how information about the materials will be shared with professionals and practitioners in STEM education communities both during and after the project. Instructional materials typically will be published and distributed commercially, although in some instances "free" distribution (e.g., through a refereed and highly visible Web site) might be an appropriate outlet. This step typically should occur within the first two years of multi-year projects, with distribution outlets firmly established (e.g., through a contract with a publisher or distributor) by the end of the third year of the project. Projects that anticipate generation of potential sales income during the duration of the grant must specify how that income will be used to support the implementation, revision, or continued development of materials.

Personnel

All projects need to describe the expertise and experience of key personnel. The proposal must include a description of the role and commitment level of each of the key personnel. Development teams must include active participation of practicing scientists, mathematicians, and engineers; cognitive scientists; STEM educators and classroom teachers.

Research Scholars Programs need to (1) identify the faculty members involved in the project and provide evidence of their qualifications to support the work of the doctoral candidates; (2) identify the roles and responsibilities of project personnel with regard to recruitment, mentoring, and retention; and (3) provide evidence that the university or consortium of universities has the appropriate programs, faculty, and resources to attract and support well-qualified U.S. students to doctoral programs in STEM education. Evidence should indicate the strength of faculty, the major elements that make up the program of doctoral study, history of student recruitment and retention for participating departments/programs, representation of women, minorities, and persons with disabilities among the faculty and graduate students, the employers and position types of recent graduates, and other measures of student success.

Results from Prior NSF support

Describe how the results of prior NSF support for related educational projects in which senior personnel have been involved. In cases where previous projects have resulted in findings, assessments and/or materials related to the proposed work, include a summary of the past project evaluation that provides compelling evidence of the quality and effectiveness of the materials developed.

Special Information/Supplementary Documentation. If applicable, provide additional documents such as letters indicating support for the proposed project. Please note that reviewers are not required to read the supporting documents. Therefore, make certain that the project description provides sufficient information about the project that will enable reviewers to make informed judgments.

B. Budgetary Information

Cost Sharing: Cost sharing is not required by NSF in proposals submitted to the National Science Foundation.

C. Due Dates

- **Letter of Intent Due Date(s) (required):**

November 01, 2006

Exploratory Projects only, in all categories

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

November 15, 2006

Full Scale Projects only, in all categories

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

December 01, 2006

Conferences related to Components A, B, and C

March 09, 2007

Component A: Applied Research (Exploratory and Full-Scale)

March 20, 2007

Component B: Development of Resources and Tools (Exploratory and Full-Scale)

March 28, 2007

Component C: Capacity Building (Exploratory and Full-Scale)

May 08, 2007

Conferences related to Components A, B, and C

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

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

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.>

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: <http://www.grants.gov/CustomerSupport>. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program and, if they meet NSF proposal preparation requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts with the proposer.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

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

What are the broader impacts of the proposed activity?

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

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

Integration of Research and Education

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

Integrating Diversity into NSF Programs, Projects, and Activities

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

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Panel Review.

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

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

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

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

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic

Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/general_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report.

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) 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. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Michael Haney, DR-K12 Co-lead, telephone: (703) 292-5102, email: mhaney@nsf.gov
- Paola Sztajn, DR-K12 Co-lead, telephone: (703) 292-5105, email: psztajn@nsf.gov
- John Bradley, Program Director [Applied Research], telephone: (703) 292-5091, email: jbradley@nsf.gov
- David Campbell, Program Director [Resources and Tools], telephone: (703) 292-5093, email: dcampbel@nsf.gov
- Julia Clark, Program Director [Capacity Building], telephone: (703) 292-5119, email: jclark@nsf.gov
- James Dietz, Program Director [Applied Research], telephone: (703) 292-5156, email: jdietz@nsf.gov
- Janice Earle, Program Director [Applied Research], telephone: (703) 292-5097, email: jearle@nsf.gov
- Robert Gibbs, Program Director [Resources and Tools], telephone: (703) 292-5122, email: rgibbs@nsf.gov
- David Hanych, Program Director [Resources and Tools], telephone: (703) 292-5124, email: dhanych@nsf.gov
- Sharon Locke, Program Director [Capacity Building], telephone: (703) 292-7322, email: slocke@nsf.gov
- Glenn Markle, Program Director [Resources and Tools], telephone: (703) 292-5096, email: gmarkle@nsf.gov

- Joan Prival, Program Director [Resources and Tools], telephone: (703) 292-4635, email: jprival@nsf.gov
- Joseph Reed, Program Director [Capacity Building], telephone: (703) 292-5187, email: jreed@nsf.gov
- Gerhard Salinger, Program Director [Resources and Tools], telephone: (703) 292-5116, email: gsalinge@nsf.gov
- Gregg Solomon, Program Director [Applied Research], telephone: (703) 292-8333, email: gesolomo@nsf.gov
- Larry Suter, Program Director [Applied Research], telephone: (703) 292-5144, email: lsuter@nsf.gov
- Angelicque Tucker Blackmon, Program Director [Capacity Building], telephone: (703) 292-5092, email: atucker@nsf.gov
- Ron Tzur, Program Director [Applied Research], telephone: (703) 292-5110, email: rtzur@nsf.gov
- Karen Zuga, Program Director [Resources and Tools], telephone: (703) 292-5112, email: kzuga@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, MyNSF (formerly the Custom News Service) is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. MyNSF also is available on NSF's Website at <http://www.nsf.gov/mynsf/>.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to

academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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 about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

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

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

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230

- **For General Information** (NSF Information Center): (703) 292-5111

- **TDD (for the hearing-impaired):** (703) 292-5090

- **To Order Publications or Forms:**
 - Send an e-mail to: pubs@nsf.gov
 - or telephone: (703) 292-7827

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

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer 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 or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; 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," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (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 the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

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